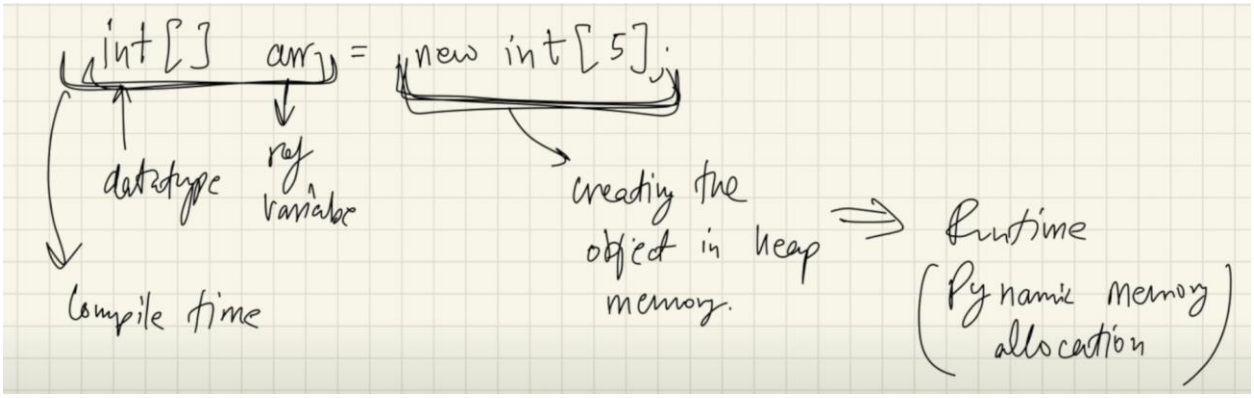
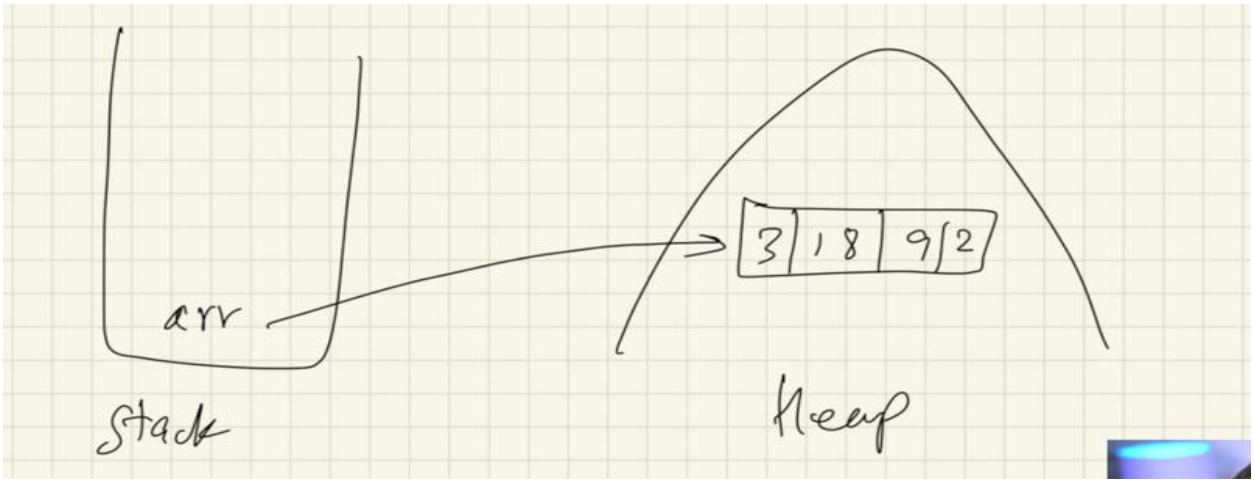
Introduction to Arrays and ArrayList in Java

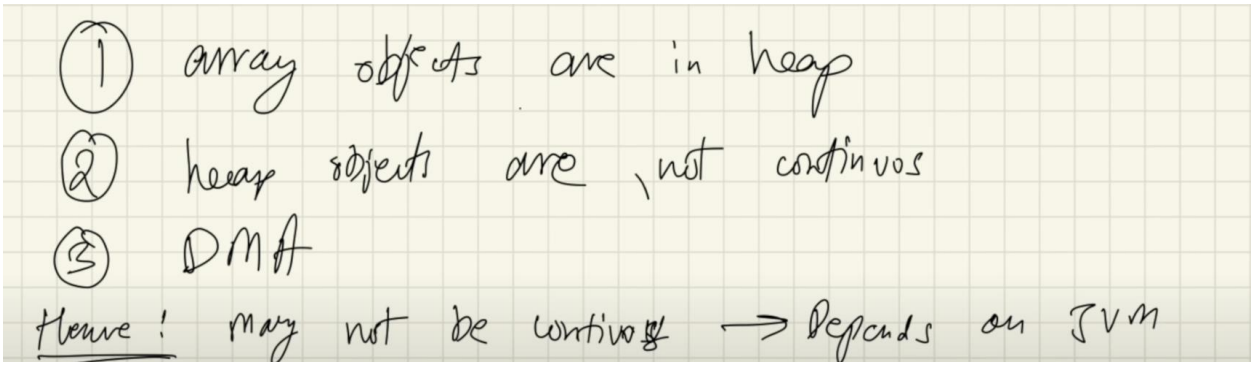
Syntax

```java
// Q: store 5 roll numbers
int rno1 = 23;
int rno2 = 55;
int rno3 = 18;

// syntax
// datatype[] variable_name = new datatype[size];
// store 5 roll numbers:
int[] rnos = new int[5];
// or directly
int[] rnos2 = {23, 12, 45, 32, 15};
```

```java
int[] ros; // declaration of array. ros is getting defined in the stack
ros = new int[5]; // actually here object is being created in the memory (heap)
```








```
24          int[] ros; // declaration of array. ros is getting d
25          ros = new int[5]; // initialisation: actually here o
26          System.out.println(ros[1]);
27
28
29
```

```
Run:  Main
/Users/kunalkushwaha/Library/Java/JavaVirtualMachines/openjdk-
0
```

