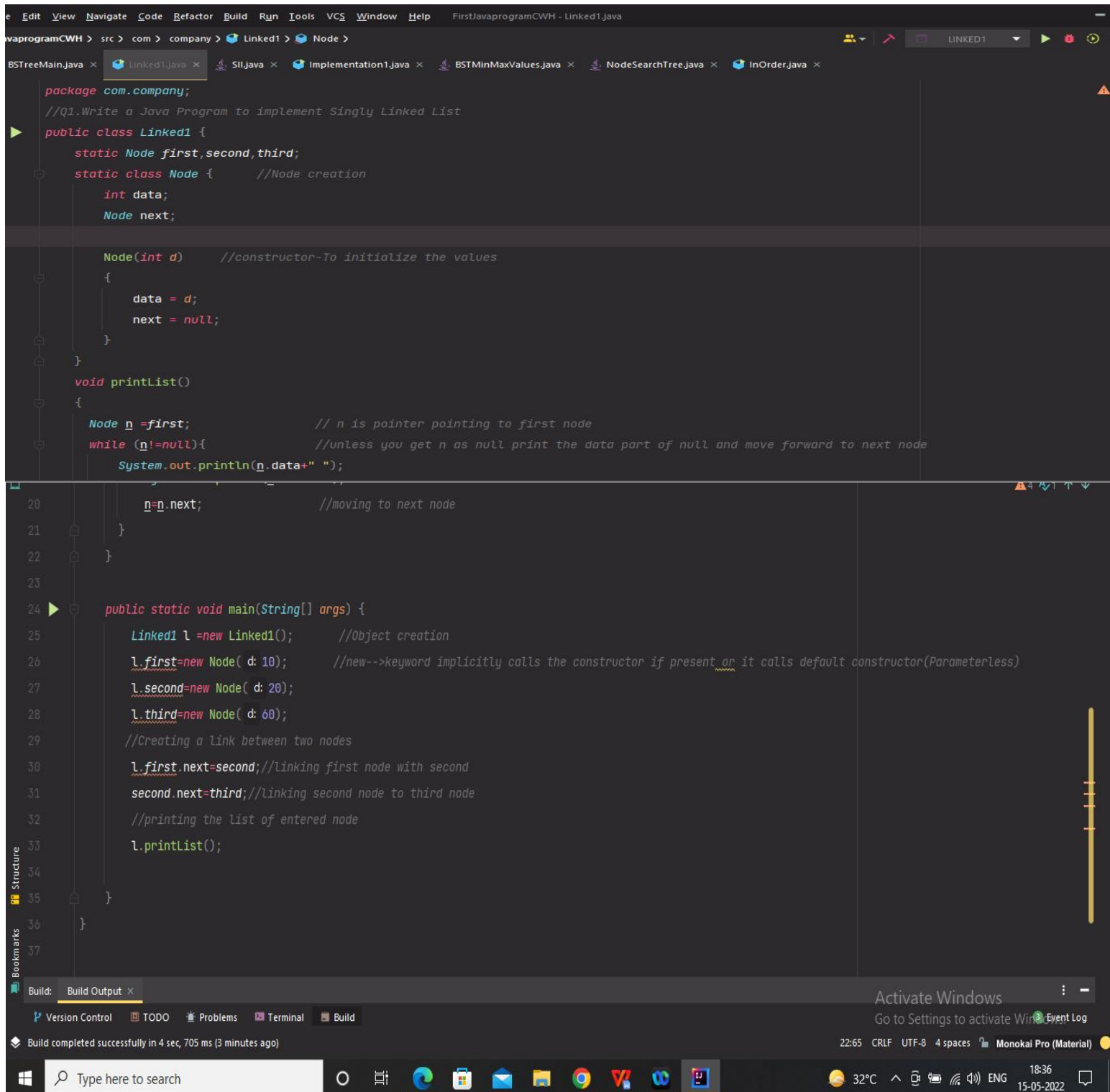


220350320059
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DS (ASSIGNMENT 1)

CODE 1



```
package com.company;
//Q1. Write a Java Program to implement Singly Linked List
public class Linked1 {
    static Node first, second, third;
    static class Node { //Node creation
        int data;
        Node next;

        Node(int d) //constructor-To initialize the values
        {
            data = d;
            next = null;
        }
    }

    void printList()
    {
        Node n = first; // n is pointer pointing to first node
        while (n != null) { //unless you get n as null print the data part of null and move forward to next node
            System.out.println(n.data + " ");

            n = n.next; //moving to next node
        }
    }

    public static void main(String[] args) {
        Linked1 l = new Linked1(); //Object creation
        l.first = new Node( d: 10); //new-->keyword implicitly calls the constructor if present or it calls default constructor(Parameterless)
        l.second = new Node( d: 20);
        l.third = new Node( d: 60);
        //Creating a link between two nodes
        l.first.next = second; //linking first node with second
        second.next = third; //linking second node to third node
        //printing the list of entered node
        l.printList();
    }
}
```

Build: Build Output x

Version Control | TODO | Problems | Terminal | Build

Build completed successfully in 4 sec, 705 ms (3 minutes ago)

