Algoritma dan Pemrograman

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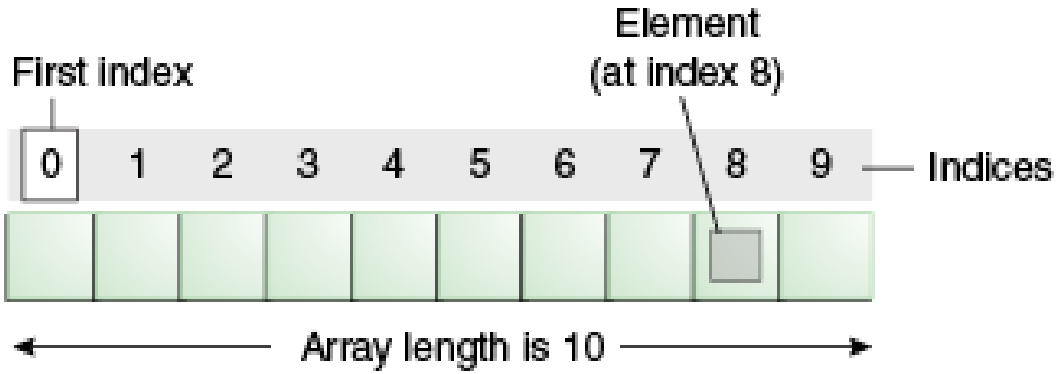
Array

Introduction

- An *array* is a container object that holds a fixed number of values of a single type. It means all **elements must be of the same data type**.
- The length of an array is established when the array is created.
- 

- Using and array in your program is a **3 step process** -
  1) Declaring your Array
  2) Constructing your Array
  3) Initializing your Array

Declaring Array

- **Syntax for Declaring Array Variables is**

  `<elementType>[] <arrayName>;`

- **Or**

  ```
  int intArray[];
  ```

  // Defines that intArray is an ARRAY variable which will store integer values

  ```
  int []intArray;
  ```

Constructing Array

- **Constructing an Array**

```
= new [];
```

- **Example:**

```
intArray = new int[10]; // Defines that
```
intArray will store 10 integer values

- **Declaration and Construction combined**

```
int intArray[] = new int[10];
```

Inizialing Array

- **Initializing an Array (one by one)**

  `intArray[0]=1;` // Assigns an integer value 1 to the first element 0 of the array

  `intArray[1]=2;` // Assigns an integer value 2 to the second element 1 of the array

- **Declaring and Initializing an Array**

  `[] = {};`

  Example:

  ```
  int intArray[] = {1, 2, 3, 4};
  ```

  // Initilializes an integer array of length 4 where the first element is 1 , second element is 2 and so on.