Internally all the array elements will be assigned to zero.

Main.java

```
1   package com.rahul;
2
3   import java.util.Arrays;
4
5   public class Main {
6
7       public static void main(String[] args) {
8           int [] arr = new int [5];
9           System.out.println(Arrays.toString(arr));
10
11      }
12  }
```

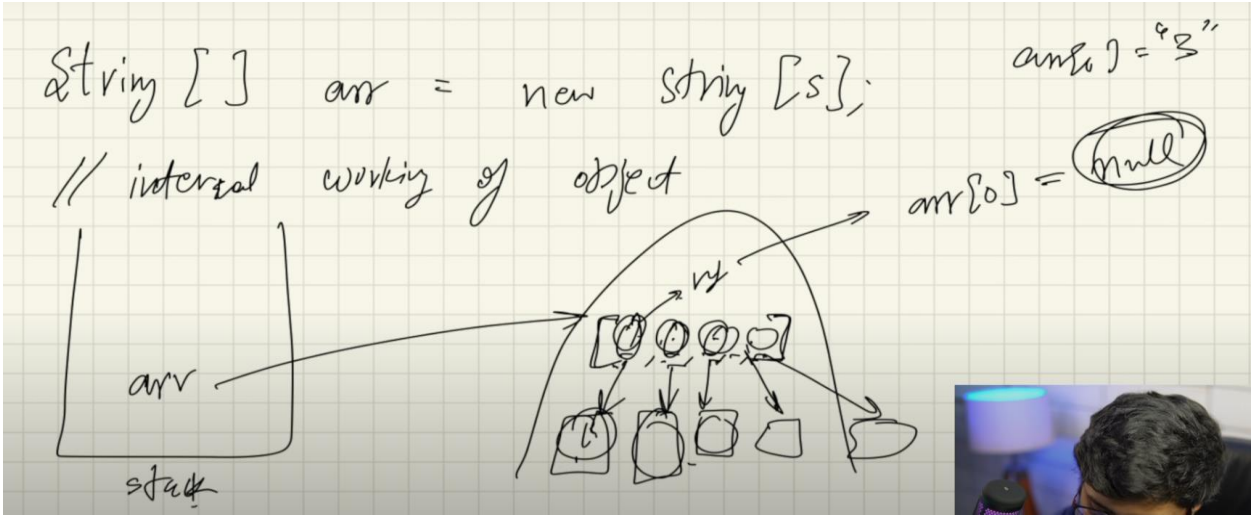
```
Run:  Main
"C:\Program Files\Java\jdk1.8.0_221\b
[0, 0, 0, 0, 0]

Process finished with exit code 0
```

Main.java

```
1   package com.rahul;
2
3   import java.util.Arrays;
4
5   public class Main {
6
7       public static void main(String[] args) {
8           int [] arr = new int [5];
9           //System.out.println(Arrays.toString(arr));
10          String [] a = new String [5];
11          System.out.println(a[0]);
12          System.out.println(Arrays.toString(a));
13      }
14  }
```

