Day 4

Task1: Array Sorting and Searching

1A) Implement a function called BruteForceSort that sorts an array using the brute force approach. Use this function to sort an array created with Initialize Array.

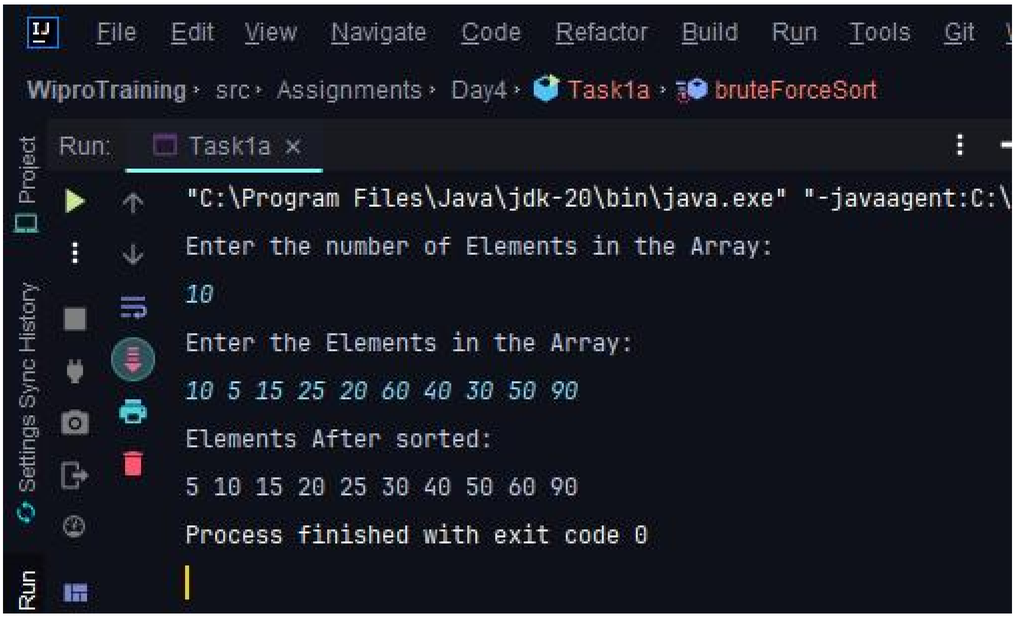
Program:

```
package Assignments.Day4;
import java.util.Scanner;

public class Task1a {
   public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      System.out.println("Enter the number of Elements in the Array: ");
      int n = scanner.nextInt();
      int [] arr = new int[n];
      System.out.println("Enter the Elements in the Array: ");
      for(int i = 0; i < n; i++){
         arr[i] = scanner.nextInt();
      }
      bruteForceSort(arr, n);
   }

   private static void bruteForceSort(int[] arr, int n) {
      for(int i = 0; i < n; i++){
         for(int j = i + 1; j < n; j++){
            if(arr[i] > arr[j]){
               int temp = arr[i];
               arr[i] = arr[j];
               arr[j] = temp;
            }
         }
      }
      System.out.println("Elements After sorted: ");
      for (int i = 0; i < n; i++) {
         System.out.print(arr[i] + " ");
      }
   }
}
```

Output:


File Edit View Navigate Code Refactor Build Run Tools Git
WiproTraining › src › Assignments › Day4 › Task1a › bruteForceSort
Run: Task1a
Project
Settings Sync History
Run

```
"C:\Program Files\Java\jdk-20\bin\java.exe" "-javaagent:C:\
Enter the number of Elements in the Array:
10
Enter the Elements in the Array:
10 5 15 25 20 60 40 30 50 90
Elements After sorted:
5 10 15 20 25 30 40 50 60 90
Process finished with exit code 0
```

1B) Write a function named PerformLinearSearch that searches for a specific element in an array and returns the index of the element if found or -1 if not found.

