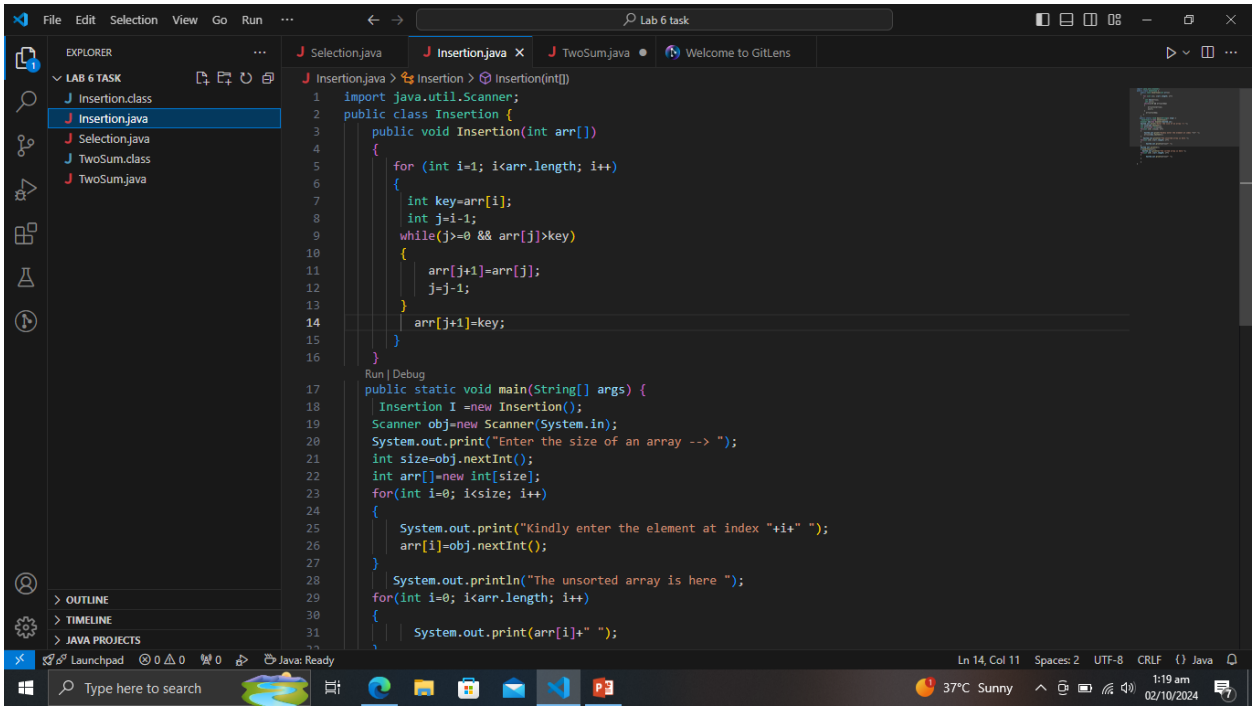
DSA LAB NO 6

ASSIGNMENT

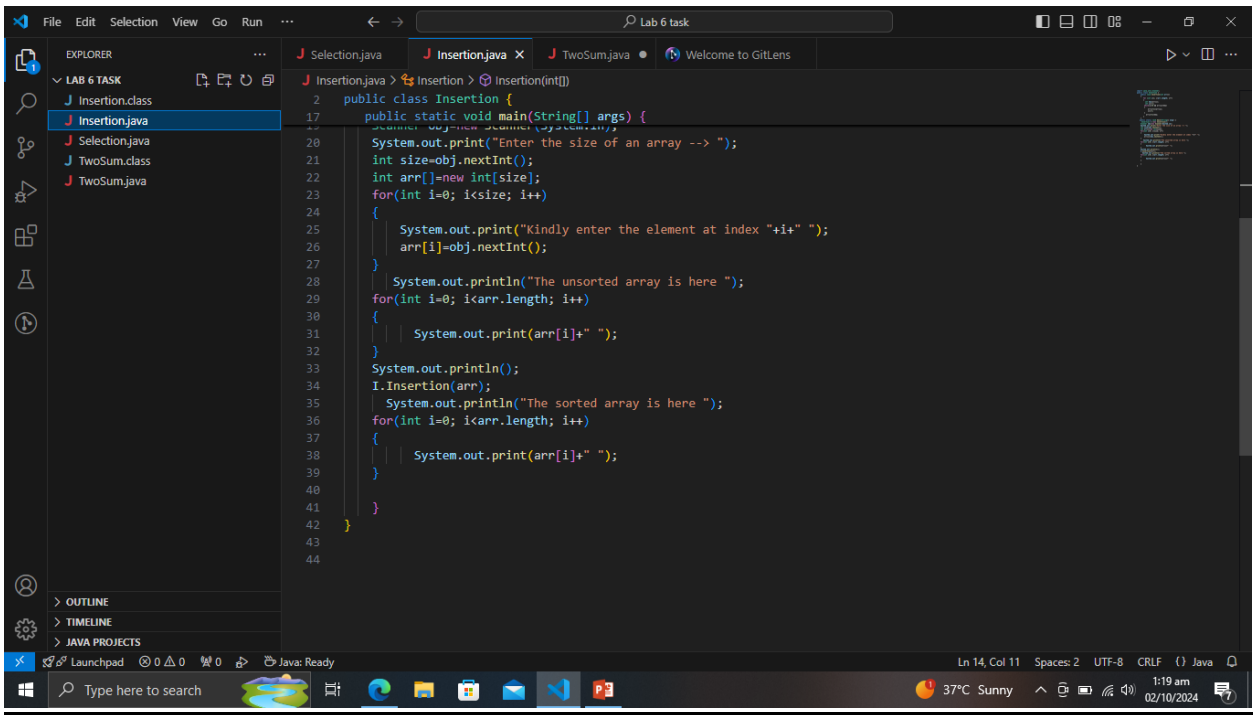
UZAIR ALI S/O YAR MUHAMMAD MEMON
BS-CS-III-SEC-A
0023-23-0350

1. Implement insertion sort.

Code

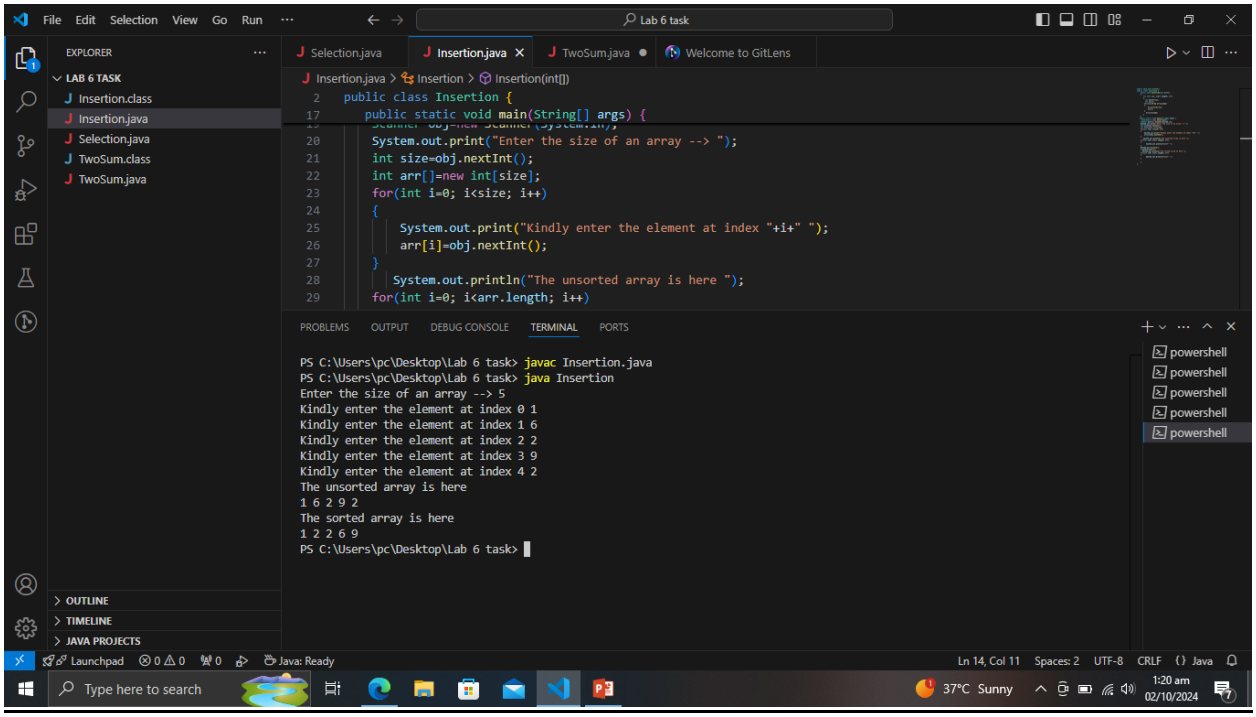


```java
import java.util.Scanner;
public class Insertion {
    public void Insertion(int arr[])
    {
        for (int i=1; i<arr.length; i++)
        {
          int key=arr[i];
          int j=i-1;
         while(j>=0 && arr[j]>key)
         {
             arr[j+1]=arr[j];
             j=j-1;
         }
          arr[j+1]=key;
        }
    }
    Run | Debug
    public static void main(String[] args) {
      Insertion I =new Insertion();
     Scanner obj=new Scanner(System.in);
     System.out.print("Enter the size of an array --> ");
     int size=obj.nextInt();
     int arr[]=new int[size];
     for(int i=0; i<size; i++)
     {
         System.out.print("Kindly enter the element at index "+i+" ");
         arr[i]=obj.nextInt();
     }
        System.out.println("The unsorted array is here ");
     for(int i=0; i<arr.length; i++)
     {
         System.out.print(arr[i]+" ");
```



