Array: -

An array is group of variables which have a same name, same data types and same size. Arrays of any type can be created and may have one or more dimensions. A specific element in an array is accessed by its index. Arrays offer a convenient means grouping related information. Arrays are categories into two types.

1.   One dimensional array
2.   Multi-dimensional array

One dimensional array: -
One dimensional array is essentially a list of like typed variable. To create an array you first most create an array variable of the desired type. The syntax is;

type var_name [ ];

Here, type declares the base type of array. The based type determines the data type. Example, int a [5]; Although this declaration establishes the fact that a is an array variable, no array actually exists. new is a special operator that allocates memory.
The general form of new as it applies to one-dimensional arrays appears as follows:

array-var = new type[size];

Here, type specifies the type of data being allocated, size specifies the number of elements in the array, and array-var is the array variable that is linked to the array. That is, to use new to allocate an array. The elements in the array allocated by new will automatically be initialized to zero.

Example 1

```
class Arraydemo
{
public static void main(String args[])
{
int mdays [];
mdays = new int[6];
mdays [0] = 31;
mdays [1] = 28;
mdays [2] = 31;
mdays [3] = 30;
mdays [4] = 31;
mdays [5] = 30;
System.out.println("Jan has " + mdays[0] + " days.");
}
}
```

Example 2

```
class Ave
{
public static void main (String args [])
```

```
{
 double nums[] = {10.1, 11.2, 12.3, 13.4, 14.5};
 double result = 0;
 int i;
for (i=0; i<5; i++)
{
result = result + nums[i];
}
System.out.println("Average is " + result / 5);
}
}
```

Example 3

```
class sam
{
public static void main (String args[])
{
int I, sum;
sum=0;
int m[]={2,3,4,5,6};
for(i=0;i<5;i++)
{
sum=sum +m[i];
}
System.out.println("sum is "+sum);
}
}
```

Example 4

```
class mm
{
public static void main(String args[])
{
int I;
char m[]={'a' ,'b', 'c' ,'d' ,'e' .'f' ,'g'};
System.out.println("The characters of the array elements are  :");
for ( i=0;i<7 ; i++)
{ System.out.println(m[i]);  }
}
}
```

```
class Testarray
{
public static void main(String args[]){
int a[]={33,3,4,5};//declaration, instantiation and initialization
```

```
//printing array
for(int i=0;i<a.length;i++)//length is the property of array
System.out.println(a[i]);
}}
```

Passing Array to a method in java

[to get the minimum number of an array using a method]

```
class mm
 {
 void min(int arr[])
{
int min=arr[0];
for(int i=1;i<arr.length;i++)
{
 if(min>arr[i])
  min=arr[i];
 }
System.out.println(min);
}
 }
  class smain
  {

public static void main(String args[])
{
mm m=new mm();
int a[]={33,3,4,5};//declaring and initializing an array
m.min(a);//passing array to method
}
}
```

Returning Array from the Method

```
class aa
{
//creating method which returns an array
static int[] get()
{
return new int[]{10,30,50,90,60};
}
  public static void main(String args[]){
//calling method which returns an array
int arr[]=get();
//printing the values of an array
for(int i=0;i<arr.length;i++)
{
```

```
System.out.println(arr[i]);
}
}}
```

ArrayIndexOutOfBoundsException

The Java Virtual Machine (JVM) throws an ArrayIndexOutOfBoundsException if length of the array in negative, equal to the array size or greater than the array size while traversing the array.

```
class TestArrayException
{
public static void main(String args[])
{
int arr[]={50,60,70,80};
for(int i=0;i<=arr.length;i++)
{
System.out.println(arr[i]);
}
}
}
```
[This program generate the error because in this program we use ' <= arr.length ' . If we replace the = sign from there then it remove the error ' <arr.length']

Using BufferedReader in Array

```
import java.io.*;
class arr
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                int a[]=new int[5];
                int i;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your numbers :");
                        a[i]=Integer.parseInt(br.readLine());

                }
                System.out.println(" The array elements are :");
                        for(i=0;i<5;i++)
                {
                        System.out.println(a[i]);
        }
}
}
```