Activate Windows
Go to Settings to activate Windows

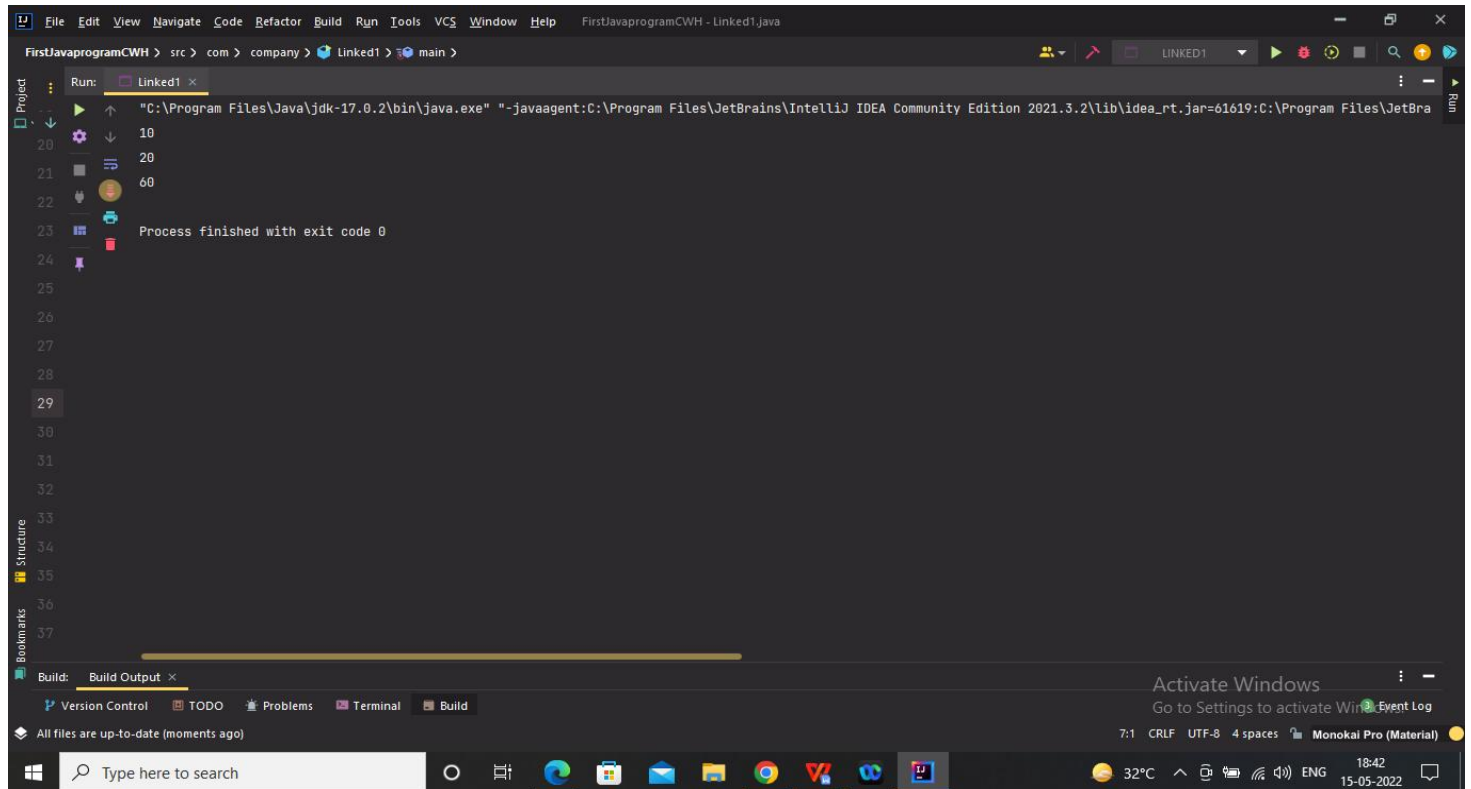
22:65 CRLF UTF-8 4 spaces Monokai Pro (Material)

Type here to search

32°C 18:36 15-05-2022

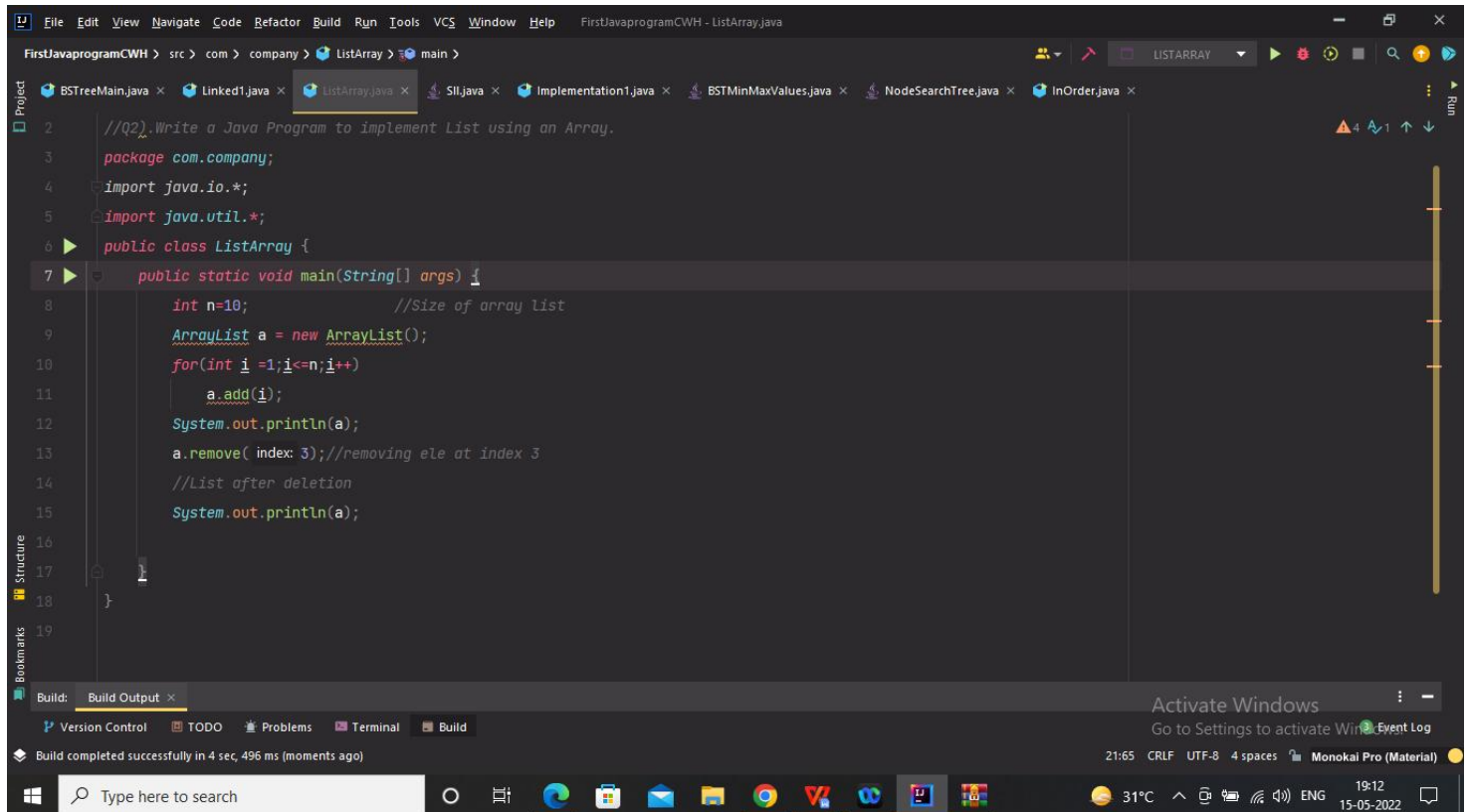
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PG-DAC MARCH 2022
DS (ASSIGNMENT 1)