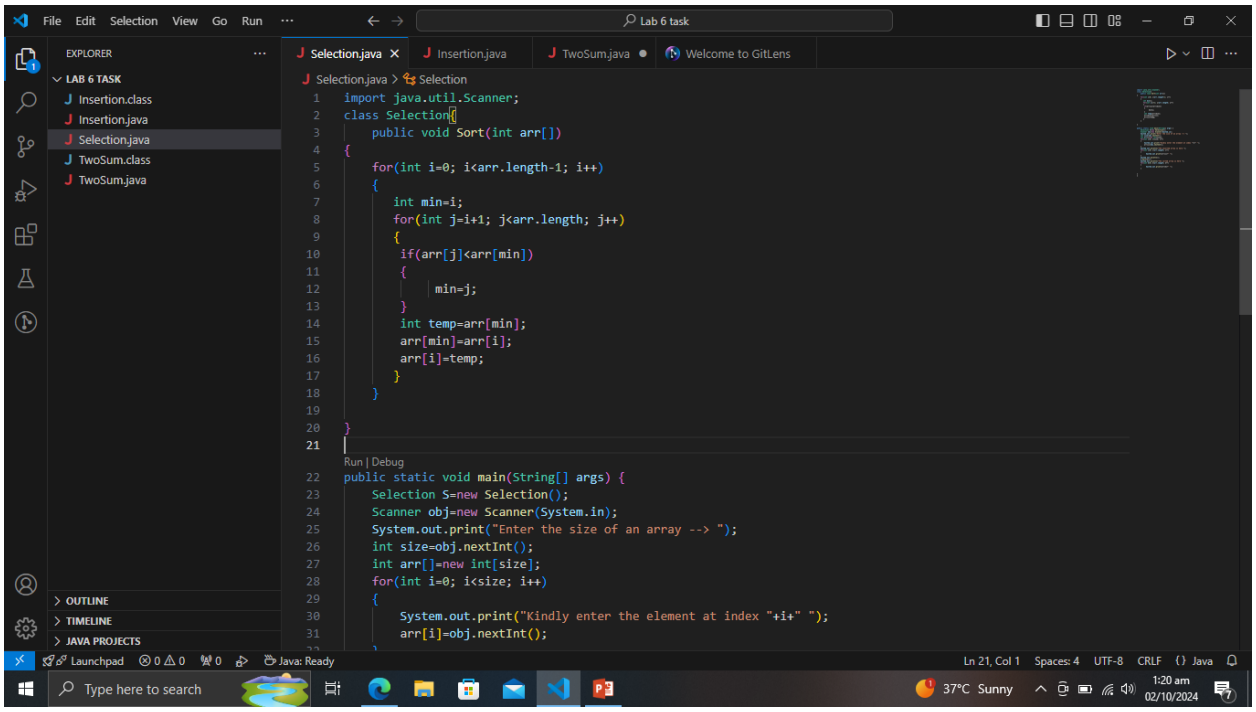
```java
public class Insertion {
    public static void main(String[] args) {
     System.out.print("Enter the size of an array --> ");
     int size=obj.nextInt();
     int arr[]=new int[size];
     for(int i=0; i<size; i++)
     {
         System.out.print("Kindly enter the element at index "+i+" ");
         arr[i]=obj.nextInt();
     }
        System.out.println("The unsorted array is here ");
     for(int i=0; i<arr.length; i++)
     {
         System.out.print(arr[i]+" ");
     }
     System.out.println();
     I.Insertion(arr);
       System.out.println("The sorted array is here ");
     for(int i=0; i<arr.length; i++)
     {
         System.out.print(arr[i]+" ");
     }

     }
 }
```