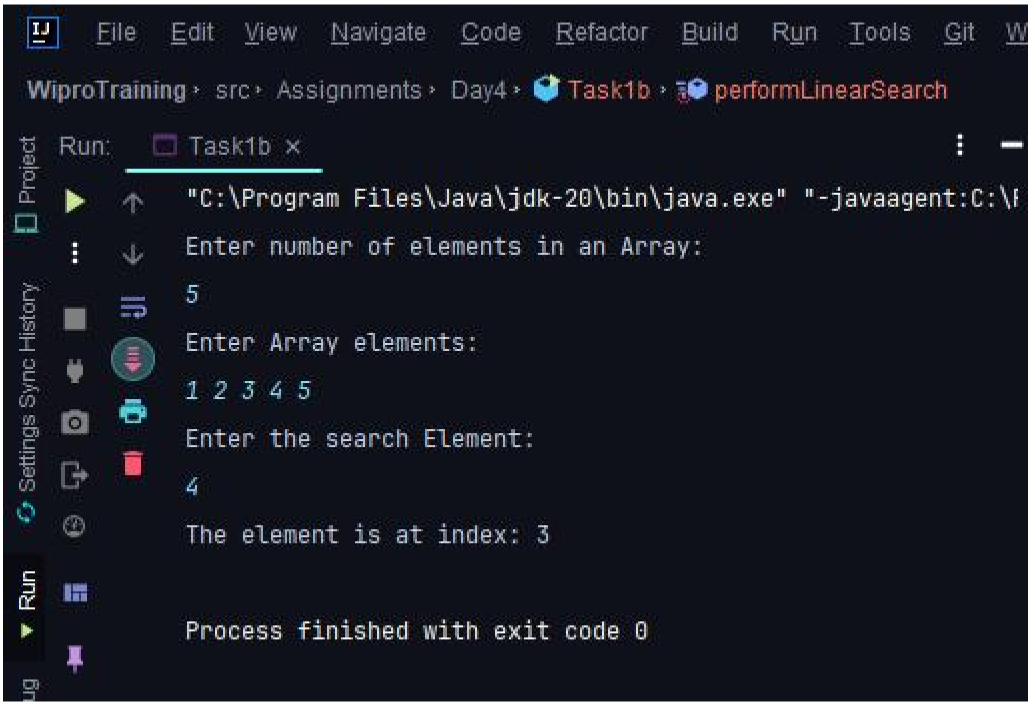
Program:

```
package Assignments.Day4;
import java.util.Scanner;

public class Task1b {
   public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      System.out.println("Enter number of elements in an Array: ");
      int n = scanner.nextInt();
      int [] arr = new int[n];
      System.out.println("Enter Array elements: ");
      for (int i = 0; i < n; i++) {
         arr[i] = scanner.nextInt();
      }
      System.out.println("Enter the search Element: ");
      int searchElement =  scanner.nextInt();

      System.out.println("The element is at index: "+performLinearSearch(arr,
searchElement, n));
   }
   private static int performLinearSearch(int [] arr, int searchElement, int n){
        for (int i = 0; i < n; i++) {
            if(arr[i] == searchElement){
                return i;
            }
        }
        return -1;
    }
}
```

Output:



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WiproTraining › src › Assignments › Day4 › Task1b › performLinearSearch
Run: Task1b
Project
Settings Sync History
Run

```
"C:\Program Files\Java\jdk-20\bin\java.exe" "-javaagent:C:\P
Enter number of elements in an Array:
5
Enter Array elements:
1 2 3 4 5
Enter the search Element:
4
The element is at index: 3

Process finished with exit code 0
```