Sum of Numbers

```java
import java.io.*;
class arr
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                int a[]=new int[5];
                int i,s=0;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your numbers :");
                        a[i]=Integer.parseInt(br.readLine());
                        s=s+a[i];
                }
                System.out.println(" The array elements are :");
                        for(i=0;i<5;i++)
                {
                        System.out.println(a[i]);
                }
        System.out.println("Sum is "+s);
}
}
```

WAP to accept any five numbers user and sort them in ascending order.

```java
import java.io.*;
class arr
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                int a[]=new int[5];
                int i,j,k;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your numbers :");
                        a[i]=Integer.parseInt(br.readLine());

                }
                for(i=0;i<5;i++)
                {
                        for(j=0;j<4;j++)
                        {
                                if (a[j]>a[j+1])
                                {
                                        k=a[j];
                                        a[j]=a[j+1];
                                        a[j+1]=k;
                                }
                        }
                }
```

```
                System.out.println(" The sorted array elements are in Ascending order :");
                        for(i=0;i<5;i++)
                {
                        System.out.println(a[i]);
                }


}
}
```

WAP to accept any 10 numbers from user and display greatest number of the elements

```
import java.io.*;
class arr
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                int a[]=new int[5];
                int i,max=0;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your numbers :");
                        a[i]=Integer.parseInt(br.readLine());

                }

                for(i=0;i<5;i++)
                {
                        if(max<a[i])
                        {
                                max=a[i];
                        }
                }
                System.out.println(" The greatest of the array elements =:"+max);
        }
}
```

WAP to accept any five numbers from user and display the maximum and minimum number of the array elements.
```
import java.io.*;
class arr2
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                int a[]=new int[5];
                int i,max=0,min=0;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your numbers :");
```

```
                a[i]=Integer.parseInt(br.readLine());

        }
        max=a[0];
        min=a[0];
        for(i=1;i<5;i++)
        {
                if(max<a[i])

                        max=a[i];
                if(min>a[i])
                min=a[i];


        }
        System.out.println(" The greatest of the array elements =:"+max);
        System.out.println(" The greatest of the array elements =:"+min);


}
}
```

WAP accept 5 numbers in array and search whether a given number is present or not and display the message.

```
import java.io.*;
class arr2
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                int a[]=new int[5];
                int i,s,k=0;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your numbers :");
                        a[i]=Integer.parseInt(br.readLine());

                }

                System.out.println("Enter your number to be searched :");
                        s=Integer.parseInt(br.readLine());


                for(i=1;i<5;i++)
                {
                        if(a[i]==s)
                        k=1;
                        }
                        if (k==1)
```

```
                System.out.println(" The required number "+s+" is present");
                else
                System.out.println(" The required number "+s+" is not present");




}
}
------------------------------------------
```

WAP to accept any 5 names from user and arrange the names in ascending order.

```
import java.io.*;
class arr4
{
        public static void main(String args[]) throws IOException
        {
                BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
                String s[]=new String[5];
                int i,j;
                String sa;
                for(i=0;i<5;i++)
                {
                        System.out.println("Enter your names :");
                        s[i]= br.readLine();

                }
                for(i=0;i<4;i++)
                {
                        for(j=i+1;j<5;j++)
                        {
                                if(s[i].compareTo(s[j])>0)
                                {
                                        sa=s[i];
                                        s[i]=s[j];
                                        s[j]=sa;
                                }
                        }
                }

                System.out.println("The names are arranged in ascending order are :");
                for(i=0;i<5;i++)
                {
                        System.out.println(s[i]);

                }
        }
}
-------------------------------------------------------------------
```

WAP to print the elements of array in reverse order.

```
class ReverseArray
{
   public static void main(String[] args)
    {
      //Initialize array
      int [] arr = new int [] {1, 2, 3, 4, 5};
      System.out.println("Original array: ");
      for (int i = 0; i < arr.length; i++) {
         System.out.print(arr[i] + " ");
      }
      System.out.println();
      System.out.println("Array in reverse order: ");
      //Loop through the array in reverse order
      for (int i = arr.length-1; i >= 0; i--) {
         System.out.print(arr[i] + " ");
      }
   }
}
```