OUTPUT:



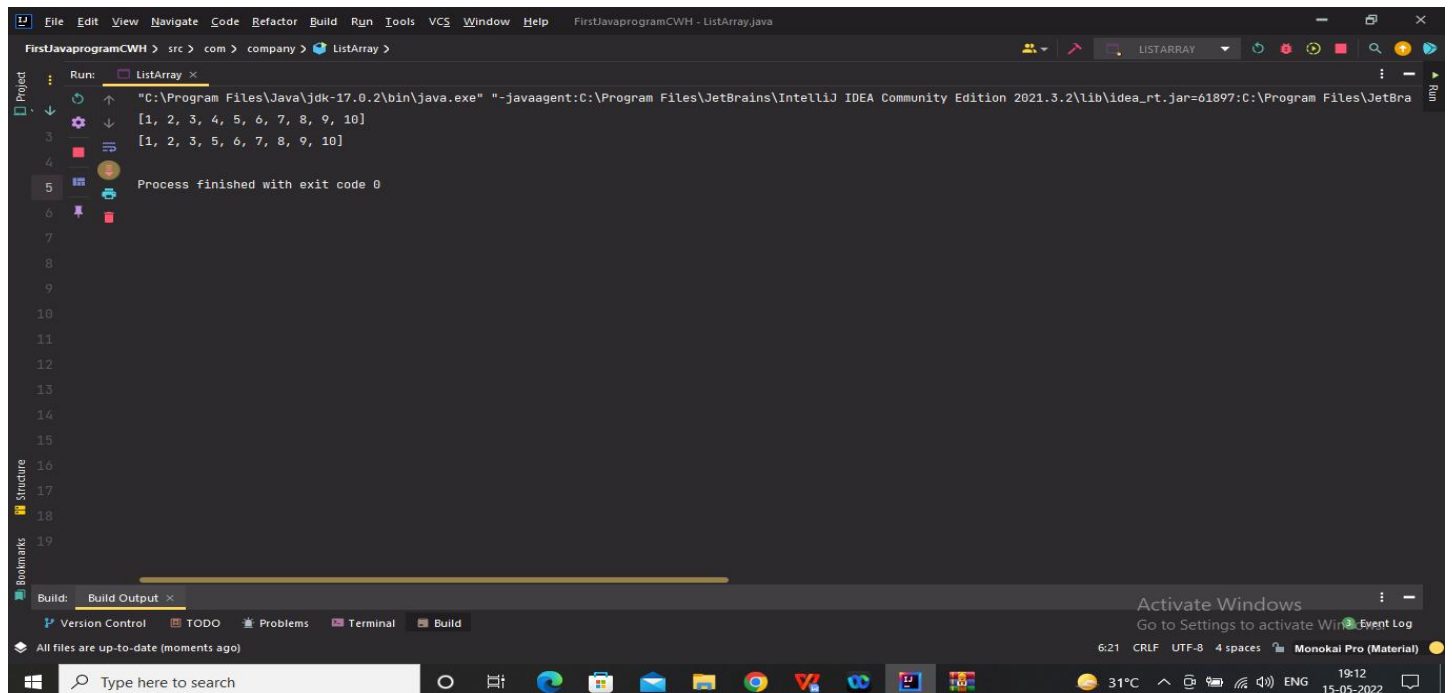
220350320059
PG-DAC MARCH 2022
DS (ASSIGNMENT 1)

CODE 2:



```
//Q2). Write a Java Program to implement List using an Array.
package com.company;
import java.io.*;
import java.util.*;
public class ListArray {
    public static void main(String[] args) {
        int n=10;           //Size of array list
        ArrayList a = new ArrayList();
        for(int i =1;i<=n;i++)
            a.add(i);
        System.out.println(a);
        a.remove(index: 3); //removing ele at index 3
        //List after deletion
        System.out.println(a);
    }
}
```

OUTPUT:



```
Run: ListArray
"C:\Program Files\Java\jdk-17.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\lib\idea_rt.jar=61897:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\bin" -Didea.config.path=C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\conf -Didea.copyright.notification=false -Didea.log=C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\log -Didea.platform.prefix=Java -Didea.vendor.id=IntelliJ -Djava.awt.headless=true -Djava.class.path=C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\bin\idea_rt.jar -Djava.library.path=C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\bin -Djava.io.tmpdir=C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\bin\temp -Djava.awt.graphicsconfig=AWT_2D
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
[1, 2, 3, 5, 6, 7, 8, 9, 10]
Process finished with exit code 0
```

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DS (ASSIGNMENT 1)