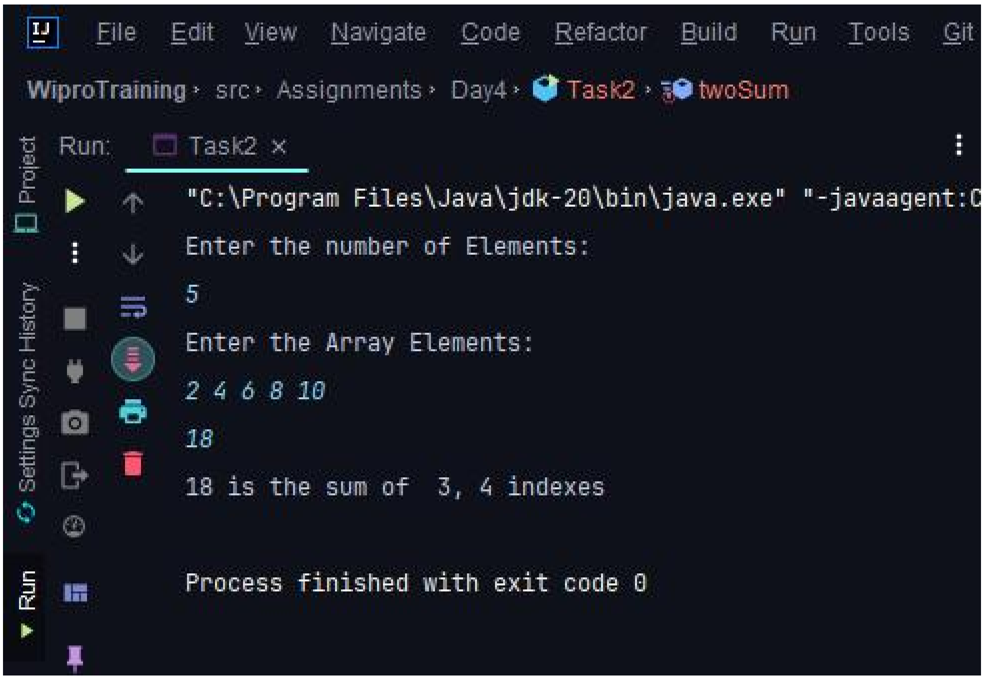
Task2: Two-Sum Problem

Given an array of integers, write a program that finds if there are two numbers that add up to a specific target. You may assume that each input would have exactly one solution, and you may not use the same element twice. Optimize the solution for time complexity.

Program:

```
package Assignments.Day4;

import java.util.HashMap;
import java.util.Scanner;

public class Task2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the number of Elements: ");
        int n = scanner.nextInt();
        int [] arr = new int[n];
        System.out.println("Enter the Array Elements: ");
        for (int i = 0; i < n; i++) {
            arr[i] = scanner.nextInt();
        }
        int target = scanner.nextInt();
        twoSum(arr, target, n);
    }
    private static void twoSum(int[] arr, int target, int n){
        HashMap<Integer,Integer> map = new HashMap<>();
        for( int i = 0; i< n; i++){
            int cur = arr[i];
            if(map.containsKey(target-cur)){
                System.out.println(target + " is the sum of  " + map.get(target-cur) +
", "+ i+ " indexes");
                break;
            }else {
                map.put(arr[i],i);
            }
        }
    }
}
```

Output:



```
"C:\Program Files\Java\jdk-20\bin\java.exe" "-javaagent:C
Enter the number of Elements:
5
Enter the Array Elements:
2 4 6 8 10
18
18 is the sum of  3, 4 indexes

Process finished with exit code 0
```