Output

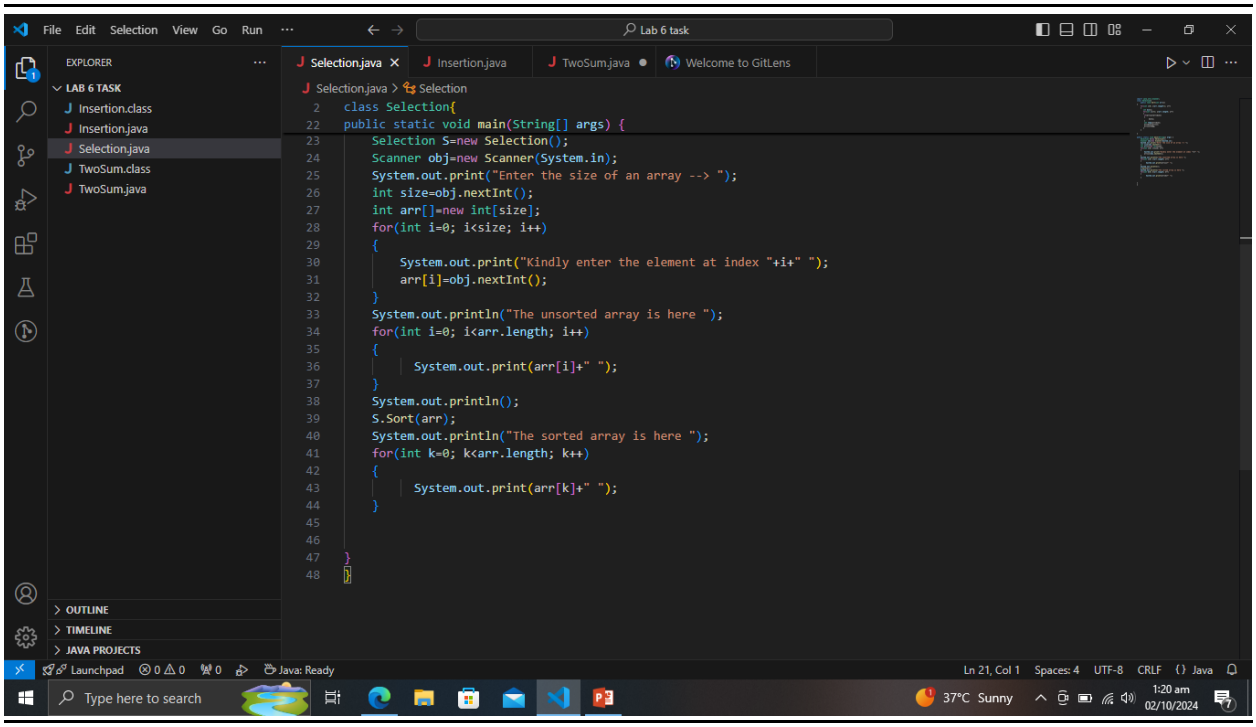

File Edit Selection View Go Run
Lab 6 task
EXPLORER
LAB 6 TASK
Insertion.class
Insertion.java
Selection.java
TwoSum.class
TwoSum.java
Selection.java
Insertion.java
TwoSum.java
Welcome to GitLens
Insertion.java > Insertion > Insertion(int[])
public class Insertion {
public static void main(String[] args) {
System.out.print("Enter the size of an array --> ");
int size=obj.nextInt();
int arr[]=new int[size];
for(int i=0; i<size; i++)
{
System.out.print("Kindly enter the element at index "+i+" ");
arr[i]=obj.nextInt();
}
System.out.println("The unsorted array is here ");
for(int i=0; i<arr.length; i++)
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\pc\Desktop\Lab 6 task> javac Insertion.java
PS C:\Users\pc\Desktop\Lab 6 task> java Insertion
Enter the size of an array --> 5
Kindly enter the element at index 0 1
Kindly enter the element at index 1 6
Kindly enter the element at index 2 2
Kindly enter the element at index 3 9
Kindly enter the element at index 4 2
The unsorted array is here
1 6 2 9 2