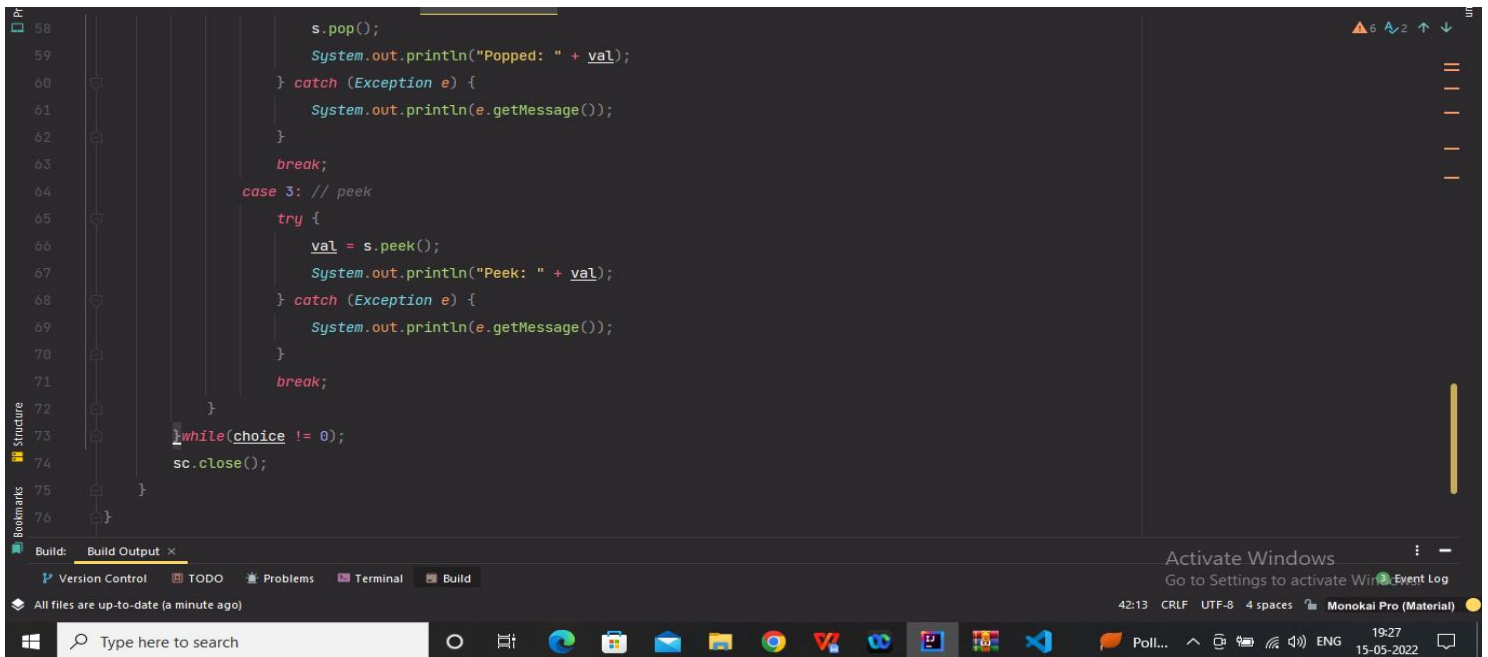
CODE 3

```
File Edit View Navigate Code Refactor Build Run Tools VCS Window Help FirstJavaprogramCWH - StackMain.java
FirstJavaprogramCWH > src > com > company > StackMain.java > StackMain > main >
BSTreeMain.java x Linked1.java x ListArray.java x StackMain.java x Sll.java x Implementation1.java x BSTMinMaxValues.java x NodeSearchTree.java x InOrder.java x
1 //Q3]Write a Java Program to implement Stack operations such as push, pop and Display using Array.
2 package com.company;
3 import java.util.Scanner;
4
5 class Stackk {
6     private int[] arr;
7     private int top;
8
9     public Stackk(int size) {
10         arr = new int[size];
11         top = -1;
12     }
13     public void push(int val) {
14         if(isFull())
15             throw new RuntimeException("Stack is Full.");
16         top++;
17         arr[top] = val;
18     }
19     public void pop() {
```

```
20         if(isEmpty())
21             throw new RuntimeException("Stack is Empty.");
22         top--;
23     }
24     public int peek() {
25         if(isEmpty())
26             throw new RuntimeException("Stack is Empty.");
27         return arr[top];
28     }
29     public boolean isEmpty() {
30         return top == -1;
31     }
32     public boolean isFull() {
33         return top == arr.length-1;
34     }
35 }
36
37 public class StackMain {
38     public static void main(String[] args) {
```

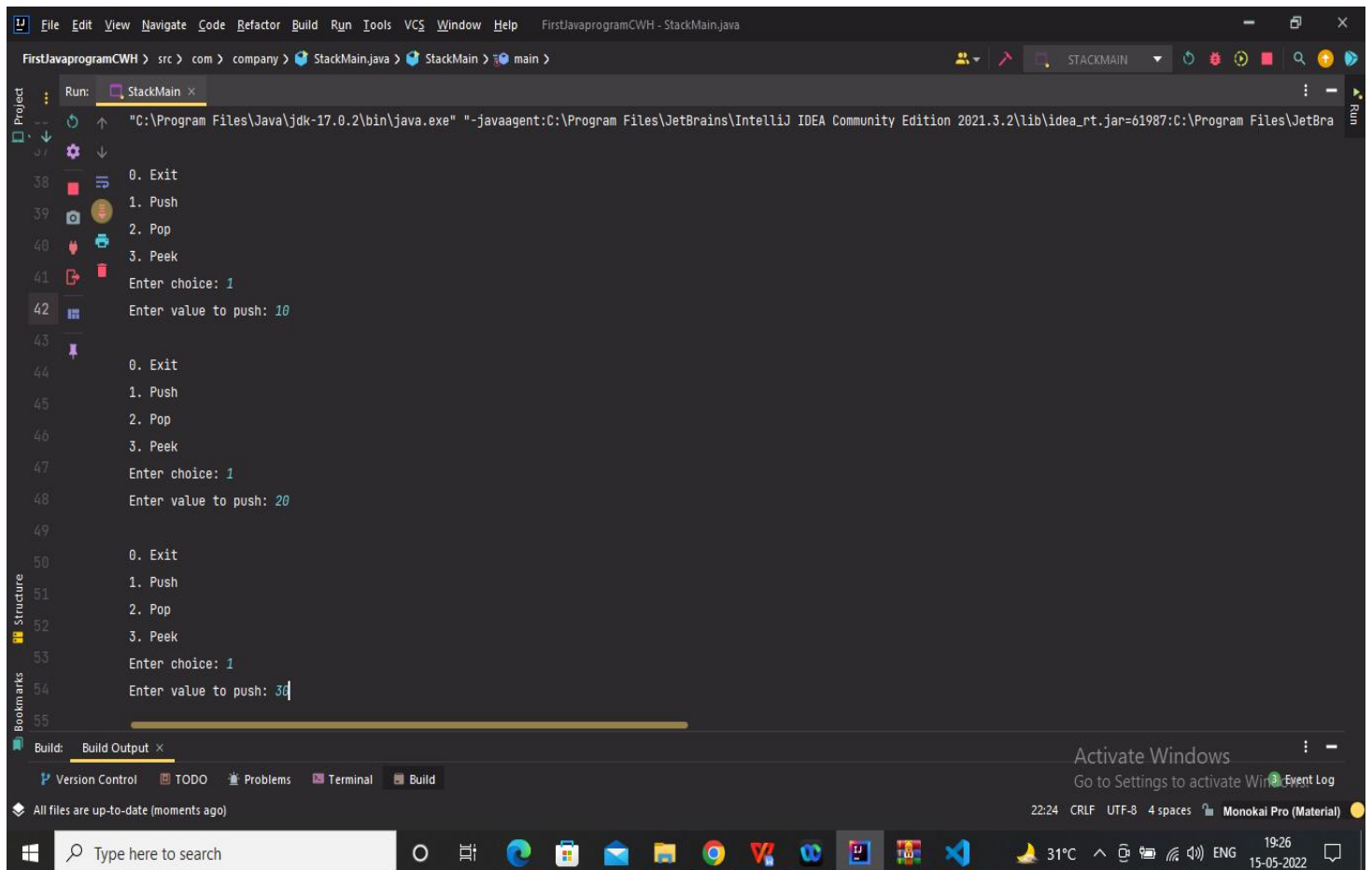
```
39         Scanner sc = new Scanner(System.in);
40         Stack s = new Stack( stackSize: 0);
41         int choice, val;
42         do {
43             System.out.print("\n0. Exit\n1. Push\n2. Pop\n3. Peek\nEnter choice: ");
44             choice = sc.nextInt();
45             switch(choice) {
46                 case 1: // push
47                     try {
48                         System.out.print("Enter value to push: ");
49                         val = sc.nextInt();
50                         s.push((char) val);
51                     } catch (Exception e) {
52                         System.out.println(e.getMessage());
53                     }
54                     break;
55                 case 2: // pop
56                     try {
57                         val = s.peek();
```