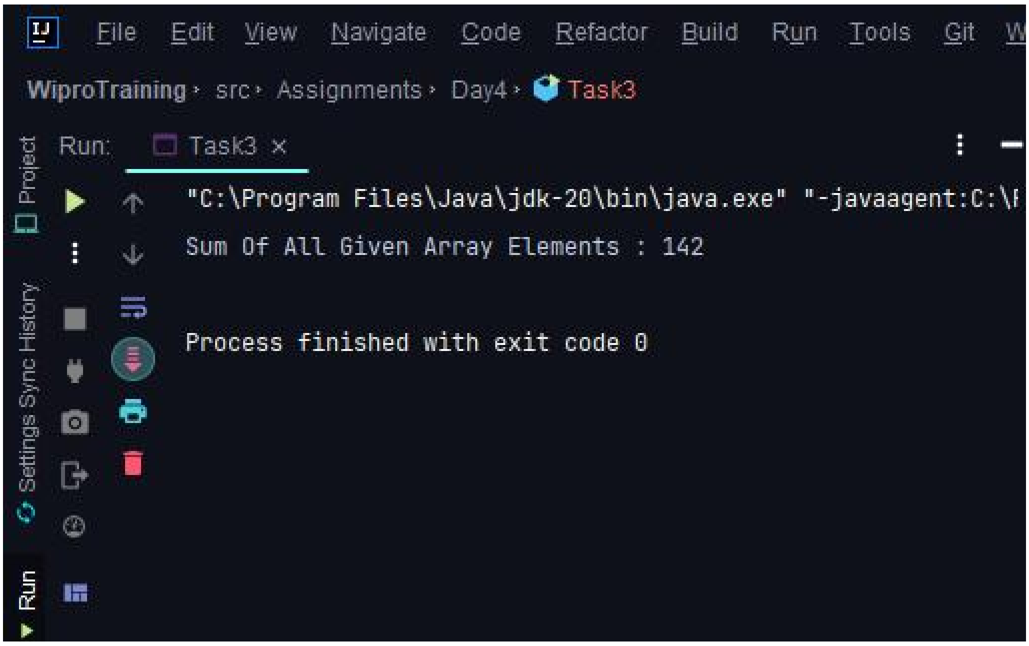
Task 3: Understanding Functions through Arrays

Write a recursive function named SumArray that calculates and returns the sum of elements in an array, demonstrate with example.

Program:

```
package Assignments.Day4;
//a) Write a recursive function named SumArray that calculates and returns the
sum of elements in an array, demonstarte with example.
public class Task3 {
   public static void main(String[] args) {
      int [] arr = {40, 30, 39, 5, 28 };
      int n = arr.length;
      System.out.println("Sum Of All Given Array Elements : "+SumArray(arr,
0, n-1));
   }
   private static int SumArray(int[] arr,int sum, int n){
      if(n == -1) return 0;          // for empty array
      if(n == 0)return sum + arr[n];   // for 1st index
      sum += arr[n];
      return SumArray(arr, sum, n-1);
   }
}
```

Output:



```
"C:\Program Files\Java\jdk-20\bin\java.exe" "-javaagent:C:\P
Sum Of All Given Array Elements : 142

Process finished with exit code 0
```

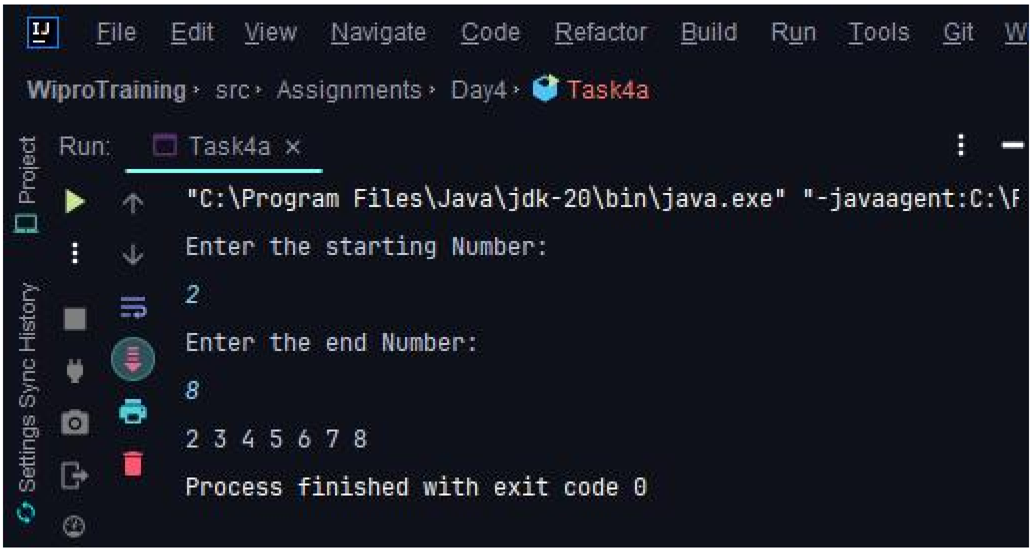
Task 4: Advanced Array Operations

4A) Implement a method Slice Array that takes an array, a starting index, and an end index, then returns a new array containing the elements from the start to the end index.