The sorted array is here
1 2 2 6 9
PS C:\Users\pc\Desktop\Lab 6 task>
powershell
powershell
powershell
powershell
powershell
OUTLINE
TIMELINE
JAVA PROJECTS
Launchpad
Java: Ready
Ln 14, Col 11
Spaces: 2
UTF-8
CRLF
Java
Type here to search
37°C Sunny
1:20 am
02/10/2024

1. Implement Selection Sort.

Code

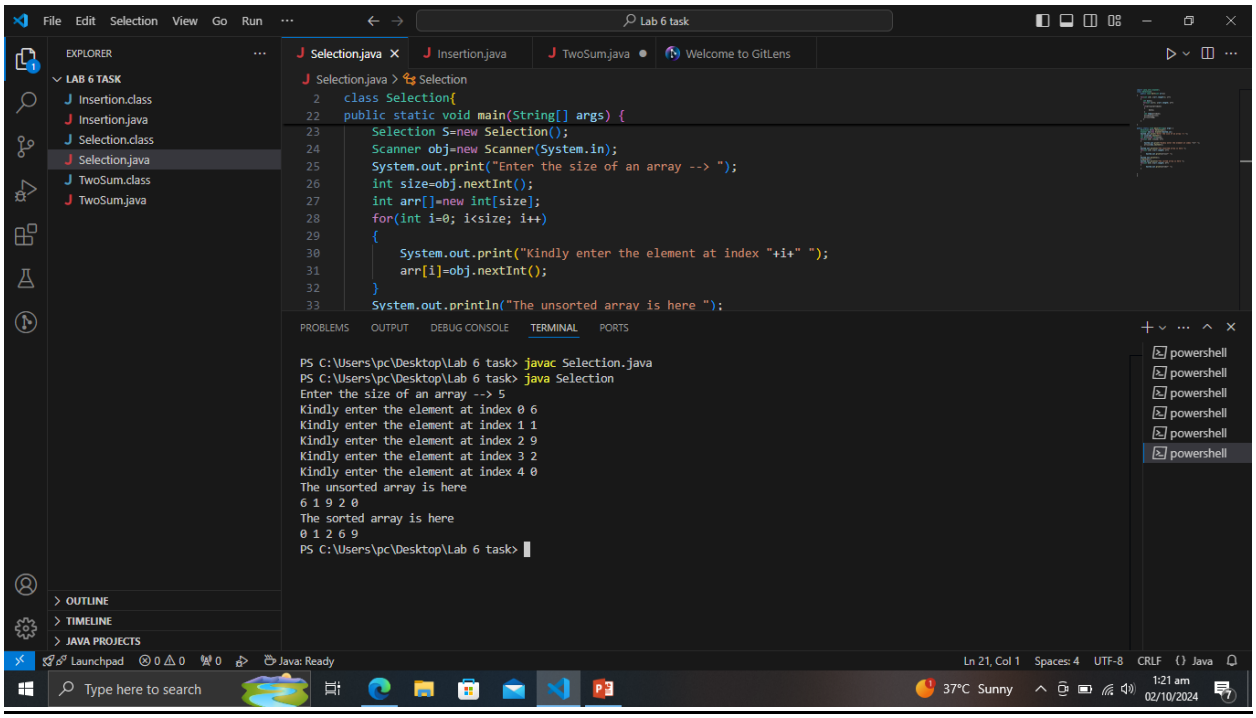


```java
import java.util.Scanner;
class Selection{
    public void Sort(int arr[])
{
    for(int i=0; i<arr.length-1; i++)
    {
       int min=i;
       for(int j=i+1; j<arr.length; j++)
       {
        if(arr[j]<arr[min])
        {
            min=j;
        }
        int temp=arr[min];
        arr[min]=arr[i];
        arr[i]=temp;
       }
    }

}

Run | Debug
public static void main(String[] args) {
    Selection S=new Selection();
    Scanner obj=new Scanner(System.in);
    System.out.print("Enter the size of an array --> ");
    int size=obj.nextInt();
    int arr[]=new int[size];
    for(int i=0; i<size; i++)
    {
        System.out.print("Kindly enter the element at index "+i+" ");
        arr[i]=obj.nextInt();
```