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DS (ASSIGNMENT 1)



```
58         s.pop();
59         System.out.println("Popped: " + val);
60     } catch (Exception e) {
61         System.out.println(e.getMessage());
62     }
63     break;
64     case 3: // peek
65     try {
66         val = s.peek();
67         System.out.println("Peek: " + val);
68     } catch (Exception e) {
69         System.out.println(e.getMessage());
70     }
71     break;
72 }
73 while(choice != 0);
74 sc.close();
75 }
76 }
```

OUTPUT:



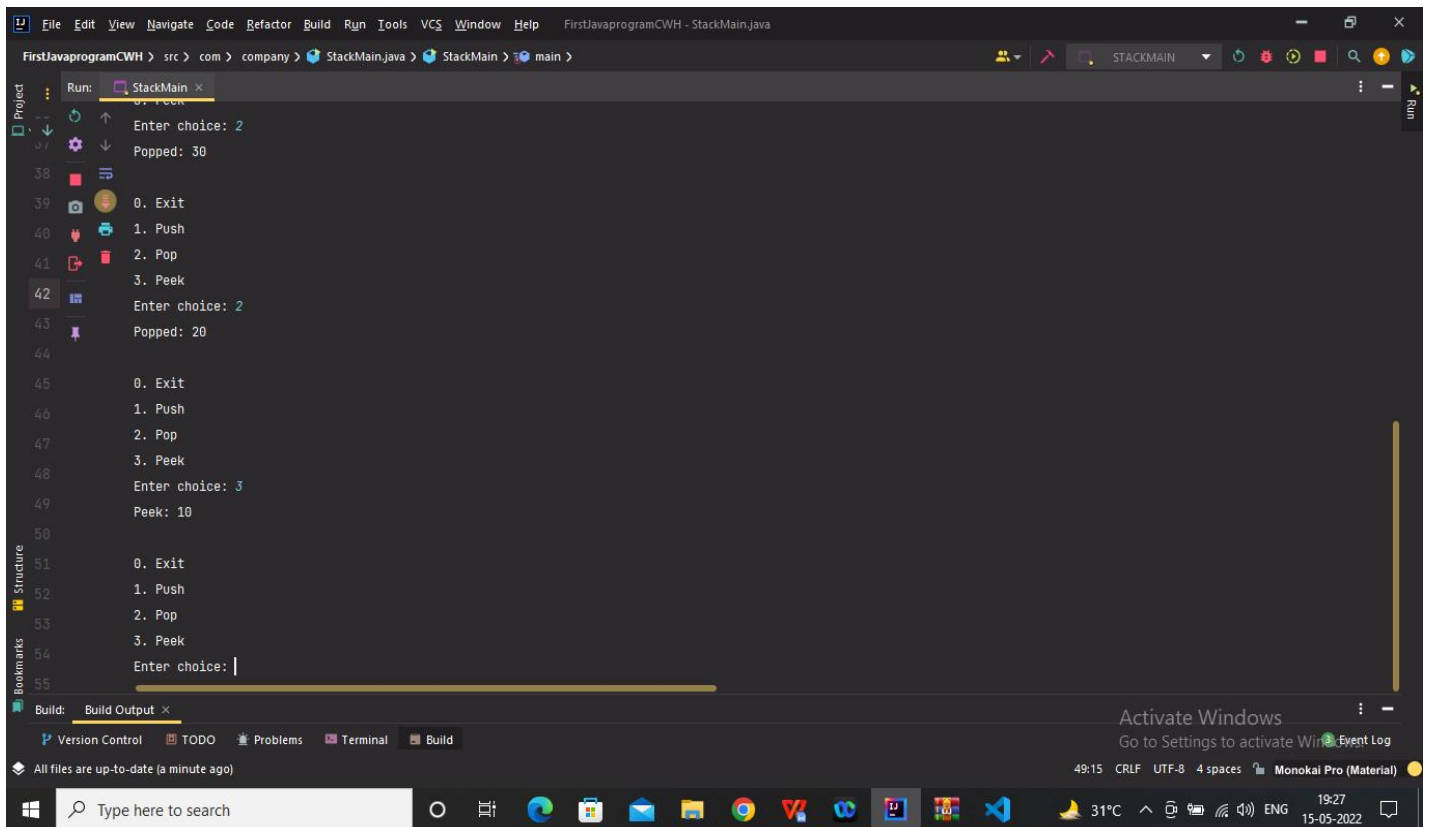
```
FirstJavaprogramCWH > src > com > company > StackMain.java > StackMain > main >
Run: StackMain x
"C:\Program Files\Java\jdk-17.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\lib\idea_rt.jar=61987:C:\Program Files\JetBra
38 0. Exit
39 1. Push
40 2. Pop
41 3. Peek
42 Enter choice: 1
43 Enter value to push: 10
44
45 0. Exit
46 1. Push
47 2. Pop
48 3. Peek
49 Enter choice: 1
50 Enter value to push: 20
51
52 0. Exit
53 1. Push
54 2. Pop
55 3. Peek
56 Enter choice: 1
57 Enter value to push: 30
```