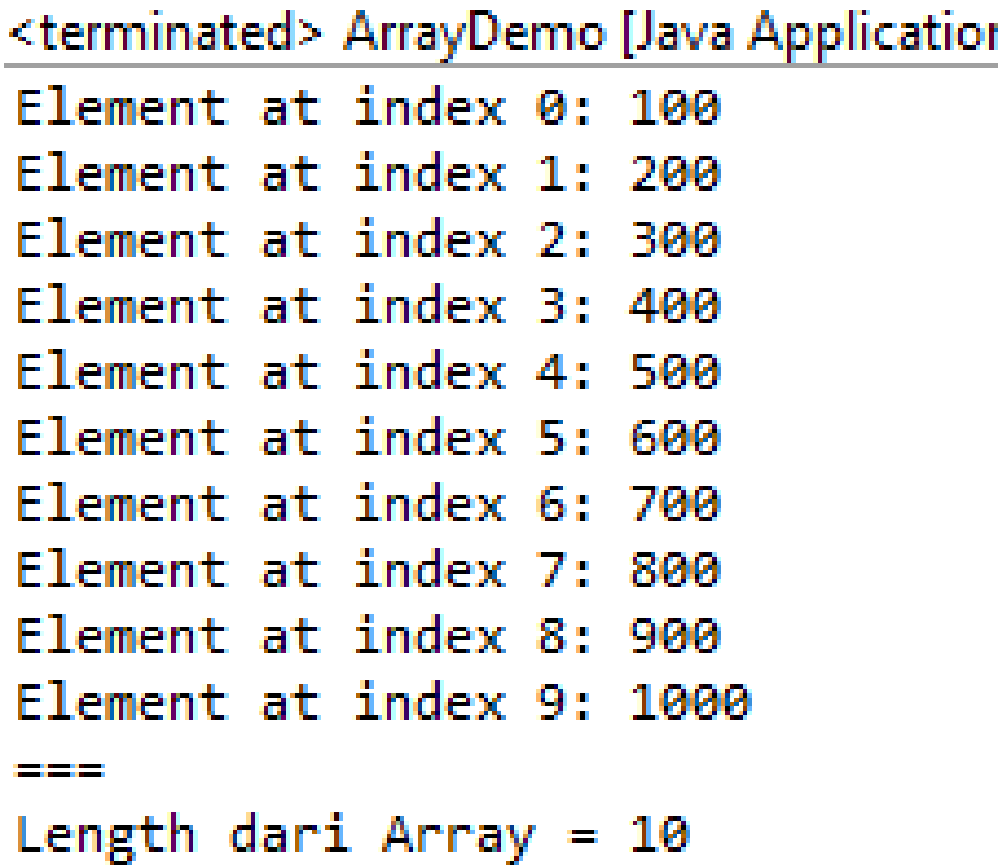
Code Array 1.1

```
package package08;

public class ArrayDemo {
    public static void main(String[] args) {
        // declares an array of integers
        int[] anArray;

        // allocates memory for 10 integers
        anArray = new int[10];

        // initialize first element, etc
        anArray[0] = 100;
        anArray[1] = 200;
        anArray[2] = 300;
        anArray[3] = 400;
        anArray[4] = 500;
        anArray[5] = 600;
        anArray[6] = 700;
        anArray[7] = 800;
        anArray[8] = 900;
        anArray[9] = 1000;
```

Code Array 1.2

```
        System.out.println("Element at index 0: "
                + anArray[0]);
        System.out.println("Element at index 1: "
                + anArray[1]);
        System.out.println("Element at index 2: "
                + anArray[2]);
        System.out.println("Element at index 3: "
                + anArray[3]);
        System.out.println("Element at index 4: "
                + anArray[4]);
        System.out.println("Element at index 5: "
                + anArray[5]);
        System.out.println("Element at index 6: "
                + anArray[6]);
        System.out.println("Element at index 7: "
                + anArray[7]);
        System.out.println("Element at index 8: "
                + anArray[8]);
        System.out.println("Element at index 9: "
                + anArray[9]);

        System.out.println("===");
        System.out.println("Length dari Array = "
                + anArray.length);
    }
}
```

Code Array 1 Result



Code Array 2

```
package package08;

public class ArrayDemo2 {
    public static void main(String[] args) {
        // declares an array of integers
        int[] anArray;

        // allocates memory for 10 integers
        anArray = new int[10];

        // input values into array
        for (int i=0; i<10; i++){
            anArray[i] = i+1;
        }

        // display result from array
        for (int j=0; j<10; j++){
            System.out.println("Element at index ke " + j + " : "+
                    anArray[j]);
        }

        System.out.println("===");
        System.out.println("Length dari Array = "
                + anArray.length);
    }
}
```