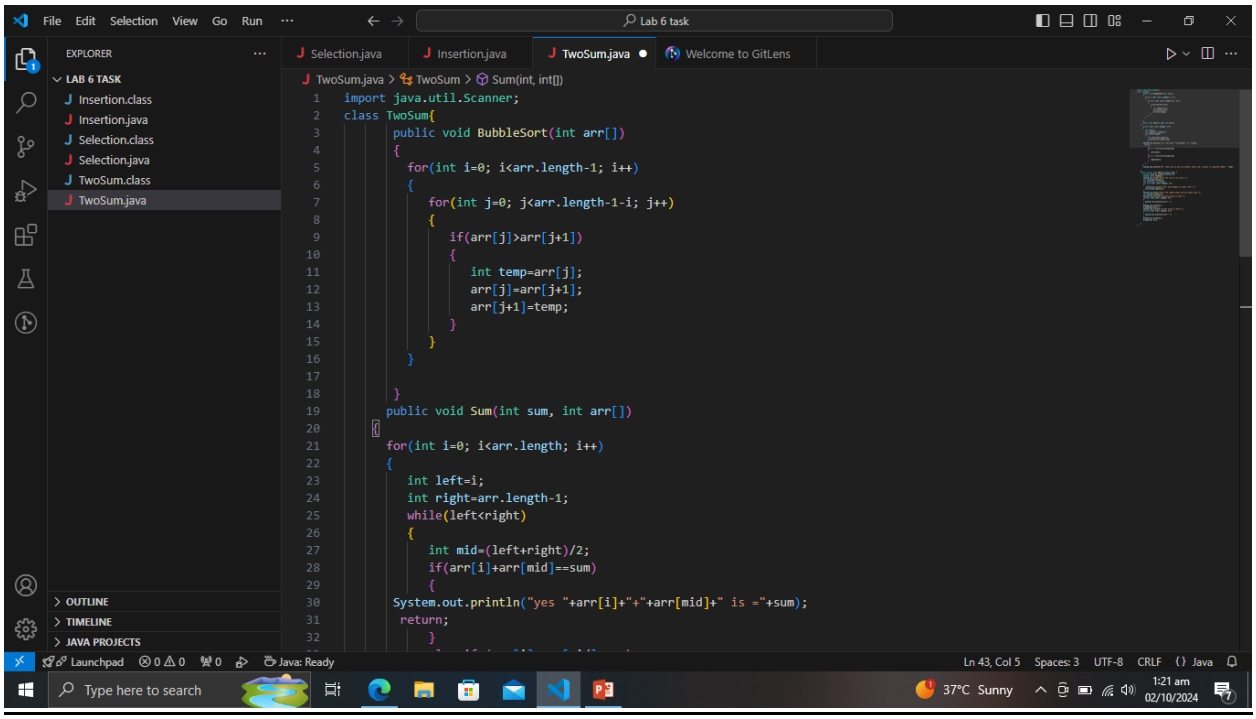
```java
class Selection{
public static void main(String[] args) {
    Selection S=new Selection();
    Scanner obj=new Scanner(System.in);
    System.out.print("Enter the size of an array --> ");
    int size=obj.nextInt();
    int arr[]=new int[size];
    for(int i=0; i<size; i++)
    {
        System.out.print("Kindly enter the element at index "+i+" ");
        arr[i]=obj.nextInt();
    }
    System.out.println("The unsorted array is here ");
    for(int i=0; i<arr.length; i++)
    {
        System.out.print(arr[i]+" ");
    }
    System.out.println();
    S.Sort(arr);
    System.out.println("The sorted array is here ");
    for(int k=0; k<arr.length; k++)
    {
        System.out.print(arr[k]+" ");
    }


}
}
```

