Arrays in Java Day 1

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What is an Array.?

- An array is a fixed-size, indexed collection of homogeneous elements.

Why we need to use an array.?

-In any Java program, to store multiple values, we require multiple variables. Handling these variables can be very difficult. To overcome this, we use arrays.

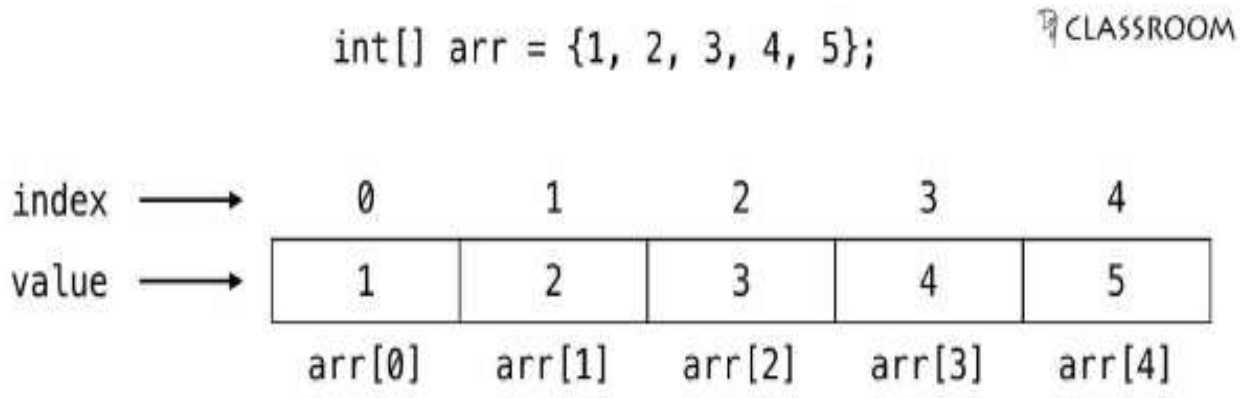
-By using arrays, we can store multiple values in a single variable.

properties of an array:

- An array stores only homogeneous data.
- The size of the array is fixed, i.e., once we specify the size of an array, we can't increase or decrease its size.
- Before using an array, we need to know its size.
- To access the array elements, we need to use index values.

Note:

In Java, array indexes start from 0 and go up to n-1, where n is the size of the array. Trying to access an index outside this range will result in an `ArrayIndexOutOfBoundsException`.



1-D Array:-

Array declaration and initialization

Syntax:
Datatype variablename []={<values>};

int arr[]={2,3,4,5};

Syntax:

Array declaration and Creation

<datatype><variablename>[]=new<datatype>[<size>];

```
int arr[] = new int[5];  // Initialize the array with size 5

arr[0] = 0;  // Assign value to the first element
arr[1] = 2;  // Assign value to the second element
arr[2] = 4;  // Assign value to the third element
arr[3] = 6;  // Assign value to the fourth element
arr[4] = 8;  // Assign value to the fifth element
```

Declare and Initialize an Array in java:

```
// Declaration
int[] arr;
// Initialization
arr = new int[5]; // Creates an array of size 5
```

Accessing Array Elements:

```
int[] arr = {1, 2, 3, 4, 5};
System.out.println(arr[0]); // Output: 1
```

Example:-

```
class Main{
    public static void main(String[] args) {
     int[] arr = {10, 20, 30, 40, 50};
     // Accessing elements of the array
     System.out.println("Element at index 0:" + arr[0]);
     System.out.println("Element at index 1:" + arr[1]);
```

```
        System.out.println("Element at index 2:" + arr[2]);
        System.out.println("Element at index 3:" + arr[3]);
        System.out.println("Element at index 4:" + arr[4]);
        // Accessing elements using loop
        System.out.println("Accessing elements using loop:");
        for (int i = 0; i < arr.length; i++) {
            System.out.println("Element at index " + i + ": " + arr[i]);
        }
    }
}
```

Example:-

```
class Arrays{
public static void main(String [] args){
int marks []= new int [3];
marks[0]=97;
marks[1]=98;
marks[1]=95;
System.out.println(marks[0]);
System.out.println(marks[1]);
System.out.println(marks[2]);
for (int i=0;i<3;i++){
System.out.println(marks[i]);
}
}
}
```

Array Length:

```
int[] arr = {1, 2, 3, 4, 5};
System.out.println(arr.length); // Output: 5
```

Example:-

```
class Main {
    public static void main(String[] args) {
        // Declare and initialize an array
        int[] arr= {10, 20, 30, 40, 50};
        // Get the length of the array
        int length = arr.length;
        // Print the length of the array
        System.out.println("Length of the array: " + length);
    }}
```

Finding Maximum and Minimum Element in an Array:

```
int[] arr = {1, 2, 3, 4, 5};
int max = arr[0], min = arr[0];
for (int i = 1; i < arr.length; i++) {
   if (arr[i] > max) {
      max = arr[i];
   }
   if (arr[i] < min) {
      min = arr[i];
   }
}
System.out.println("Max: " + max + ", Min: " + min);
```

Example:-

```
class Main {
   public static void main(String[] args) {
      // Declare and initialize an array
      int[] numbers = {10, 5, 20, 8, 15};
      // Initialize variables to hold maximum and minimum elements
      int max = numbers[0];
      int min = numbers[0];
      // Iterate through the array to find maximum and minimum elements
      for (int i = 1; i < numbers.length; i++) {
         if (numbers[i] > max) {
            max = numbers[i];
         }
         if (numbers[i] < min) {
            min = numbers[i];
         }
      }
      // Print the maximum and minimum elements
      System.out.println("Maximum element: " + max);
      System.out.println("Minimum element: " + min);
   }
}
```

Questions

1. Write a Java program to print the elements of an array.?
2. Write a Java program to print the maximum elements in an array.?
3. Write a Java program to print the sum of elements of an array.?
4. Write a Java program to print all the even elements of an array.?
5. Write a Java program to print all the odd elements of an array.?
6. Write a Java program to find the sum of the even elements of an array.?
7. Write a Java program to find the sum of the odd elements of an array.?
8. Write a Java program to find the product of an array.?
9. Write a Java program to print the reverse of an array.?

