

Sriram B

24BCS285

CSE-A1

ARRAYS

Aim:

To understand and implement array operations in Java.

PRE LAB EXERCISE

QUESTIONS

- ✓ What is an array?

An array is a collection of elements of the same data type stored in consecutive memory locations.

- ✓ Why are arrays used?

Arrays are used to store multiple values using a single name and to easily access and process large amounts of data.

- ✓ What is the difference between array and variable?

- A **variable** stores only one value at a time.
- An **array** stores multiple values of the same data type under one name.

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

```

Run  ReadPrintArray ×
C:\Users\User\.jdks\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar" -Dfile.encoding=UTF-8 Main
Enter 5 elements:
10 20 30 40 50
Array elements are:
10 20 30 40 50
Process finished with exit code 0

```

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

```

Run ReadPrint ×

C:\Users\User\.jdks\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar=53158" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8
Enter 5 elements:
5 10 15 20 25
Sum = 75
Process finished with exit code 0

```

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

```

Run  LlargestElement x
C:\Users\User\.jdks\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar=62652" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8
Enter 5 elements:
12 45 23 9 30
Largest element = 45
Process finished with exit code 0

```

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

```

Run ReverseArray ×
C: C:\Users\User\.jdks\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar=65315" -Dfile.encoding=UTF-8 -Dsun.s
↑ Enter 5 elements:
↓ 1 2 3 4 5
→ Reversed array:
← 5 4 3 2 1
Process finished with exit code 0

```

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

```

Run EvenOddCount x
C:\Users\User\.jdks\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar=65267" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=
↑ Enter 5 elements:
↓ 2 7 4 9 10
→ Even = 3
→ Odd = 2
Process finished with exit code 0

```

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] + " ");  
    }  
}
```

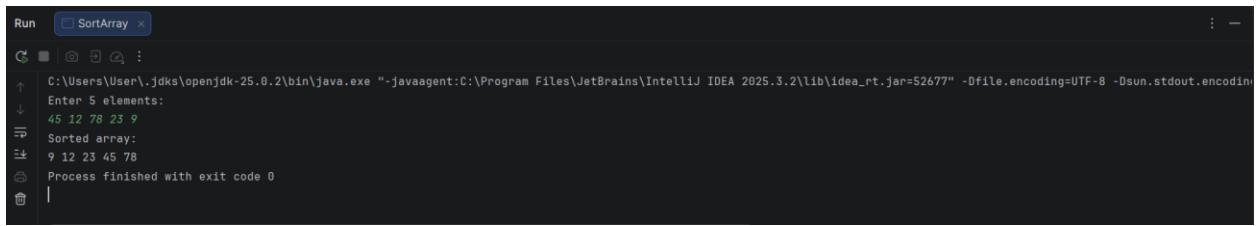
OUTPUT:**Input:**

45 12 78 23 9

Output:

Sorted array:

9 12 23 45 78



```
Run SortArray ×
C:\Users\User.jdk\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar=52677" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8
Enter 5 elements:
45 12 78 23 9
Sorted array:
9 12 23 45 78
Process finished with exit code 0
```

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);
        }
    }
}
```

```
}
```

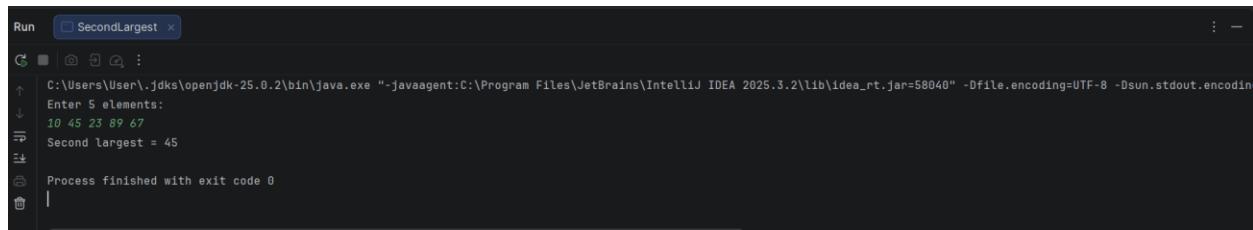
OUTPUT:

Input:

```
10 45 23 89 67
```

Output:

```
Second largest = 67
```



```
Run SecondLargest x
C:\Users\User\jdks\openjdk-25.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2025.3.2\lib\idea_rt.jar=58040" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8
Enter 5 elements:
10 45 23 89 67
Second largest = 45
Process finished with exit code 0
```

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 of matrices A and B is:");
        for(int i = 0; i < 2; i++)
            for(int j = 0; j < 2; j++)
                System.out.print(sum[i][j] + " ");
    }
}
```

```

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:

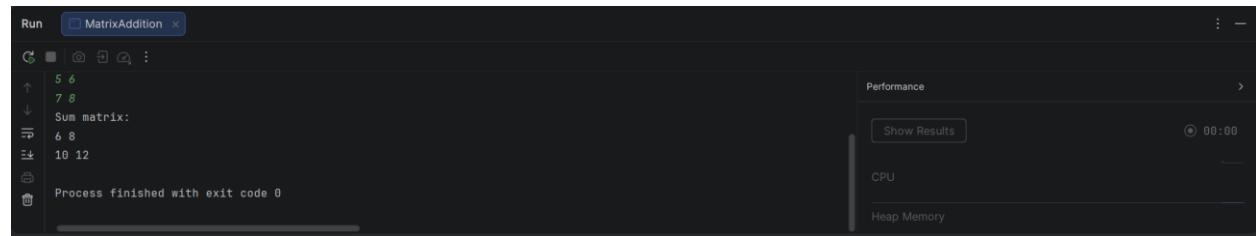
5 6

7 8

Sum matrix:

6 8

10 12



POST LAB EXERCISE

- ✓ Why is array indexing usually started from zero instead of one?
Because the index represents the offset from the starting memory address, and the first element has offset 0.

- ✓ What happens if we try to access an array element outside its declared size?
It causes an error or undefined behavior and may crash the program or give garbage values.

- ✓ How does memory allocation differ for static arrays and dynamic arrays?
 - **Static arrays:** Memory is allocated at compile time and size is fixed.
 - **Dynamic arrays:** Memory is allocated at runtime and size can be changed.

- ✓ Why is searching faster in arrays compared to linked lists?
Because arrays allow direct access using index, while linked lists require sequential traversal.

- ✓ What is the difference between contiguous and non-contiguous memory allocation?
 - **Contiguous memory:** Elements are stored in continuous memory locations (arrays).
 - **Non-contiguous memory:** Elements are stored at different memory locations linked together (linked lists).

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		