Program:

```
package Assignments.Day4;

import java.util.Scanner;

public class Task4a {

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the starting Number: ");
        int start = scanner.nextInt(); // 5
        System.out.println("Enter the end Number: ");
        int end = scanner.nextInt(); // 10
        int n = end-start;
        int [] arr = new int[n+1];
        SliceArray(arr,  start, end, n);
    }
    // 5  6 7 8 9 10
    private static void SliceArray(int[] arr, int start, int end, int n) {
        int i = 0;
        while(start <= end){
            arr[i] = start;
            start++;
            i++;
        }
        for(int j : arr){
            System.out.print(j + " ");
        }
    }
}
```

Output:



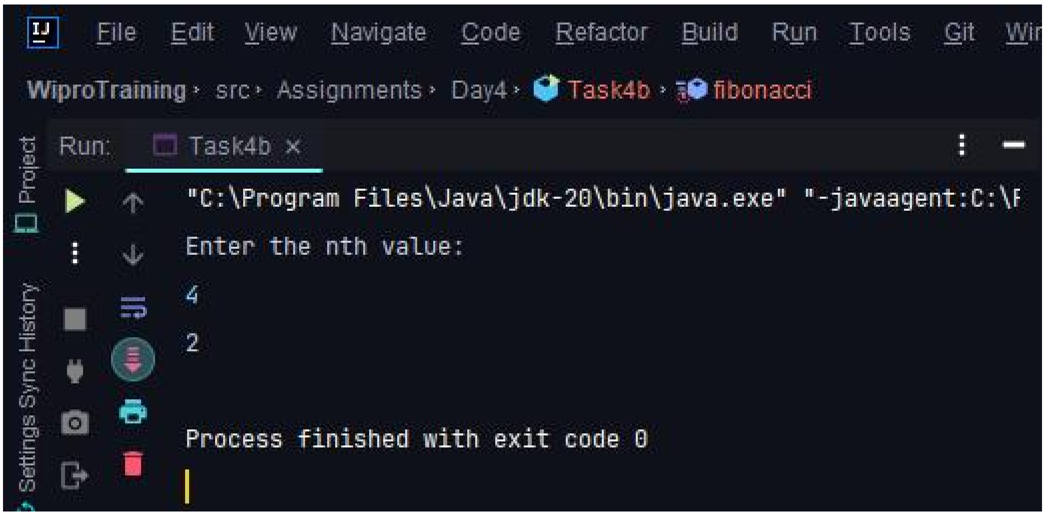
```
"C:\Program Files\Java\jdk-20\bin\java.exe" "-javaagent:C:\F
Enter the starting Number:
2
Enter the end Number:
8
2 3 4 5 6 7 8
Process finished with exit code 0
```

4B) Create a recursive function to find the nth element of a Fibonacci sequence and store the first n elements in an array.

Program:

```
package Assignments.Day4;

import java.util.Scanner;

/*
     fibonacci : 0 1 1 2 3 5 8.....
 */

public class Task4b {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the nth value: ");
        int n = scanner.nextInt();
        System.out.println(fibonacci(n, 0, 1, 1));
    }

    private static int fibonacci(int n, int a, int b, int count) {
        if(count == n) return a;
        int sum = a+b;
        a = b;
        b = sum;
        count++;
        return fibonacci(n, a,b, count);
    }
}
```

Output:



```
"C:\Program Files\Java\jdk-20\bin\java.exe" "-javaagent:C:\F
Enter the nth value:
4
2

Process finished with exit code 0
```