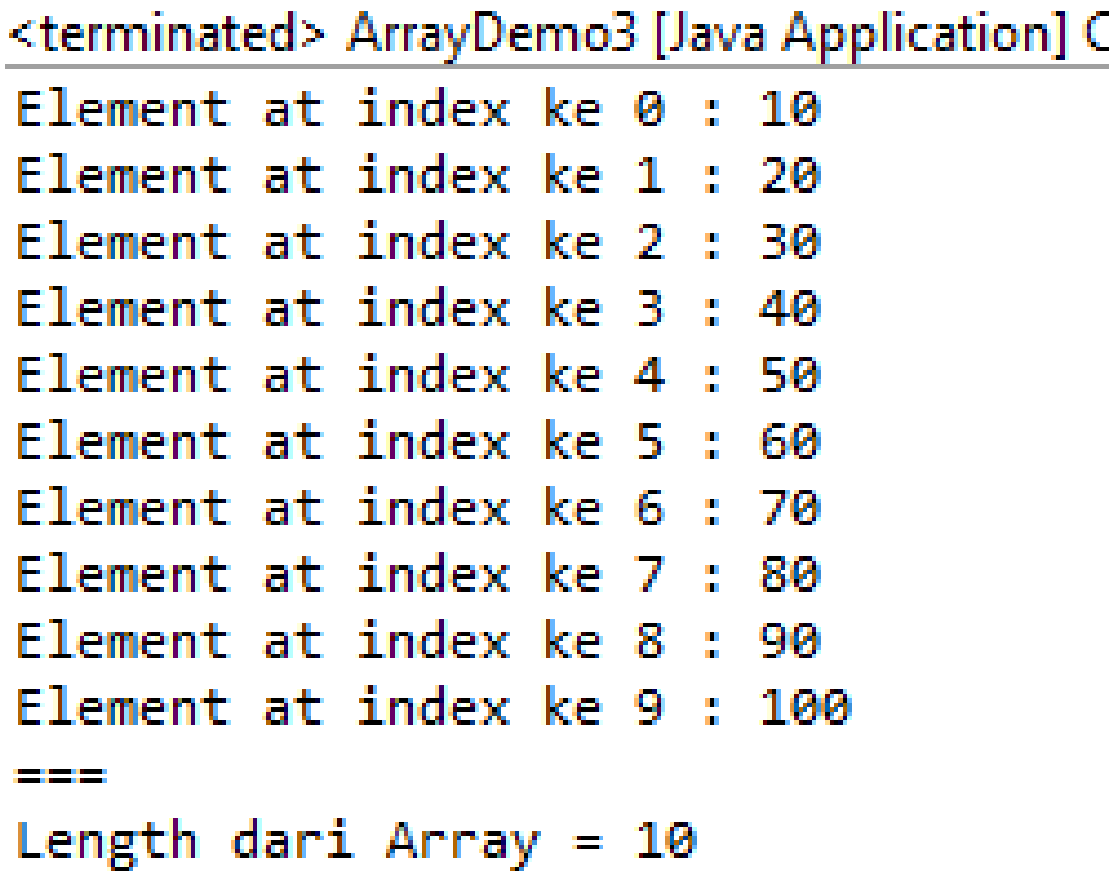
Code Array 2 Result

```
<terminated> ArrayDemo2 [Java Application]
Element at index ke 0 : 1
Element at index ke 1 : 2
Element at index ke 2 : 3
Element at index ke 3 : 4
Element at index ke 4 : 5
Element at index ke 5 : 6
Element at index ke 6 : 7
Element at index ke 7 : 8
Element at index ke 8 : 9
Element at index ke 9 : 10
===
Length dari Array = 10
```

Code Array 3

```
package package08;

public class ArrayDemo3 {

    public static void main(String[] args) {

        // declares, initials, input an array of integers
        int anArray[] = {10, 20, 30, 40, 50, 60, 70, 80, 90, 100};

        // display result from array
        for (int j=0; j<10; j++){
            System.out.println("Element at index ke " + j + " : "+
                    anArray[j]);
        }

        System.out.println("===");
        System.out.println("Length dari Array = "
                + anArray.length);
    }
}
```

Code Array 3 Result



Array Copy Method

- The System class has an arraycopy method that you can use to efficiently copy data from one array into another:
- public static void arraycopy(Object src, int srcPos, Object dest, int destPos, int length)
- The two Object arguments specify the array to copy *from* and the array to copy *to*. The three int arguments specify the starting position in the source array, the starting position in the destination array, and the number of array elements to copy.

```java
package package08;

public class ArrayCopyDemo {

    public static void main(String[] args) {

        char[] copyFrom = { 'd', 'e', 'c', 'a', 'f', 'f', 'e',
                'i', 'n', 'a', 't', 'e', 'd' };
        char[] copyTo = new char[7];

        System.arraycopy(copyFrom, 2, copyTo, 0, 7);
        System.out.println(new String(copyTo));
    }
}
```

```
<terminated> ArrayCopyDemo [Java Application] C:\Program Files (x86)\Java\jre7\bin\jav
caffein
```