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DS (ASSIGNMENT 1)

```
File Edit View Navigate Code Refactor Build Run Tools VCS Window Help FirstJavaprogramCWH - StackMain.java
FirstJavaprogramCWH > src > com > company > StackMain.java > StackMain > main >
Run: StackMain x
Enter choice: 1
Enter value to push: 20
38
39 0. Exit
40 1. Push
41 2. Pop
42 3. Peek
43 Enter choice: 1
44 Enter value to push: 30
45
46 0. Exit
47 1. Push
48 2. Pop
49 3. Peek
50 Enter choice: 2
51 Popped: 30
52
53 0. Exit
54 1. Push
55 2. Pop
56 3. Peek
57 Enter choice:
Build: Build Output x
Version Control TODO Problems Terminal Build
All files are up-to-date (moments ago)
Activate Windows
Go to Settings to activate Windows. Event Log
35:15 CRLF UTF-8 4 spaces Monokai Pro (Material)
Type here to search 31°C 19:27 15-05-2022
```

```
File Edit View Navigate Code Refactor Build Run Tools VCS Window Help FirstJavaprogramCWH - StackMain.java
FirstJavaprogramCWH > src > com > company > StackMain.java > StackMain > main >
Run: StackMain x
Enter choice: 1
Enter value to push: 30
38
39 0. Exit
40 1. Push
41 2. Pop
42 3. Peek
43 Enter choice: 2
44 Popped: 30
45
46 0. Exit
47 1. Push
48 2. Pop
49 3. Peek
50 Enter choice: 2
51 Popped: 20
52
53 0. Exit
54 1. Push
55 2. Pop
56 3. Peek
57 Enter choice:
Build: Build Output x
Version Control TODO Problems Terminal Build
All files are up-to-date (a minute ago)
Activate Windows
Go to Settings to activate Windows. Event Log
42:15 CRLF UTF-8 4 spaces Monokai Pro (Material)
Type here to search 31°C 19:27 15-05-2022
```

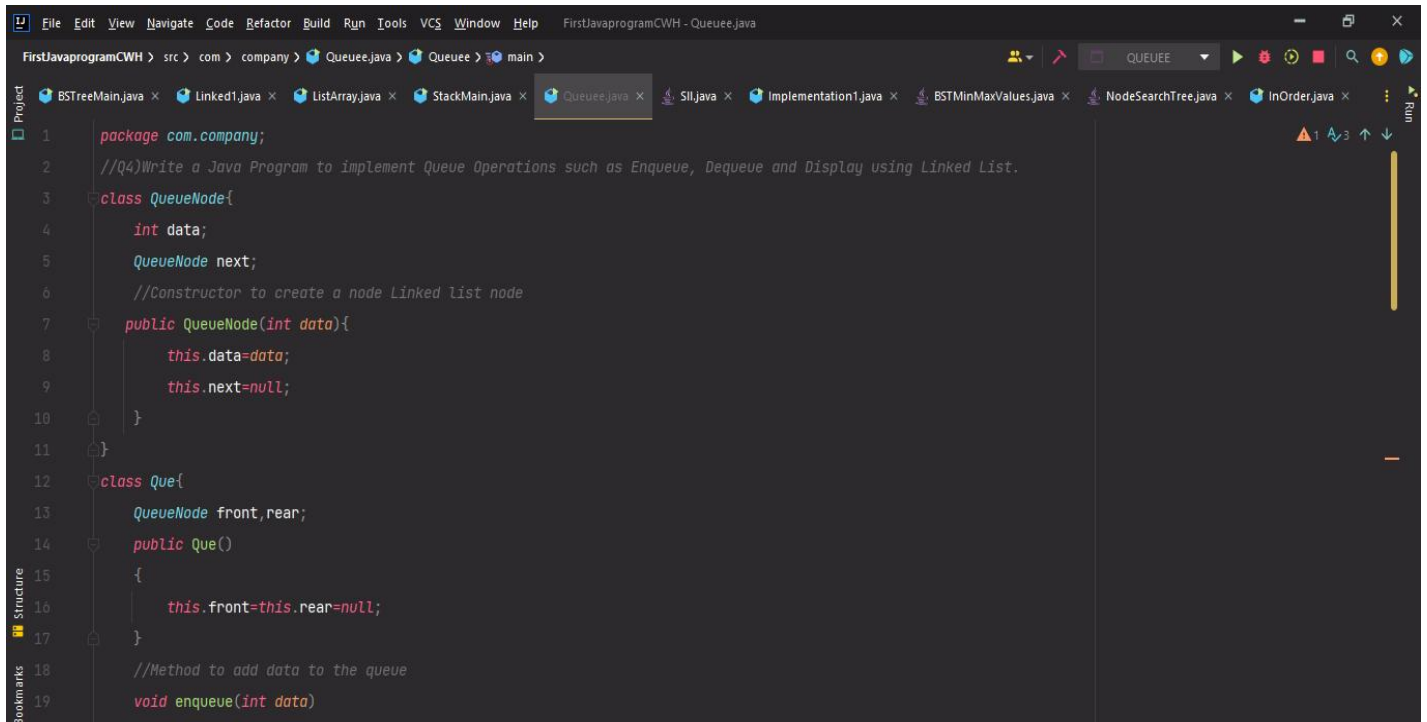

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DS (ASSIGNMENT 1)