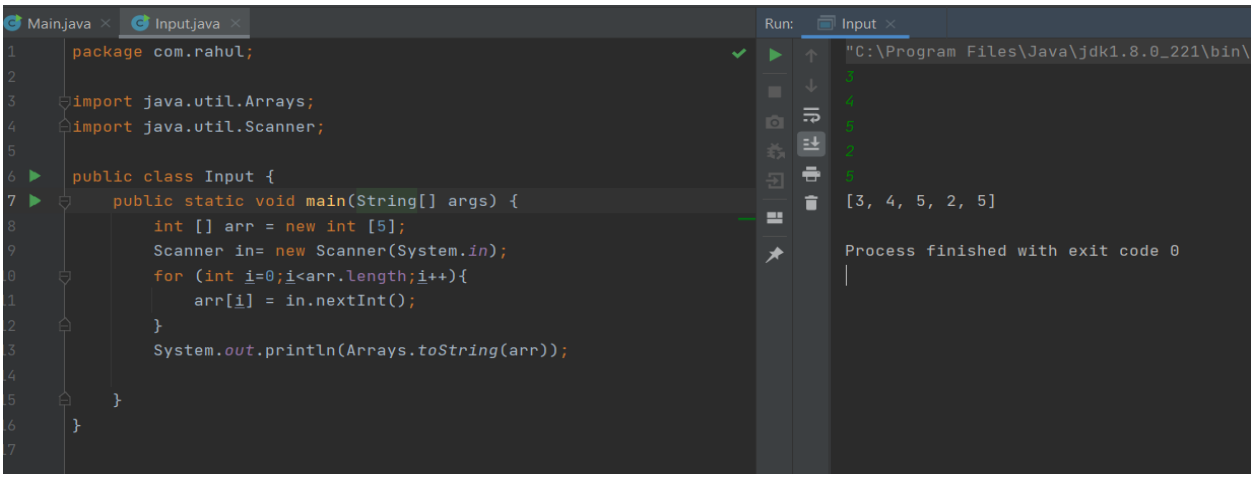
```
Run:  Main
"C:\Program Files\Java\jdk1.8.0_221\bin\java.e
null
[null, null, null, null, null]

Process finished with exit code 0
```

In java, array primitive are stored in stack and object are stored in heap. In heap of array each element in index is an object which refers to anther location where data is located. By default when array is created each element will be stored as zero.



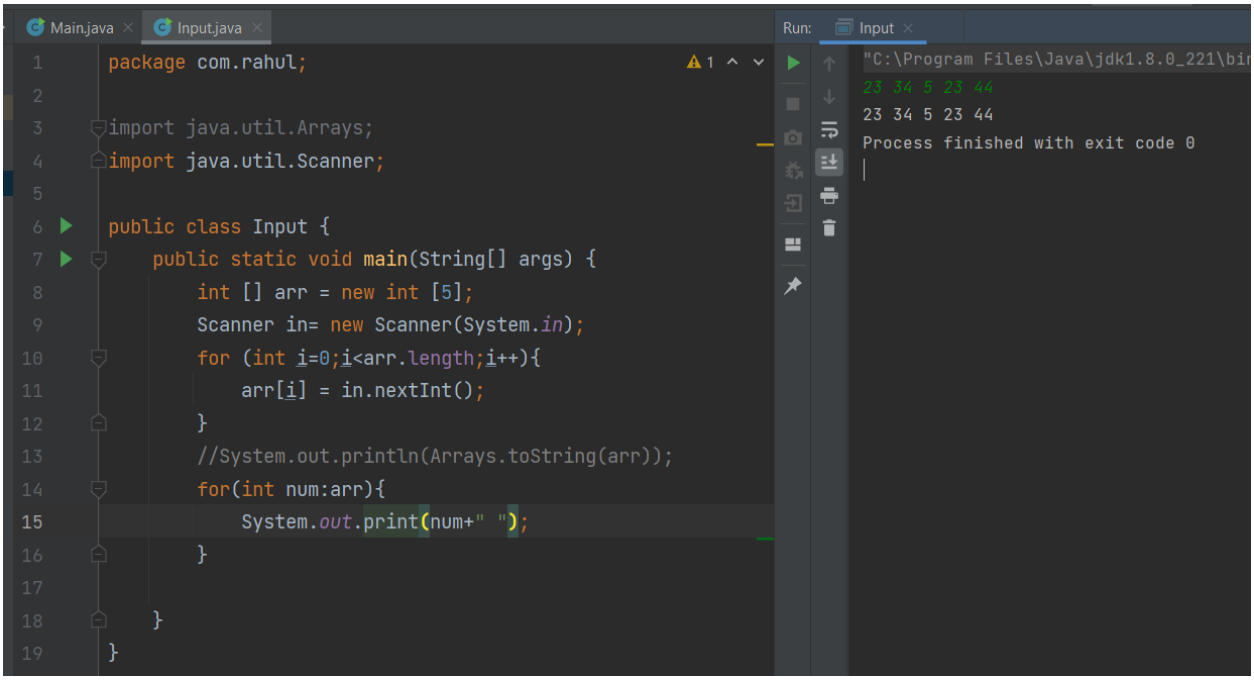

```java
package com.kunal;

public class Input {
    public static void main(String[] args) {
        int[] arr = new int[5];
        arr[0] = 23;
        arr[1] = 45;
        arr[2] = 233;
        arr[3] = 543;
        arr[4] = 3;
        // [23, 45, 233, 543, 3]
        System.out.println(arr[3]);
    }
}
```

