Experiment Number : 04 **Date:**

ARRAYS

Aim:

To understand and implement array operations in Java.

PRE LAB EXERCISE

QUESTIONS

- ✓ **What is an array?**

  An array is a collection of similar data elements stored in consecutive memory locations.

- ✓ **Why are arrays used?**

  Arrays are used to store and manage multiple values of the same type efficiently using a single name.

- ✓ **What is the difference between array and variable?**

  A variable stores one value, while an array stores multiple values of the same data type.

IN LAB EXERCISE

Objective:

To perform array operations using simple programs.

PROGRAMS:

1. Program to Read and Print Array Elements

Code:

```
import java.util.Scanner;
public class ReadPrintArray {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int[] arr = new int[5];
      System.out.println("Enter 5 elements:");
      for(int i = 0; i < 5; i++)
         arr[i] = sc.nextInt();
```

```
        System.out.println("Array elements are:");
        for(int i = 0; i < 5; i++)
            System.out.print(arr[i] + " ");
    }
}
```

OUTPUT:

Input:
10 20 30 40 50

Output:

Array elements are:

10 20 30 40 50

```
Storage/0bf54446b42aa6e1dbffa55502133ecd/redhat.java/jdt_ws/JAVA\ VS_2bcf11c9/bin array
1
2
3
4
5
1 2 3 4 5 %
```

2. Program to Find Sum of Array Elements

Code:

```
import java.util.Scanner;
public class SumArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        int sum = 0;
        System.out.println("Enter 5 elements:");
        for(int i = 0; i < 5; i++)
            arr[i] = sc.nextInt();
        for(int i = 0; i < 5; i++)
            sum += arr[i];
```

```
        System.out.println("Sum = " + sum);
    }
}
```

OUTPUT:

Input:
5 10 15 20 25

Output:

Sum = 75

3. Program to Find Largest Element in an Array

Code:

```
import java.util.Scanner;
public class LargestElement {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        System.out.println("Enter 5 elements:");
        for(int i = 0; i < 5; i++)
            arr[i] = sc.nextInt();
        int max = arr[0];
        for(int i = 1; i < 5; i++)
            if(arr[i] > max)
                max = arr[i];
        System.out.println("Largest element = " + max);
    }
```

```
}
```

OUTPUT:

Input:

12 45 23 9 30

Output:

Largest element = 45

4. Program to Reverse an Array

Code:

```
import java.util.Scanner;


public class ReverseArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        System.out.println("Enter 5 elements:");
        for(int i = 0; i < 5; i++)
            arr[i] = sc.nextInt();
        System.out.println("Reversed array:");
        for(int i = 4; i >= 0; i--)
            System.out.print(arr[i] + " ");
    }
}
```

OUTPUT:

Input:
1 2 3 4 5

Output:

Reversed array:

5 4 3 2 1

5. Program to Count Even and Odd Numbers

Code:

```
import java.util.Scanner;

public class EvenOddCount {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        int[] arr = new int[5];

        int even = 0, odd = 0;

        System.out.println("Enter 5 elements:");

        for(int i = 0; i < 5; i++)

            arr[i] = sc.nextInt();

        for(int i = 0; i < 5; i++) {

            if(arr[i] % 2 == 0)

                even++;

            else

                odd++;

        }


        System.out.println("Even = " + even);

        System.out.println("Odd = " + odd);
```

```
    }
}
```

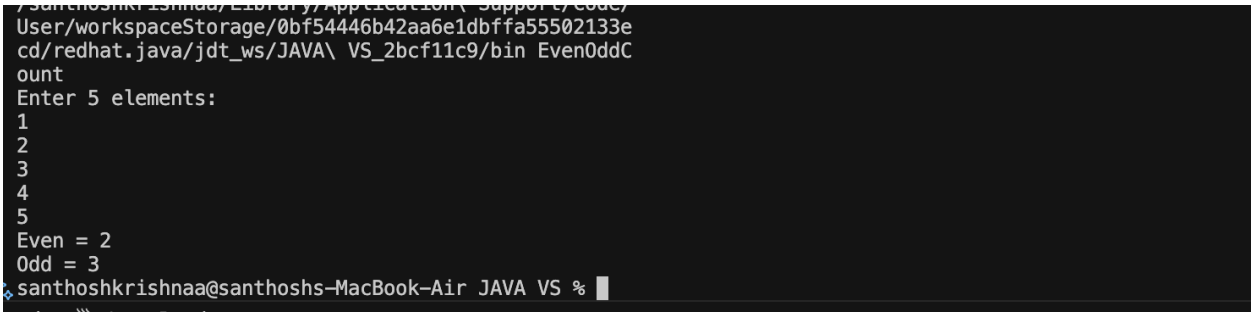
OUTPUT:

Input:
2 7 4 9 10

Output:

Even = 3

Odd = 2



6. Program to Sort Array in Ascending Order

Code:

```
import java.util.Scanner;
public class SortArray {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        int temp;
        System.out.println("Enter 5 elements:");
        for(int i = 0; i < 5; i++)
            arr[i] = sc.nextInt();
        for(int i = 0; i < 5; i++) {
            for(int j = i + 1; j < 5; j++) {
                if(arr[i] > arr[j]) {
                    temp = arr[i];
```

```
                arr[i] = arr[j];
                arr[j] = temp;
            }
        }
    }
    System.out.println("Sorted array:");
    for(int i = 0; i < 5; i++)
        System.out.print(arr[i] + " ");
  }
}
```

OUTPUT:

Input:
45 12 78 23 9

Output:

Sorted array:

9 12 23 45 78

```
User/workspaceStorage/0bf54446b42aa6e1dbffa55502133e
cd/redhat.java/jdt_ws/JAVA\ VS_2bcf11c9/bin SortArra
y
Enter 5 elements:
1
5
4
2
3
Sorted array:
1 2 3 4 5 %
santhoshkrishnaa@santhoshs-MacBook-Air JAVA VS %
```

7. Program to Find Second Largest Element

Code:

```
import java.util.Scanner;
public class SecondLargest {
   public static void main(String[] args) {
```

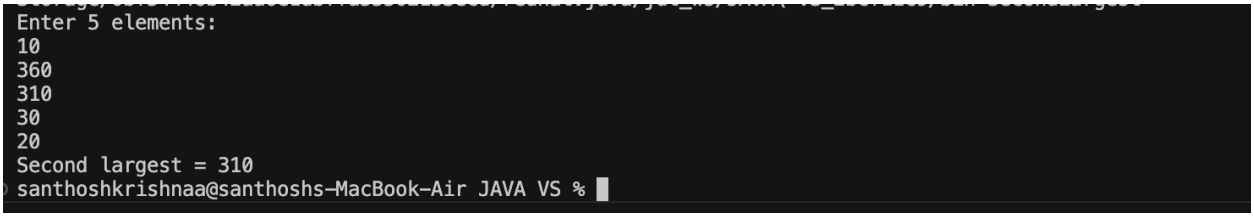
```
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];

        System.out.println("Enter 5 elements:");
        for(int i = 0; i < 5; i++)
            arr[i] = sc.nextInt();
        int largest = arr[0];
        int second = arr[0];
        for(int i = 0; i < 5; i++) {
            if(arr[i] > largest) {
                second = largest;
                largest = arr[i];
            }
        }
        System.out.println("Second largest = " + second);
    }
}
```

OUTPUT:

Input:
10 45 23 89 67

Output:

Second largest = 67



8. Program for Matrix Addition (2D Array)

Code:

import java.util.Scanner;

```
public class MatrixAddition {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[][] a = new int[2][2];
        int[][] b = new int[2][2];
        int[][] sum = new int[2][2];
        System.out.println("Enter elements of matrix A:");
        for(int i = 0; i < 2; i++)
            for(int j = 0; j < 2; j++)
                a[i][j] = sc.nextInt();
        System.out.println("Enter elements of matrix B:");
        for(int i = 0; i < 2; i++)
            for(int j = 0; j < 2; j++)
                b[i][j] = sc.nextInt();
        for(int i = 0; i < 2; i++)
            for(int j = 0; j < 2; j++)
                sum[i][j] = a[i][j] + b[i][j];
        System.out.println("Sum matrix:");
        for(int i = 0; i < 2; i++) {
            for(int j = 0; j < 2; j++)
                System.out.print(sum[i][j] + " ");
            System.out.println();
        }
    }
}
```

OUTPUT:

Matrix A:

1 2

3 4

Matrix B:

5 6

7 8

Sum matrix:

6 8

10 12

```
Enter 5 elements:
10
360
310
30
20
Second largest = 310
santhoshkrishnaa@santhoshs-MacBook-Air JAVA VS %
```

POST LAB EXERCISE

- ✓ **Why is array indexing usually started from zero instead of one?**
  Array indexing starts at zero because it represents the offset from the base memory address.
- ✓ **What happens if we try to access an array element outside its declared size?**
  It causes a runtime error (ArrayIndexOutOfBoundsException).
- ✓ **How does memory allocation differ for static arrays and dynamic arrays?**
  Static arrays have fixed size at compile time, while dynamic arrays can change size at runtime.
- ✓ **Why is searching faster in arrays compared to linked lists?**
  Arrays allow direct access using index, while linked lists require sequential traversal.
- ✓ **What is the difference between contiguous and non-contiguous memory allocation?**
  Contiguous allocation stores elements in consecutive memory locations, while non-contiguous does not.

Result:

Thus the array operations were executed successfully.

ASSESSMENT

Description	Max Marks	Marks Awarded
Pre Lab Exercise	**5**	
In Lab Exercise	**10**	
Post Lab Exercise	**5**	
Viva	**10**	
Total	**30**	
Faculty Signature		