Copy Array using Code

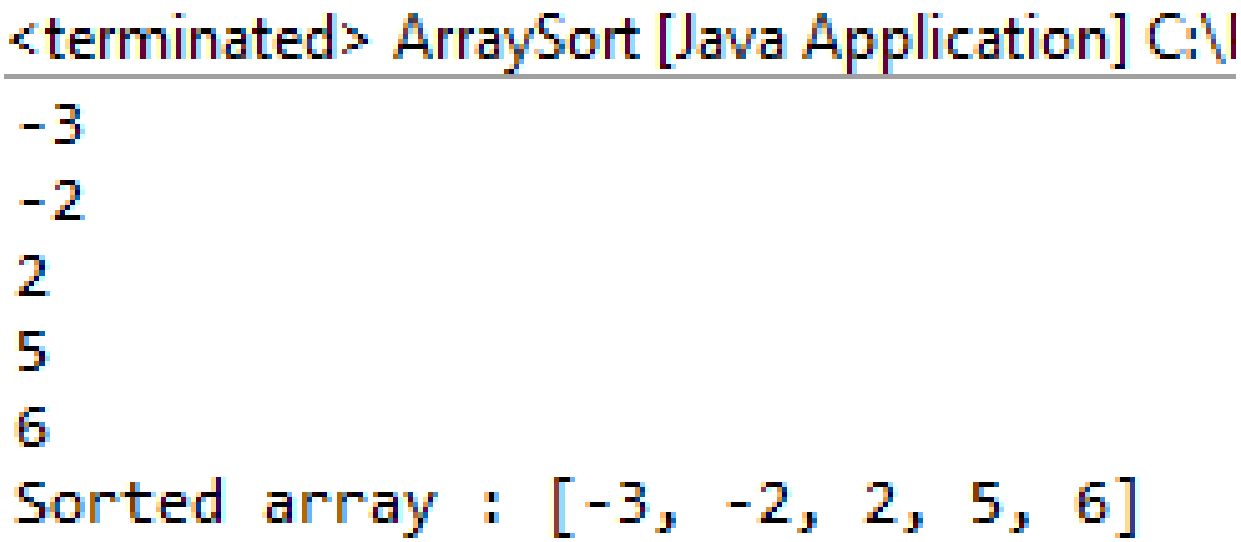
```
package package08;

public class ArrayString {

    public static void main(String[] args) {

        String arrLeader[] = {
                "Soekarno", "Soeharto",
                "B.J. Habibie", "Abdurrahman Wahid", "Megawati S.P.",
                "Soesilo Bambang Yudhoyono"
        };

        String indPresident[] = new String[6];

        // display result from array
        for (int j=0; j<arrLeader.length; j++){
            System.out.println("Indonesian Leader ke " + j + " : "+
                    arrLeader[j]);
        }
```

```
        System.out.println("===");
        System.out.println("Length dari Array = "
                + arrLeader.length);
        System.out.println("===");

        for(int i=0; i<arrLeader.length; i++){
            indPresident[i] = arrLeader[i];
        }

        // copied array
        for (int k=0; k<indPresident.length; k++){
            System.out.println("President RI ke " + (k+1) + " : "+
                    indPresident[k]);
        }
    } // main
} // class
```

```
<terminated> ArrayString [Java Application] C:\Program Files (x86)'
Indonesian Leader ke 0 : Soekarno
Indonesian Leader ke 1 : Soeharto
Indonesian Leader ke 2 : B.J. Habibie
Indonesian Leader ke 3 : Abdurrahman Wahid
Indonesian Leader ke 4 : Megawati S.P.
Indonesian Leader ke 5 : Soesilo Bambang Yudhoyono
===
Length dari Array = 6
===
President RI ke 1 : Soekarno
President RI ke 2 : Soeharto
President RI ke 3 : B.J. Habibie
President RI ke 4 : Abdurrahman Wahid
President RI ke 5 : Megawati S.P.
President RI ke 6 : Soesilo Bambang Yudhoyono
```