WAP to copy elements of one array to another array

```
class Copyarr
{
   public static void main(String[] args) {
         //Initialize array
      int [] arr1 = new int [] {1, 2, 3, 4, 5};
       //Create another array arr2 with size of arr1
      int arr2[] = new int[arr1.length];
      //Copying all elements of one array into another
      for (int i = 0; i < arr1.length; i++) {
         arr2[i] = arr1[i];
      }
       //Displaying elements of array arr1
      System.out.println("Elements of original array: ");
      for (int i = 0; i < arr1.length; i++) {
         System.out.print(arr1[i] + " ");
      }

      System.out.println();

      //Displaying elements of array arr2
      System.out.println("Elements of new array: ");
      for (int i = 0; i < arr2.length; i++) {
         System.out.print(arr2[i] + " ");
      }
      }
      }
```

Multidimensional Arrays

In Java, multidimensional arrays are actually array of arrays. To declare a multidimensional array variable, specify each additional index using another set of square brackets.
int a [ ] [ ] = new int [4][5];
Multi – dimensional array used to store the data in tabular format where row and column are defined as matrix form.
Single dimensional arrays consist of only one row. A Double dimensional array is a structure created in memory to contain the data values by using rows and columns. A Double dimensional array is also referred as a doble subscripted variable because using two types of subscripts one for row number and other for column number represents any elements of the arrays.

Example 1

```
class darr
{
        public static void main(String args[])
        {
                int i,j;
                int m[][]={{1,2,3,4},{5,6,7,8},{9,10,11,12}};
                System.out.println("The elements of the matrix are:");
                for(i=0;i<3;i++)
                {
                        for(j=0;j<3;j++)
                        {
                                System.out.print(m[i][j]+" ");

                        }
                        System.out.println();
                }
        }
}
```

Example 2

```
class darr
{
        public static void main(String args[])
        {
                int i,j;
                char m[][]={{'a','b','c','d'},{'e','f','g','h'},{'i','j','k','l'}};
                System.out.println("The elements of the matrix are:");
                for(i=0;i<3;i++)
                {
                        for(j=0;j<3;j++)
                        {
                                System.out.print(m[i][j]+" ");
```

```
                }
                System.out.println();
            }
        }
    }
```

Example 3

```java
import java.io.*;
class darr2
{
        public static void main(String args[]) throws IOException
        {
        BufferedReader br=new BufferedReader (new InputStreamReader (System.in));
        int i,j;
        int m[][]=new int[3][3];
System.out.println("Enter number of elements");
for(i=0;i<3;i++)
{
        for(j=0;j<3;j++)
        {
                m[i][j]=Integer.parseInt(br.readLine());
        }
}
System.out.println("The elements of array :");
                for(i=0;i<3;i++)
                {
                        for(j=0;j<3;j++)
                        {
                                System.out.print(m[i][j]+" ");

                        }
                        System.out.println();
                }
            }
        }
```

Example 4

```java
class daar4
{
public static void main(String args[])
{
int twoD[][] = new int[4][];
twoD[0] = new int[1];
twoD[1] = new int[2];
twoD[2] = new int[3];
```

```
twoD[3] = new int[4];
int i, j, k = 0;
for(i=0; i<4; i++)
for(j=0; j<i+1; j++) {
twoD[i][j] = k;
k++;
}
for(i=0; i<4; i++) {
for(j=0; j<i+1; j++)
System.out.print(twoD[i][j] + " ");
System.out.println();
}
}
}
```

Example 5

```
class darr5
{
public static void main(String args[])
 {
int twoD[][]= new int[4][5];
int i, j, k = 0;
for(i=0; i<4; i++)
{

for(j=0; j<5; j++)
 {
twoD[i][j] = k;
k++;
}
}
for(i=0; i<4; i++)
 {
for(j=0; j<5; j++)
{

System.out.print(twoD[i][j] + " ");
}
System.out.println();
}
}
}
```