Answers

1. Write a Java program to print the elements of an array.?

```
class ArrayElements{
        public static void main(String[] args){
        int arr[]={6,4,5,3,2,1,9};
        for(int i=0;i<arr.length;i++){
        System.out.println(arr[i]);
          }
        }
}
```

Using Scanner class:-

```
import java.util.Scanner;
class ArrayElements {
   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 " + n + " elements:");
      for (int i = 0; i < n; i++) {
```

```
            arr[i] = scanner.nextInt();
        }
        // Print the array elements
        System.out.println("The array elements are:");
        for (int i = 0; i < arr.length; i++) {
            System.out.println(arr[i]);
        }
    }
}
```

2. Write a Java program to print the maximum elements in an array.?

```
class MaxElement{
        public static void main(String [] args){
        int arr[]={2,3,4,5,9,8};
        int max=arr[0];
        for(int i=0;i<arr.length;i++){
        if(arr[i]>max){
                max=arr[i];
        }
    }
        System.out.println(max);
  }
}
```

3. Write a Java program to print the sum of elements of an array.?

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

  }
}
```

4. Write a Java program to print all the even elements of an array.?

```
class EvenElements{
        public static void main(String [] args){
        int arr[]={2,1,3,4,5,6,9};
        for(int i=0;i<arr.length;i++){
        if(arr[i]%2==0){
                System.out.println(arr[i]);
                }
           }
    }
}
```

Or

```
class Main {
   public static void main(String[] args) {
      // Declare and initialize an array
      int[] numbers = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
      // Print even elements in the array
      System.out.println("Even elements in the array:");
      for (int number : numbers) {
         if (number % 2 == 0) {
            System.out.print(number + " ");
         }
      }
   }
}
```

5. Write a java program to find the product of odd indexed value of an array.?

```
class OddIndexProduct {
   public static void main(String[] args) {
      int[] array = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
      int product = 1;
      for (int i = 1; i < array.length; i += 2) {
         product *= array[i];
      }
      System.out.println("The product of the values at odd indices is: " + product);
   }
}
```

6. Write a java program to find the sum of the even elements of an array.?

```
class EvenElementsSum {
    public static void main(String[] args) {
        int[] array = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
        int sum = 0;
        for (int value : array) {
            if (value % 2 == 0) {
                sum += value;
            }
        }
        System.out.println("The sum of the even elements is: " + sum);
    }
}
```

7. Write a Java program to print the reverse of an array.?

```
class Reverse{
        public static void main(String[] args){
        int arr[]={5,4,3,2,1};
        int rev[]=new int[arr.length];
        for(int i=arr.length-1;i>=0;i--){
                rev[i]=arr[i];
        }
        for(int i=0;i<rev.length;i++){
        System.out.println(rev[i]);
        }
    }
}
```

Array Sorting:

```
int[] arr = {5, 3, 1, 4, 2};
Arrays.sort(arr);
```

Example:-

```
import java.util.Arrays;
class Main {
   public static void main(String[] args) {
      // Declare and initialize an array
      int[] numbers = {10, 5, 20, 8, 15};
      // Sort the array in ascending order
      Arrays.sort(numbers);
      // Print the sorted array
      System.out.println("Sorted array in ascending order:");
      for (int number : numbers) {
         System.out.print(number + " ");
      }
      System.out.println();
   }
}
```

Copying an Array:

```
int[] source = {1, 2, 3, 4, 5};
int[] target = new int[source.length];
System.arraycopy(source, 0, target, 0, source.length);
```

Example:-

```
import java.util.Arrays;
class Main {
   public static void main(String[] args) {
      // Declare and initialize an array
      int[] originalArray = {1, 2, 3, 4, 5};
      // Copy the original array to a new array
      int[] copiedArray = Arrays.copyOf(originalArray, originalArray.length);
      // Print the original and copied arrays
      System.out.println("Original array: " + Arrays.toString(originalArray));
      System.out.println("Copied array: " + Arrays.toString(copiedArray));
   }
```

Reversing an Array:

```
int[] arr = {1, 2, 3, 4, 5};
for (int i = 0, j = arr.length - 1; i < j; i++, j--) {
    int temp = arr[i];
    arr[i] = arr[j];
    arr[j] = temp;
}
```

Example:-

```
import java.util.Arrays;
class Main {
    public static void main(String[] args) {
        // Declare and initialize an array
        int[] numbers = {1, 2, 3, 4, 5};
        // Print the original array
        System.out.println("Original array: " + Arrays.toString(numbers));
        // Reverse the array
        for (int i = 0; i < numbers.length / 2; i++) {
            int temp = numbers[i];
            numbers[i] = numbers[numbers.length - 1 - i];
            numbers[numbers.length - 1 - i] = temp;
        }
        // Print the reversed array
        System.out.println("Reversed array: " + Arrays.toString(numbers));
    }
}
```