Array input

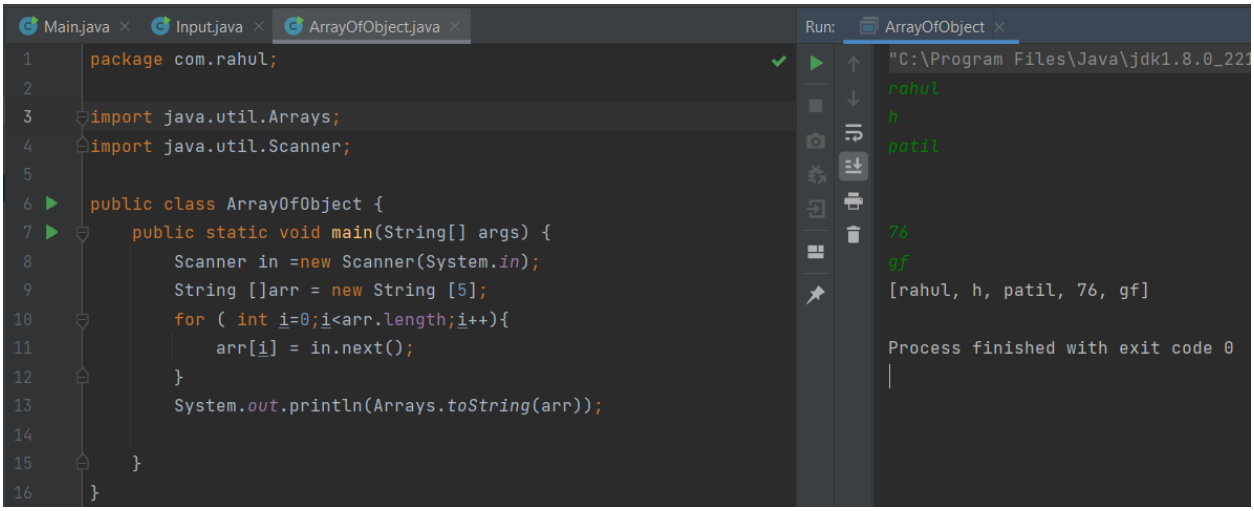


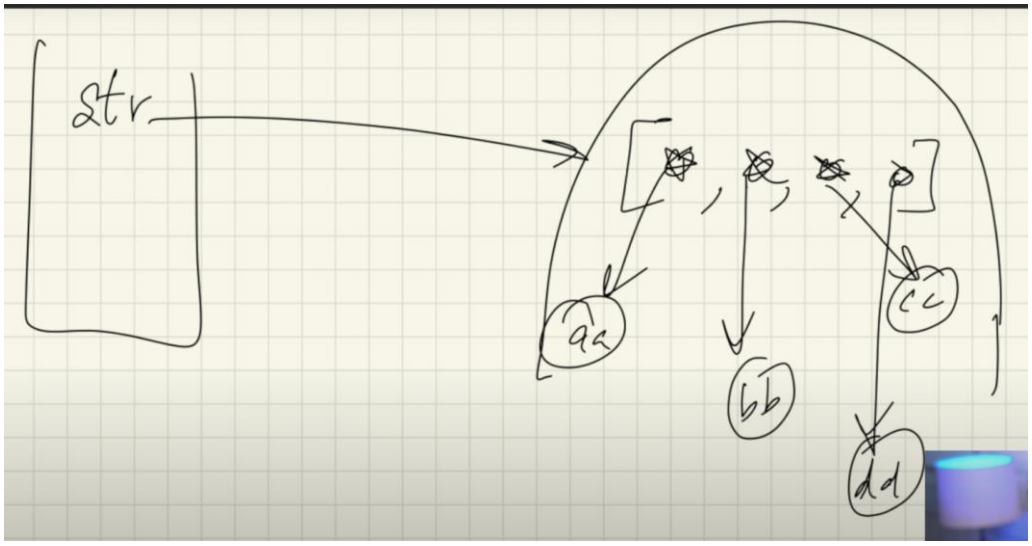
FOR EACH LOOP

```
for(int num : arr) { // for every element in array, print the element
    System.out.print(num + " "); //  here num represents element of the array
}
```