Output

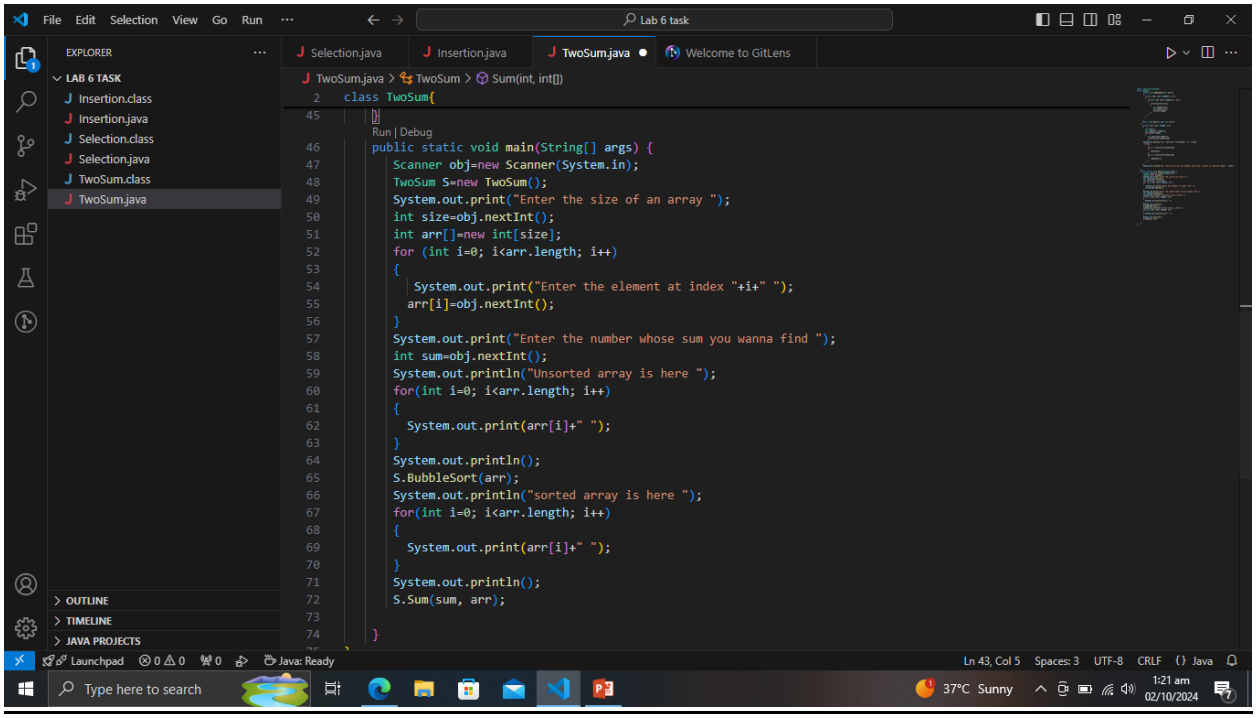


4. (Solve in NlogN): We are given an array that contains N numbers. We want to determine if there are two numbers whose sum equals a given number K. For instance, if the input is 8, 4, 1, and 6, and K is 10, then the answer is yes (4 plus 6 is 10). A number n may appear more than once in the input array; in that case and only in that case the sum may have the form n + n. Implement a function TwoSum() to solve this problem in O(N log N) time.