Example 6

```
class darr6
{
```

```java
public static void main(String args[])
{
int threeD[][][] = new int[3][4][5];
int i, j, k;
for(i=0; i<3; i++)
{

for(j=0; j<4; j++)
{

for(k=0; k<5; k++)
{

threeD[i][j][k] = i * j * k;
}
}
}
for(i=0; i<3; i++)
{
for(j=0; j<4; j++)
{
for(k=0; k<5; k++)
{

System.out.print(threeD[i][j][k] + " ");

}
System.out.println();
}
System.out.println();
}
}
}
```

Example 7 : Addition of Two matrices in Java

```java
class darr7
{
public static void main(String args[])
{
//creating two matrices
int a[][]={{1,3,4},{3,4,5}};
int b[][]={{1,3,4},{3,4,5}};

//creating another matrix to store the sum of two matrices
int c[][]=new int[2][3];

//adding and printing addition of 2 matrices
```

```
for(int i=0;i<2;i++)
{
for(int j=0;j<3;j++)
{
c[i][j]=a[i][j]+b[i][j];
System.out.print(c[i][j]+" ");
}
System.out.println();
}
}}
```

Example 8 : Multiplication of Two matrices in Java

```
class darr8
{
public static void main(String args[]){
//creating two matrices
int a[][]={{1,1,1},{2,2,2},{3,3,3}};
int b[][]={{1,1,1},{2,2,2},{3,3,3}};

//creating another matrix to store the multiplication of two matrices
int c[][]=new int[3][3];  //3 rows and 3 columns

//multiplying and printing multiplication of 2 matrices
for(int i=0;i<3;i++){
for(int j=0;j<3;j++){
c[i][j]=0;
for(int k=0;k<3;k++)
{
c[i][j]+=a[i][k]*b[k][j];
}//end of k loop
System.out.print(c[i][j]+" ");  //printing matrix element
}//end of j loop
System.out.println();//new line
}
}}
```

Example 9 # WAP to subtract two Matrices

```
class subarr
{
   public static void main(String[] args) {
      int rows, cols;

      //Initialize matrix a
       int a[][] = {
                  {4, 5, 6},
                  {3, 4, 1},
                  {1, 2, 3}
              };
```

```
        //Initialize matrix b
        int b[][] = {
                    {2, 0, 3},
                    {2, 3, 1},
                    {1, 1, 1}
                };

        //Calculates number of rows and columns present in given matrix
        rows = a.length;
    cols = a[0].length;

        //Array diff will hold the result
        int diff[][] = new int[rows][cols];

        //Performs subtraction of matrices a and b. Store the result in matrix diff
        for(int i = 0; i < rows; i++){
            for(int j = 0; j < cols; j++){
                diff[i][j] = a[i][j] - b[i][j];
            }
        }

        System.out.println("Subtraction of two matrices: ");
        for(int i = 0; i < rows; i++){
            for(int j = 0; j < cols; j++){
                System.out.print(diff[i][j] + " ");
            }
            System.out.println();
        }
    }
}
```

Example 10 #Transpose of Matrix

Transpose of a matrix can be found by interchanging rows with the column that is, rows of the original matrix will become columns of the new matrix. Similarly, columns in the original matrix will become rows in the new matrix. The operation can be represented as follows:

```
class Trans
{
    public static void main(String[] args) {
        int rows, cols;

        //Initialize matrix a
        int a[][] = {
                    {1, 2, 3},
                    {4, 5, 6},
                    {7, 8, 9}
                };
```

```java
        //Calculates number of rows and columns present in given matrix
        rows = a.length;
    cols = a[0].length;

    //Declare array t with reverse dimensions
    int t[][] = new int[cols][rows];

    //Calculates transpose of given matrix
    for(int i = 0; i < cols; i++){
        for(int j = 0; j < rows; j++){
            //Converts the row of original matrix into column of transposed matrix
            t[i][j] = a[j][i];
        }
    }

    System.out.println("Transpose of given matrix: ");
    for(int i = 0; i < cols; i++){
        for(int j = 0; j < rows; j++){
            System.out.print(t[i][j] + " ");
        }
        System.out.println();
    }
  }
}
```

-------------------------------- THE END--