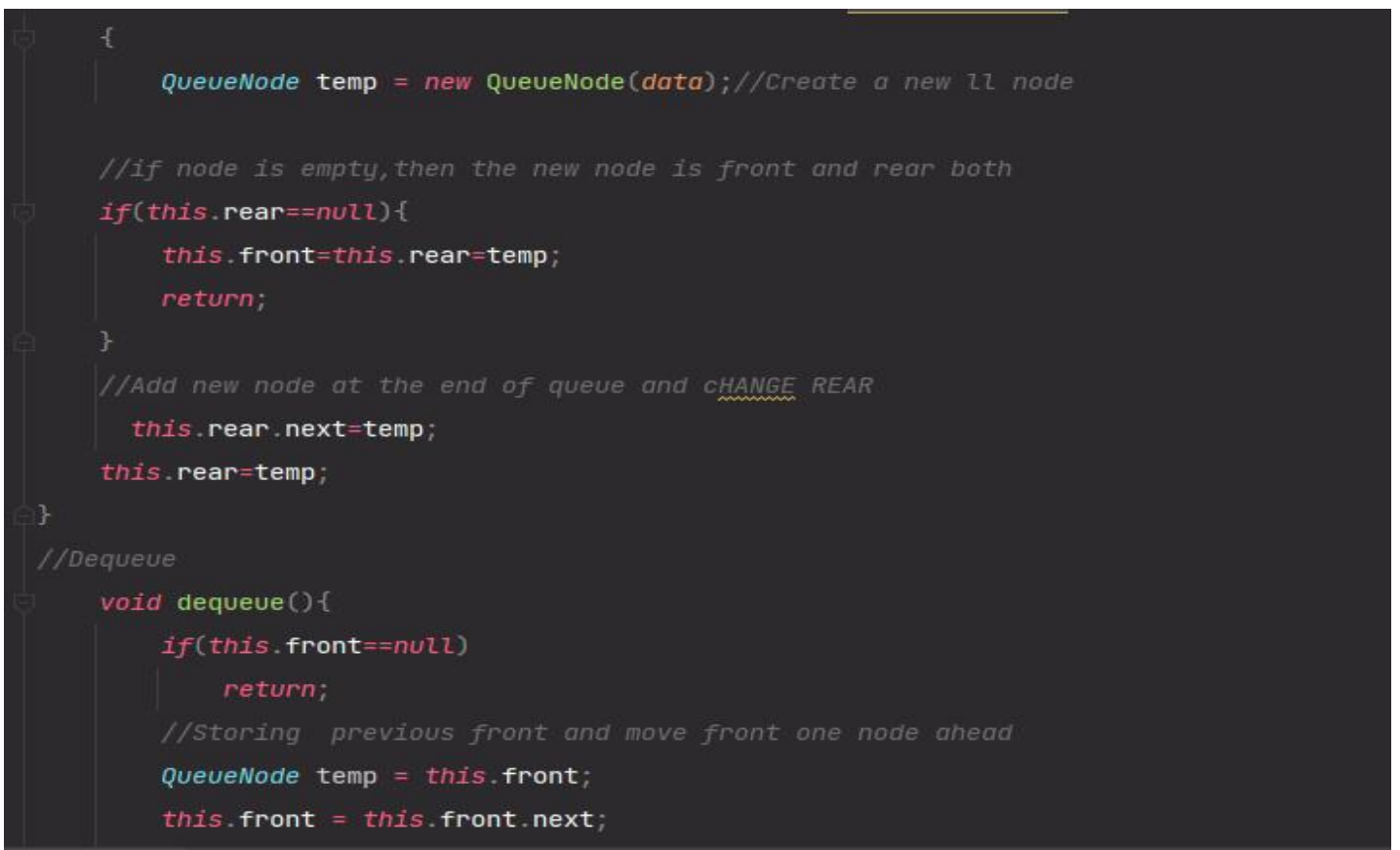
```
File Edit View Navigate Code Refactor Build Run Tools VCS Window Help FirstJavaProgramCWH - StackMain.java
FirstJavaProgramCWH > src > com > company > StackMain.java > StackMain > main >
Run: StackMain x
37 Peek
Enter choice: 2
Popped: 30
38
39 0. Exit
40 1. Push
41 2. Pop
42 3. Peek
Enter choice: 2
43 Popped: 20
44
45 0. Exit
46 1. Push
47 2. Pop
48 3. Peek
Enter choice: 3
49 Peek: 10
50
51 0. Exit
52 1. Push
53 2. Pop
54 3. Peek
Enter choice: |
55
Build: Build Output x
Version Control TODO Problems Terminal Build
All files are up-to-date (a minute ago)
Activate Windows
Go to Settings to activate Windows.
49:15 CRLF UTF-8 4 spaces Monokai Pro (Material)
Type here to search
31°C 19:27 15-05-2022
```

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DS (ASSIGNMENT 1)

CODE 4:



```
1 package com.company;
2 //Q4)Write a Java Program to implement Queue Operations such as Enqueue, Dequeue and Display using Linked List.
3 class QueueNode{
4     int data;
5     QueueNode next;
6     //Constructor to create a node Linked list node
7     public QueueNode(int data){
8         this.data=data;
9         this.next=null;
10    }
11 }
12 class Que{
13     QueueNode front,rear;
14     public Que()
15     {
16         this.front=this.rear=null;
17     }
18     //Method to add data to the queue
19     void enqueue(int data)
```



```
{
    QueueNode temp = new QueueNode(data); //Create a new ll node

    //if node is empty, then the new node is front and rear both
    if(this.rear==null){
        this.front=this.rear=temp;
        return;
    }
    //Add new node at the end of queue and CHANGE REAR
    this.rear.next=temp;
    this.rear=temp;
}

//Dequeue
void dequeue(){
    if(this.front==null)
        return;
    //Storing previous front and move front one node ahead
    QueueNode temp = this.front;
    this.front = this.front.next;
```


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DS (ASSIGNMENT 1)

```
        this.front = this.front.next;
        //If front becomes null, then change rear also as null
        if(this.front==null)
            this.rear=null;
    }

}

//Driver class
public class Queuee {
    public static void main(String[] args) {
        Que q = new Que();
        q.enqueue( data: 20); //20
        q.enqueue( data: 60); //20 60
        q.dequeue(); //60
        q.enqueue( data: 100); //60 100
        q.enqueue( data: 120); //60 100 120
        q.dequeue(); //100 120
        q.enqueue( data: 220); //100 120 220

        System.out.println("Queue front: "+q.front.data); //100
        System.out.println("Queue rear: "+q.rear.data); //220
    }
}
```

Build Output x

ion Control TODO Problems Terminal Build

Completed successfully in 3 sec, 958 ms (a minute ago)

Activate Windows
Go to Settings to activate Windows

21:65 CRLF UTF-8 4 spaces Monokai Pro (Material)

Type here to search

31°C 20:10 15-05-2022

220350320059
PG-DAC MARCH 2022
DS (ASSIGNMENT 1)

OUTPUT:

```
Run: StackMain x Queue x
"C:\Program Files\Java\jdk-17.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\lib\idea_rt.jar=64127:C:\Program Files\JetBra
Queue front: 100
Queue rear: 220
Process finished with exit code 0
Build: Build Output x
Version Control TODO Problems Terminal Build
Build completed successfully in 3 sec, 958 ms (a minute ago)
Activate Windows
Go to Settings to activate Windows
21:65 CRLF UTF-8 4 spaces Monokai Pro (Material)
Type here to search
```