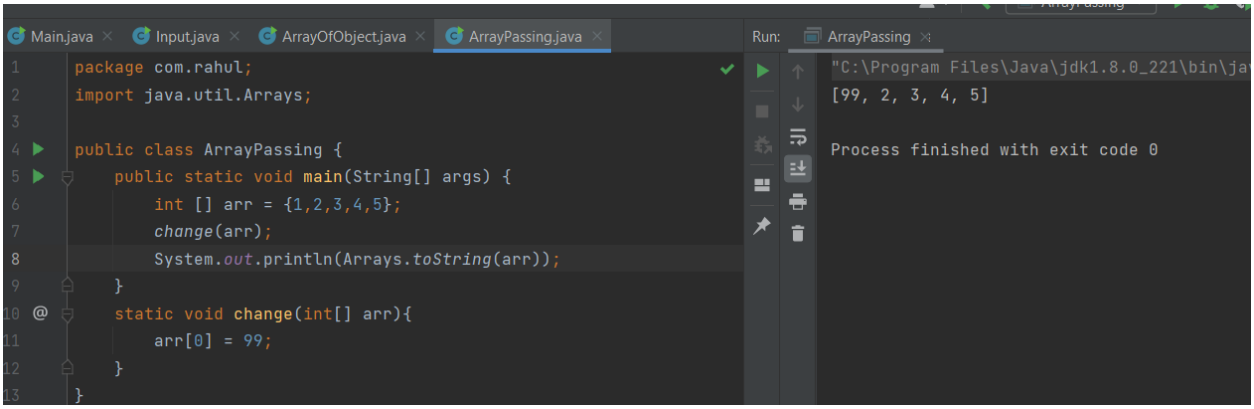


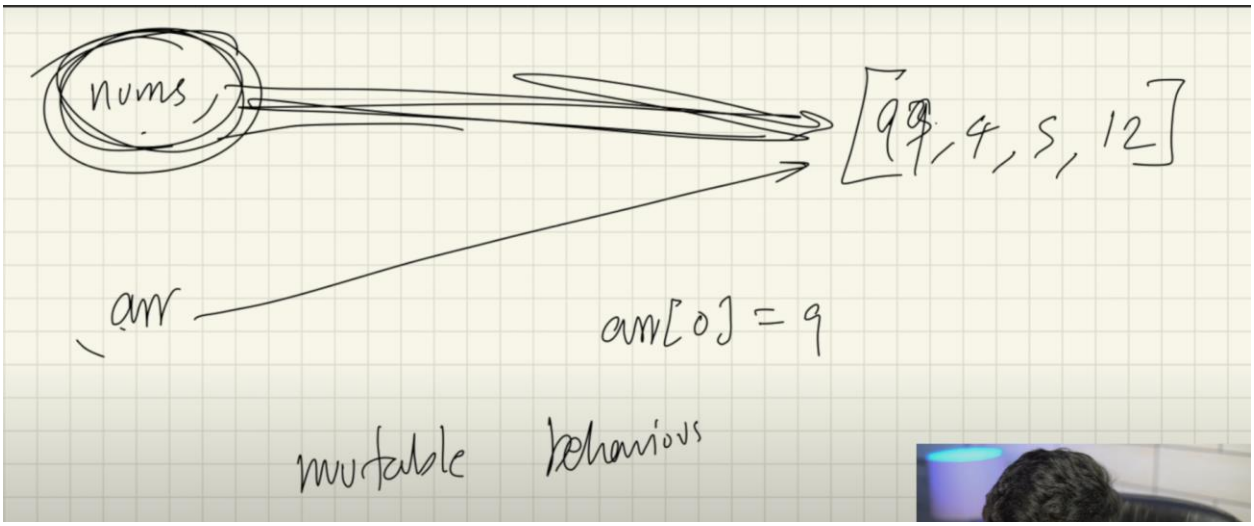
Array of objects



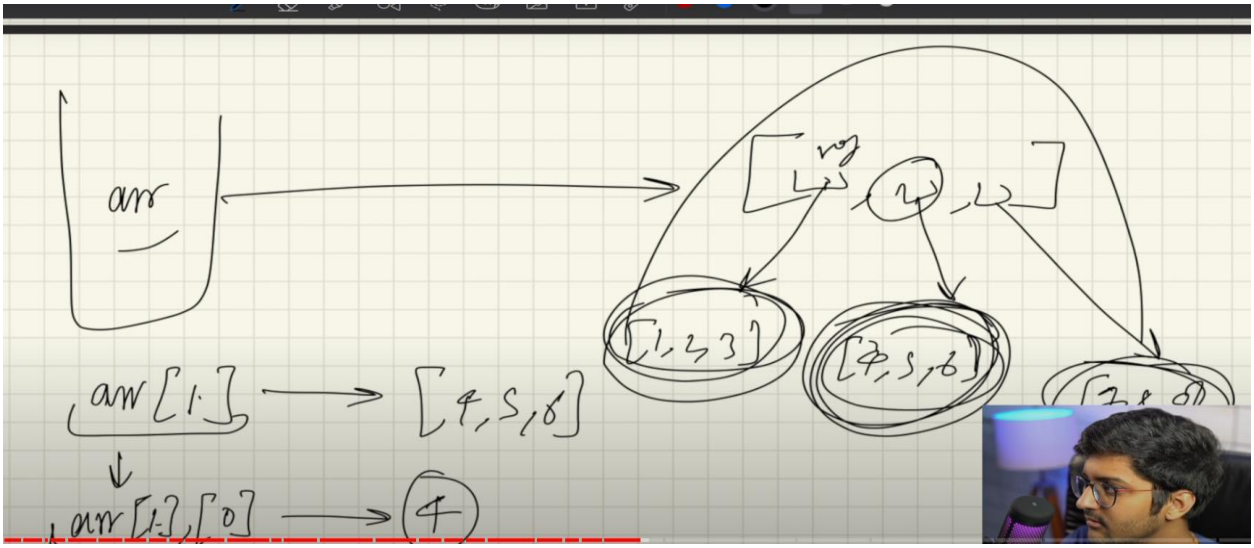


Array passing in function





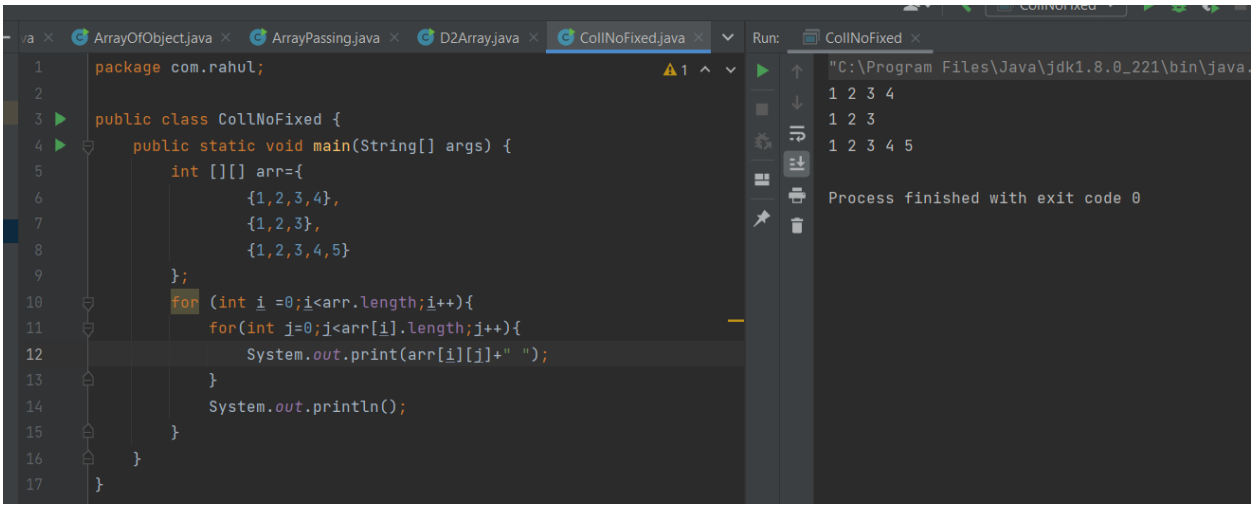
2 - Dimensional Array




```
int[][] arr = {
        {1, 2, 3},
        {4, 5},
        {6, 7, 8, 9}
```

```
public class D2Array {
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        int [][] arr = new int [3][3];
        for(int row=0;row<arr.length;row++){
            for(int col = 0; col< arr[row].length; col++){
                arr[row][col]= in.nextInt();
            }
        }
        /*
        for(int row=0;row<arr.length;row++){
            for(int col = 0; col< arr[row].length; col++){
                System.out.println(arr[row][col]);
            }
        }
        for (int[] ints : arr) {
            for (int col = 0; col < ints.length; col++) {
                System.out.println(ints[col]);
            }
        }*/
        for (int[] ints : arr) {
            for (int anInt : ints) {
                System.out.print(anInt+" ");
            }
            System.out.println();
        }

    }
}
```

