

OOPS IN JAVA

TUTORIAL - 5

Karthik Krishnan

Roll No: 45

S3 CSE B

Matrix in Java

Module - 2

Qn 1) Write a Java program that finds the maximum element in each row of a given 3D matrix and returns the results in a separate array.

```
1  /*
2  TUTORIALS 5
3  MATRIX IN JAVA
4  QN 1)
5  Write a Java Program that finds the maximum element in each row of a given 3D Matrix and
6  returns the results in a separate array.
7  Karthik Krishnan
8  S3 CSE B
9  Roll: 45
10 */
11
12
13 package tutorials;
14 import java.util.Scanner;
15
16 public class Tutorials5qn1 {
17     public static void main(String[] args) {
18         Scanner sc = new Scanner(System.in);
19         int rows, cols;
```

```
20
21     System.out.println("Enter the number of rows in the matrix: ");
22     rows = sc.nextInt();
23     System.out.println("Enter the number of columns in the matrix: ");
24     cols = sc.nextInt();
25
26     int[][] matrix = new int[rows][cols];
27
28     System.out.println("Enter the elements of the matrix: ");
29     for (int i = 0; i < rows; i++) {
30         for (int j = 0; j < cols; j++) {
31             matrix[i][j] = sc.nextInt();
32         }
33     }
34
35     System.out.println("The Matrix is: ");
36     for (int i = 0; i < rows; i++) {
37         for (int j = 0; j < cols; j++) {
38             System.out.print(matrix[i][j] + "\t");
39         }
40         System.out.println();
41     }
42
43     System.out.println("Maximum elements in each row: ");
44     for (int i = 0; i < rows; i++) {
45         int max = matrix[i][0];
46         for (int j = 0; j < cols; j++) {
47             if (matrix[i][j] > max) {
48                 max = matrix[i][j];
49             }
50         }
51         System.out.println("Row " + (i + 1) + ": " + max);
52     }
53 }
54 }
55
56
```

OUTPUT:

```
Problems Javadoc Declaration Console X
<terminated> Tutorials5qn1 [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe (28-Jul-2024, 8:42:16 pm – 8:42:34 pm) [pid: 22756]

Enter the number of rows in the matrix:
3
Enter the number of columns in the matrix:
3
Enter the elements of the matrix:
1
2
5
6
5
6
87
5
5
The Matrix is:
1    2    5
6    5    6
87   5    5
Maximum elements in each row:
Row 1: 5
Row 2: 6
Row 3: 87
```

Qn 2) Write a java program to multiply each element of a matrix by a scalar value .also display the resultant matrix after multiplication.