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DS (ASSIGNMENT 1)

```
package com.company;

//5)Write a Java Program to implement Binary Search Trees with Linked representation.

class BinarySearchTree {
    static class Node {
        // Node fields
        private int data;
        private Node left, right;
        // Node methods
        public Node() {
            data = 0;
            left = null;
            right = null;
        }
        public Node(int val) {
            data = val;
            left = null;
            right = null;
        }
    }

    // Tree fields
    private Node root;

    // Tree methods
    public BinarySearchTree() {
        root = null;
    }

    public void add(int val) { //50
        Node newNode = new Node(val);
        if(root == null)
            root = newNode;
        else {
            Node trav = root;
            while(true) {
                if(val < trav.data) {
                    if(trav.left != null)
                        trav = trav.left; //modification part
                    else { // no child in left

```

CODE 5:

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DS (ASSIGNMENT 1)

```
        System.out.print(trav.data + ", ");
        preorder(trav.left);
        preorder(trav.right);
    }

    public void preorder() {
        System.out.print("PRE : ");
        preorder(root);
        System.out.println();
    }

    public void inorder(Node trav) {
        if(trav == null)
            return;
        inorder(trav.left);
        System.out.print(trav.data + ", ");
        inorder(trav.right);
    }

    public void inorder() {
        System.out.print("IN : ");

        inorder(root);

        System.out.println();
    }

    public void postorder(Node trav) {
        if(trav == null)
            return;
        postorder(trav.left);
        postorder(trav.right);
        System.out.print(trav.data + ", ");
    }

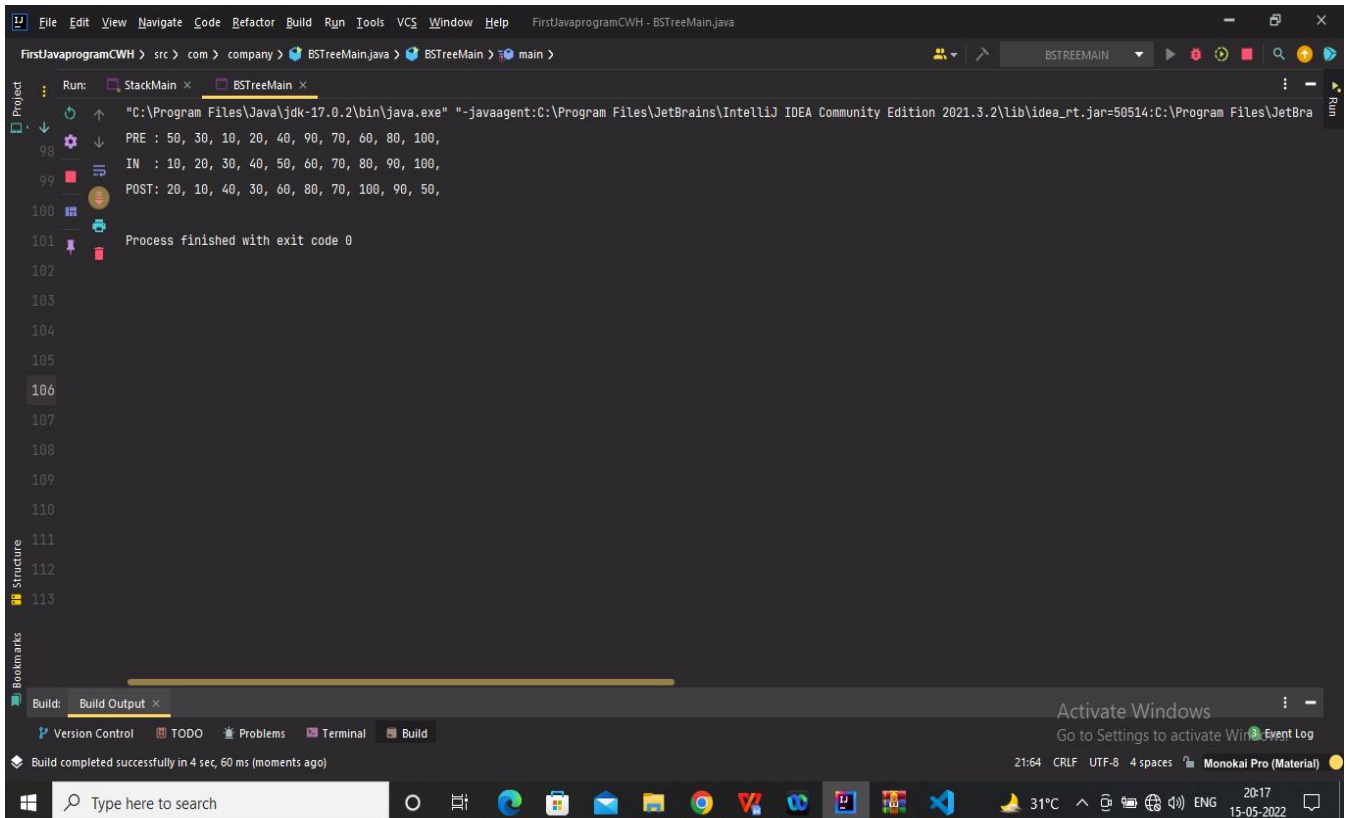
    public void postorder() {
        System.out.print("POST: ");
        postorder(root);
        System.out.println();
    }
}

public class BSTreeMain {
```

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DS (ASSIGNMENT 1)

```
public static void main(String[] args) {  
    BinarySearchTree t = new BinarySearchTree();  
    t.add(50);  
    t.add(30);  
    t.add(10);  
    t.add(90);  
    t.add(100);  
    t.add(40);  
    t.add(70);  
    t.add(80);  
    t.add(60);  
    t.add(20);  
    t.preorder();  
    t.inorder();  
    t.postorder();  
}
```

OUTPUT:



```
Run: StackMain x BSTreeMain x  
"C:\Program Files\Java\jdk-17.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.3.2\lib\idea_rt.jar=50514:C:\Program Files\JetBra  
PRE : 50, 30, 10, 20, 40, 90, 70, 60, 80, 100,  
IN : 10, 20, 30, 40, 50, 60, 70, 80, 90, 100,  
POST: 20, 10, 40, 30, 60, 80, 70, 100, 90, 50,  
Process finished with exit code 0
```