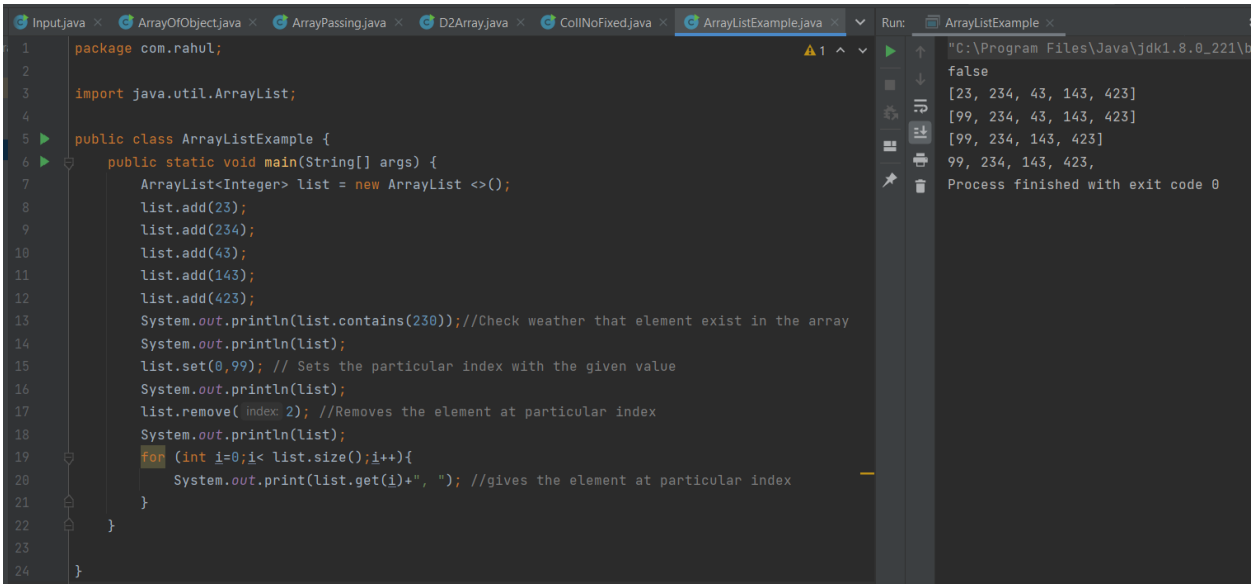
```
"C:\Program Files\Java\jdk1.8.0_221\bi
1 1 1
2 2 2
3 3 3
1 1 1
2 2 2
3 3 3

Process finished with exit code 0
```




```
package com.rahul;

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

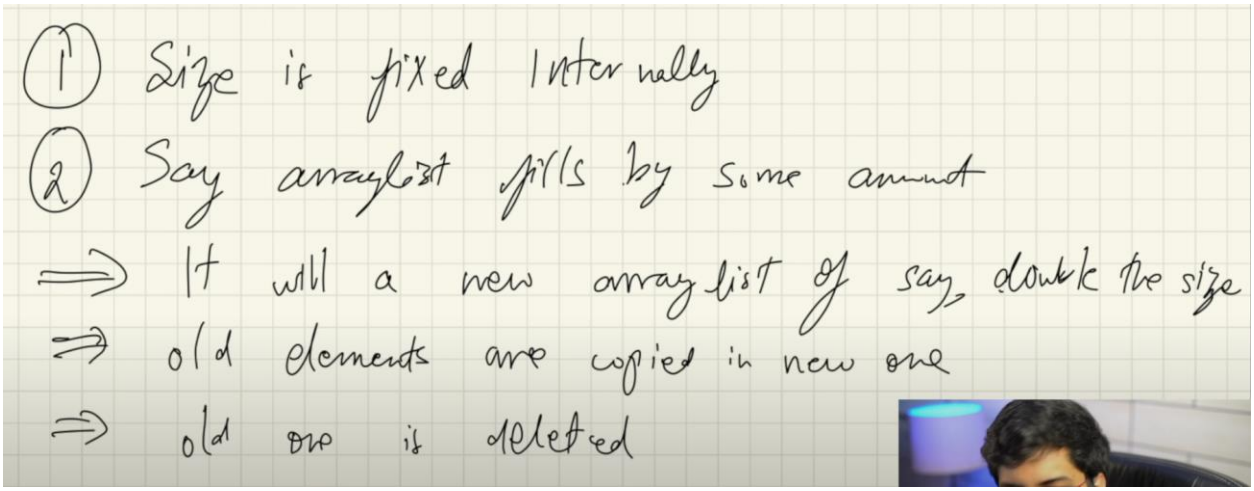
Array List Syntax

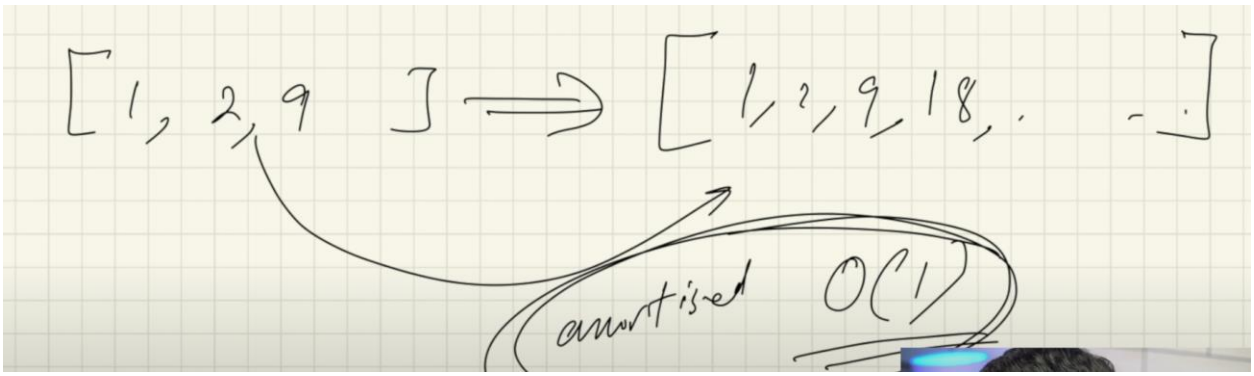
```
import java.util.ArrayList;

public class ArrayListExample {
    public static void main(String[] args) {
        // Syntax
        ArrayList<Integer> list = new ArrayList<>( initialCapacity: 10);


    }
}
```




```
package com.rahul;

import java.util.ArrayList;

public class ArrayListExample {
    public static void main(String[] args) {
        ArrayList<Integer> list = new ArrayList <>();
        list.add(23);
        list.add(234);
        list.add(43);
        list.add(143);
        list.add(423);
        System.out.println(list.contains(230));//Check weather that element exist in the array
        System.out.println(list);
        list.set(0,99); // Sets the particular index with the given value
        System.out.println(list);
        list.remove( index: 2); //Removes the element at particular index
        System.out.println(list);
        for (int i=0;i< list.size();i++){
            System.out.print(list.get(i)+", "); //gives the element at particular index
        }
    }