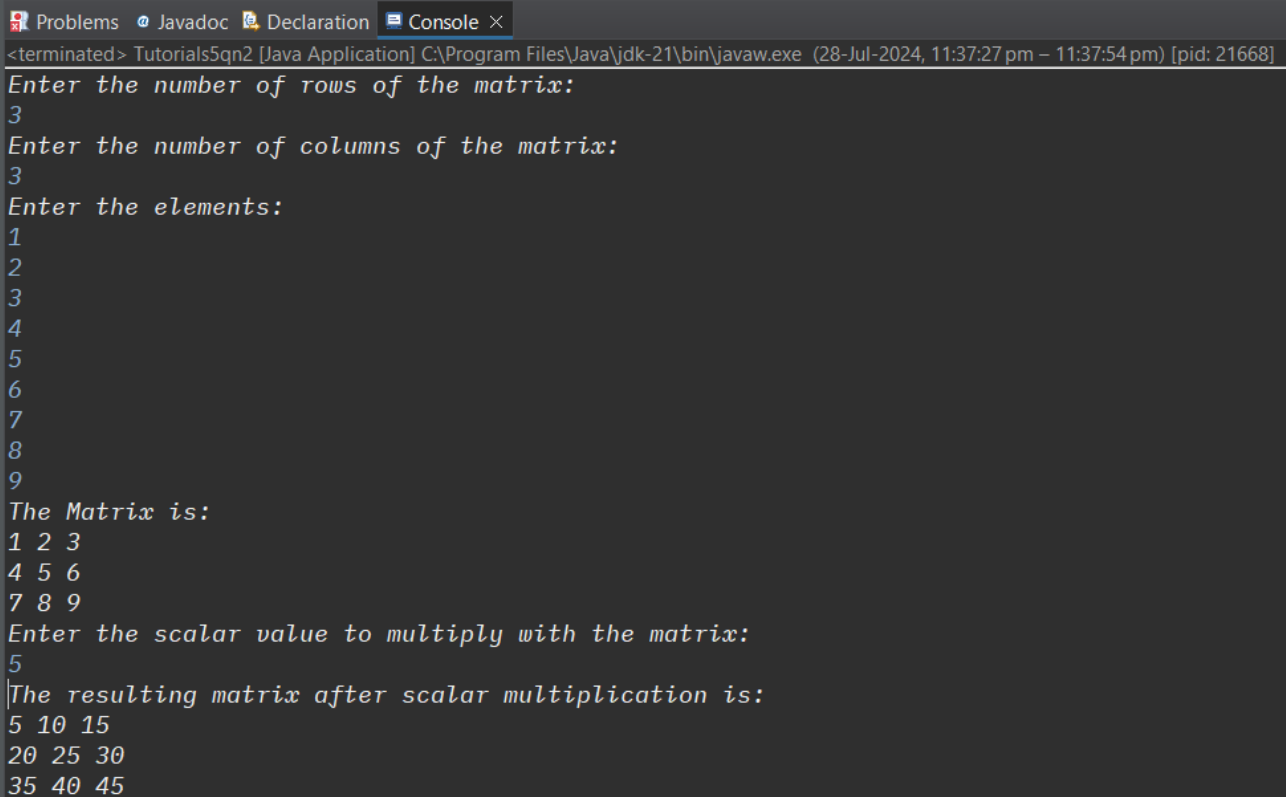
```
ArithmeticandConcatenatio... Numbersign.java Tutorials5qn1.java *Tutorials5qn2.java × Tutorials5qn3.java Tutorials5qn4.java
1  /*
2   TUTORIALS 5
3   MATRIX IN JAVA
4   QN 2)
5   Write a java program to multiply each element of a matrix by a scalar value
6   .also display the resultant matrix after multiplication.
7
8   Karthik Krishnan
9   S3 CSE B
10  Roll: 45
11  */
12
13  package tutorials;
14  import java.util.Scanner;
15  public class Tutorials5qn2 {
16
17      public static void main(String[] args) {
18          Scanner sc = new Scanner(System.in);
19
20          int cols, rows;
21          System.out.println("Enter the number of rows of the matrix: ");
22          rows = sc.nextInt();
23
24          System.out.println("Enter the number of columns of the matrix: ");
25          cols = sc.nextInt();
26
27          //User to enter the elements
28          int[][] matrix = new int[rows][cols];
29
29
30          System.out.println("Enter the elements: ");
31          for (int i = 0; i < rows; i++) {
32              for (int j = 0; j < cols; j++) {
33                  matrix[i][j] = sc.nextInt();
34              }
35          }
36
37          //Display the matrix
38          System.out.println("The Matrix is: ");
39          for (int i = 0; i < rows; i++) {
40              for (int j = 0; j < cols; j++) {
41                  System.out.print(matrix[i][j] + " ");
42              }
43              System.out.println();
44          }
45
46      }
47  }
```

```

46         //User to enter the scalar value
47         System.out.println("Enter the scalar value to multiply with the matrix: ");
48         int scalar = sc.nextInt();
49
50         //Display the scalar matrix after scalar multiplication
51         System.out.println("The resulting matrix after scalar multiplication is: ");
52         for (int i = 0; i < rows; i++) {
53             for (int j = 0; j < cols; j++) {
54                 System.out.print(matrix[i][j] * scalar + " ");
55             }
56             System.out.println();
57         }
58
59         sc.close();
60     }
61 }
62 |

```

OUTPUT:



The screenshot shows a Java IDE with a console window. The console output is as follows:

```

<terminated> Tutorials5qn2 [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe (28-Jul-2024, 11:37:27 pm – 11:37:54 pm) [pid: 21668]
Enter the number of rows of the matrix:
3
Enter the number of columns of the matrix:
3
Enter the elements:
1
2
3
4
5
6
7
8
9
The Matrix is:
1 2 3
4 5 6
7 8 9
Enter the scalar value to multiply with the matrix:
5
The resulting matrix after scalar multiplication is:
5 10 15
20 25 30
35 40 45