Code

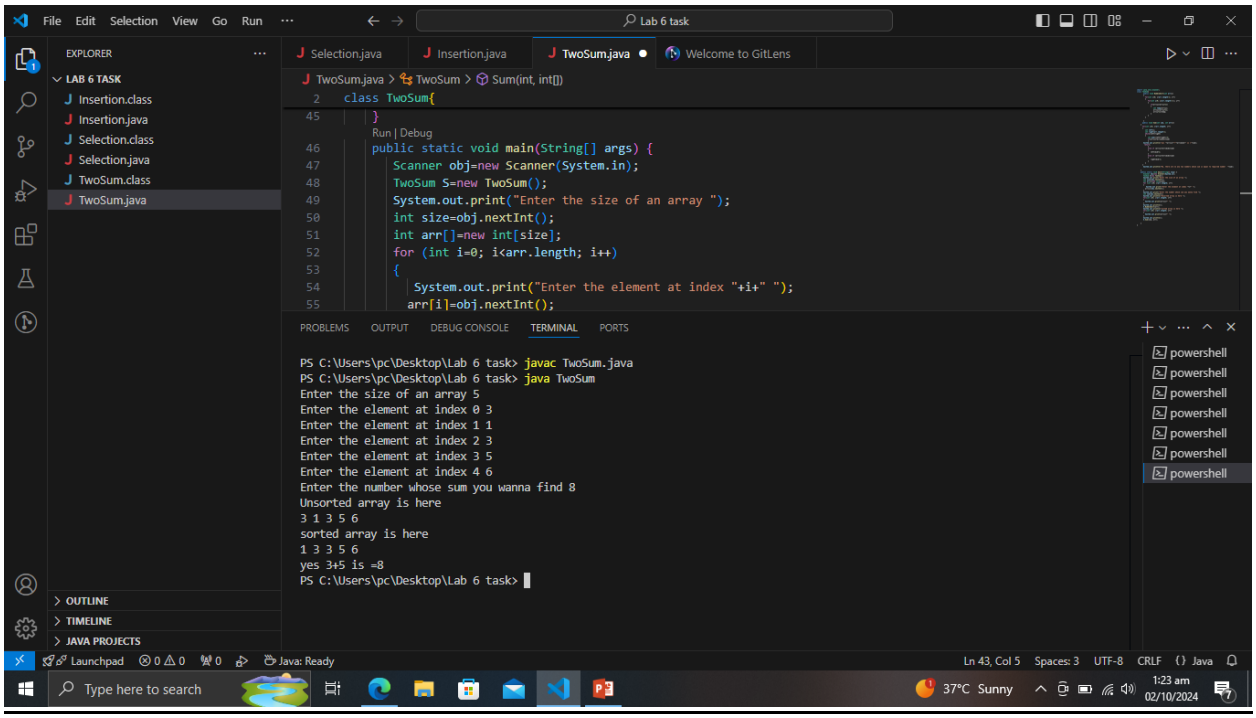


```java
import java.util.Scanner;
class TwoSum{
    public void BubbleSort(int arr[])
    {
      for(int i=0; i<arr.length-1; i++)
      {
        for(int j=0; j<arr.length-1-i; j++)
        {
          if(arr[j]>arr[j+1])
          {
            int temp=arr[j];
            arr[j]=arr[j+1];
            arr[j+1]=temp;
          }
        }
      }

    }
    public void Sum(int sum, int arr[])
    {
    for(int i=0; i<arr.length; i++)
    {
      int left=i;
      int right=arr.length-1;
      while(left<right)
      {
        int mid=(left+right)/2;
        if(arr[i]+arr[mid]==sum)
        {
    System.out.println("yes "+arr[i]+"+"+arr[mid]+" is ="+sum);
     return;
        }
```



```java
class TwoSum{
    }
    Run | Debug
    public static void main(String[] args) {
      Scanner obj=new Scanner(System.in);
      TwoSum S=new TwoSum();
      System.out.print("Enter the size of an array ");
      int size=obj.nextInt();
      int arr[]=new int[size];
      for (int i=0; i<arr.length; i++)
      {
        System.out.print("Enter the element at index "+i+" ");
        arr[i]=obj.nextInt();
      }
      System.out.print("Enter the number whose sum you wanna find ");
      int sum=obj.nextInt();
      System.out.println("Unsorted array is here ");
      for(int i=0; i<arr.length; i++)
      {
        System.out.print(arr[i]+" ");
      }
      System.out.println();
      S.BubbleSort(arr);
      System.out.println("sorted array is here ");
      for(int i=0; i<arr.length; i++)
      {
        System.out.print(arr[i]+" ");
      }
      System.out.println();
      S.Sum(sum, arr);

    }
```

Output.



The End