Sorting Array Element

```
import java.util.Arrays;

public class ArraySort {

    public static void main(String[] args) {

        int array[] = { 2, 5, -2, 6, -3 };
        Arrays.sort(array);

        for (int i : array) {
            System.out.println(i);
        }
        System.out.print("Sorted array : " +
                Arrays.toString(array));
    }
} // class
```


<terminated> ArraySort [Java Application] C:\
-3
-2
2
5
6
Sorted array : [-3, -2, 2, 5, 6]

Search in Array

```
package package08;

import java.util.Scanner;

public class SearchInArray {

    public static void main(String[] args) {
        int[] array={11,-10,25,18,45,55,30,87,-28,18};

        System.out.println("The contents of the Array are :");

        for(int i=0;i<array.length;i++)
                        System.out.println("Array[" + i + "] = " + array[i]);
```

```
        System.out.print("\nInput number to search ? ");
        int inSearch = new Scanner(System.in).nextInt();

        int search_element = inSearch;
        int find_index=-1;

        for(int j=0;j<(array.length-1);j++){
            if(array[j]==search_element){
                find_index=j;
                break;
            }
        }

        if(find_index!=-1){
            System.out.println(" The search element is : " + search_element);
            System.out.println(" It is found in the array at index position : "
            + find_index);
        }

        else
            System.out.println("\n The search element is not found in array.");
    } // Main
} // Class
```

```
package package08;
import java.util.Scanner;
public class SearchInArray {

    public static void main(String[] args) {
        int[] array={11,-10,25,18,45,55,30,87,-28,28};

        System.out.println("The contents of the Array are :");

        for(int i=0;i<array.length;i++)
                        System.out.println("Array[" + i + "] = " + array[i]);

        System.out.print("\nInput number to search ? ");
        int inSearch = new Scanner(System.in).nextInt();
```

```
        int search_element = inSearch;
        int find_index=-1;

        for(int j=0;j<(array.length-1);j++){
            if(array[j]==search_element){
                find_index=j;
                break;
            }
        }

        if(find_index!=-1){
            System.out.println(" The search element is : " + search_element);
            System.out.println(" It is found in the array at index position : "
            + find_index);
        }
        else
            System.out.println("\n The search element is not found in array.");
    } // Main
} // Class
```

Result

```
<terminated> SearchInArray [Java Application] C:\Program Files (x
The contents of the Array are :
Array[0] = 11
Array[1] = -10
Array[2] = 25
Array[3] = 18
Array[4] = 45
Array[5] = 55
Array[6] = 30
Array[7] = 87
Array[8] = -28
Array[9] = 28

Input number to search ? 55
 The search element is : 55
 It is found in the array at index position : 5
```

Max and Min value in array

```
package package08;
import java.util.Arrays;
public class ArrayMaxElement {

    public static void main(String[] args) {
        int[] array = {45, 66, 77, 54, 76, 89, 86, 44, 67, 87};

        System.out.println("Array : " + Arrays.toString(array));

        // max
        //assign the first element as maximum
        int maximum = array[0];
        // start with the first value
        int indexMax = -1;
        //Find maximum (largest) value in array using loop
        for (int i = 1; i < array.length; i++) {
            if (array[i] > maximum) {
                maximum = array[i];
                // new maximum
                indexMax = i;
            }
        }
        System.out.println("Maximun element : " + maximum +
                "\nIndex of Maximum : " + indexMax);
```

```
        //min
        //assign the first element as maximum
        int minimum = array[0];
        // start with the first value
        int indexMin = -1;
        //Find maximum (largest) value in array using loop
        for (int i = 1; i < array.length; i++) {
            if (array[i] < minimum) {
                minimum = array[i];
                // new maximum
                indexMin = i;
            }
        }
        System.out.println("Minimum element : " + minimum +
                "\nIndex of Minimum : " + indexMin);
    } // main
} // class
```

```
<terminated> ArrayMaxElement [Java Application] C:\Program F
Array : [45, 66, 77, 54, 76, 89, 86, 44, 67, 87]
Maximun element : 89
Index of Maximum : 5
Minimum element : 44
Index of Minimum : 7
```

- Untuk latihan Anda dapat menghitung total jumlah bilangan dalam array serta reratanya.