```

Qn 3) write a java program to generate an identity matrix of a given size.

```
ArithmeticandConcatenation... Numbersign.java Tutorials5qn1.java Tutorials5qn2.java Tutorials5qn3.java × Tutorials5qn4.java
1 /*
2  TUTORIALS 5
3  MATRIX IN JAVA
4  QN 3)
5  Write a java program to generate an identity matrix of a given size.
6
7  Karthik Krishnan
8  S3 CSE B
9  Roll: 45
10 */
```

```
11 package tutorials;
12 import java.util.Scanner;
13
14 public class Tutorials5qn3 {
15     public static void main(String[] args) {
16         Scanner scanner = new Scanner(System.in);
17
18         System.out.print("Enter the size of the identity matrix (n for an nxn matrix): ");
19         int n = scanner.nextInt();
20         int[][] matrix = new int[n][n];
21
22         for (int i = 0; i < n; i++) {
23             for (int j = 0; j < n; j++) {
24                 if (i == j) {
25                     matrix[i][j] = 1;
26                 } else {
27                     matrix[i][j] = 0;
28                 }
29             }
30         }
31
32         System.out.println("The identity matrix is: ");
33
```

```
34         for (int i = 0; i < n; i++) {
35             for (int j = 0; j < n; j++) {
36                 System.out.print(matrix[i][j] + "\t");
37             }
38             System.out.println();
39         }
40
41         scanner.close();
42     }
43 }
```

OUTPUT:

```
Problems Javadoc Declaration Console ×
<terminated> Tutorials5qn3 [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe (28-Jul-2024, 11:35:07 pm – 11:35:15 pm) [pid: 2472]
Enter the size of the identity matrix (n for an nxn matrix): 3
The identity matrix is:
1      0      0
0      1      0
0      0      1
```

Qn 4) write a java program to check if a given matrix is symmetric in Java?

```
ArithmeticandConcatenation... Numbersign.java Tutorials5qn1.java Tutorials5qn2.java Tutorials5qn3.java Tutorials5qn4.java X
1  /*
2  TUTORIALS 5
3  MATRIX IN JAVA
4  QN 4)
5  Write a java program to check if a given matrix is symmetric in Java?
6
7  Karthik Krishnan
8  S3 CSE B
9  Roll: 45
10 */
11 package tutorials;
12
13 import java.util.Scanner;
14
15 public class Tutorials5qn4 {
16
17     public static void main(String[] args) {
18         Scanner sc = new Scanner(System.in);
19
20         System.out.print("Enter the size of the square matrix (n for n×n matrix): ");
21         int n = sc.nextInt();
22
23         System.out.println("Enter the elements of the matrix:");
24
25         int[][] matrix = new int[n][n];
26         for (int i = 0; i < n; i++) {
27             for (int j = 0; j < n; j++) {
28                 matrix[i][j] = sc.nextInt();
29             }
30         }
31
32         System.out.println("The matrix is:");
33         for (int i = 0; i < n; i++) {
34             for (int j = 0; j < n; j++) {
35                 System.out.print(matrix[i][j] + "\t");
36             }
37             System.out.println();
38         }
39
40         boolean Symmetric = true;
41         for (int i = 0; i < n; i++) {
42             for (int j = 0; j < n; j++) {
43                 if (matrix[i][j] != matrix[j][i]) {
44                     Symmetric = false;
45                     break;
46                 }
47             }
48         }
49
50         System.out.println(Symmetric ? "The matrix is symmetric." : "The matrix is not symmetric.");
51         sc.close();
52     }
53 }
54
55
```


OUTPUT:

```
Problems Javadoc Declaration Console X
<terminated> Tutorials5qn4 [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe (29-Jul-2024, 12:41:15 am – 12:41:28 am) [pid: 20828]
Enter the size of the square matrix (n for n×n matrix): 2
Enter the elements of the matrix:
3
3
3
3
The matrix is:
3      3
3      3
The matrix is symmetric.
```

```
Problems Javadoc Declaration Console X
<terminated> Tutorials5qn4 [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe (29-Jul-2024, 12:41:48 am – 12:42:06 am) [pid: 6708]
Enter the size of the square matrix (n for n×n matrix): 3
Enter the elements of the matrix:
1
5
7
8
4
3
2
5
6
The matrix is:
1      5      7
8      4      3
2      5      6
The matrix is not symmetric.
|
```