}
```

How Array List size is maintained.



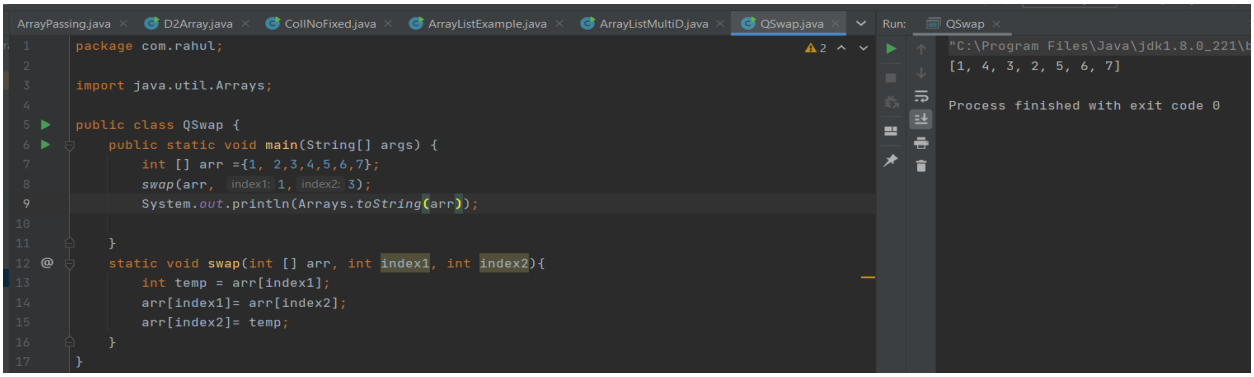


Array List follows amortized time complexity.

```java
package com.rahul;

import java.util.ArrayList;
import java.util.Scanner;

public class ArrayListMultiD {
    public static void main(String[] args) {
        ArrayList<ArrayList<Integer>> list= new ArrayList<>();
        Scanner in= new Scanner(System.in);
        // initialisation
        for(int i=0;i<3;i++){
            list.add(new ArrayList<>());
        }

        //add elements
        for(int i=0;i<3;i++){
            for(int j=0;j<3;j++){
                list.get(i).add(in.nextInt());
            }
        }
        System.out.println(list);
    }
}
```

```
"C:\Program Files\Java\jdk1.8.0_221\bi
1 2 3 4 5 6 7 8 9
[[1, 2, 3], [4, 5, 6], [7, 8, 9]]

Process finished with exit code 0
```

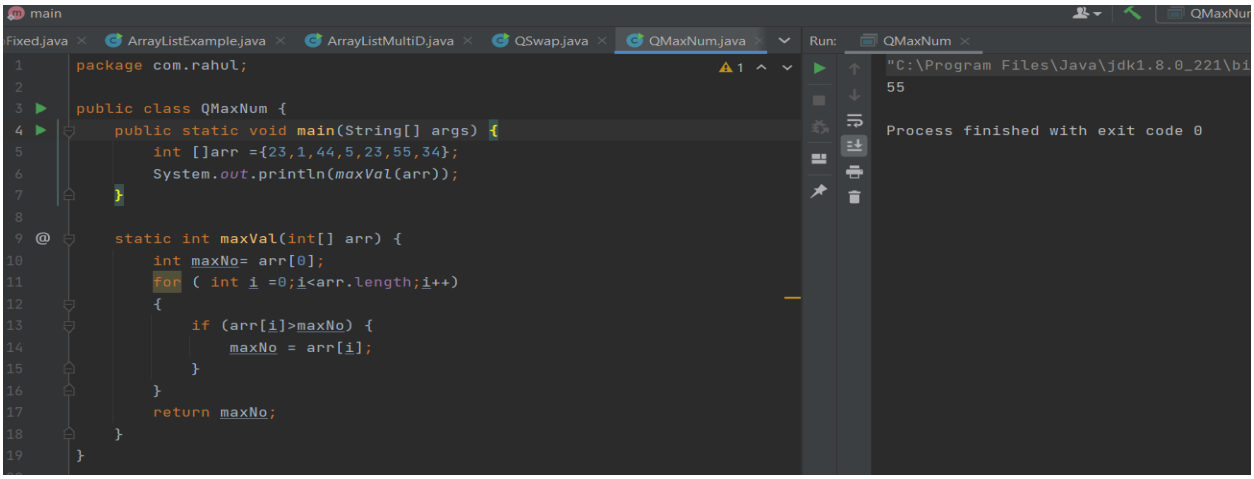
Q Swap



```java
package com.rahul;

import java.util.Arrays;

public class QSwap {
    public static void main(String[] args) {
        int [] arr ={1, 2,3,4,5,6,7};
        swap(arr, index1: 1, index2: 3);
        System.out.println(Arrays.toString(arr));

    }
    static void swap(int [] arr, int index1, int index2){
        int temp = arr[index1];
        arr[index1]= arr[index2];
        arr[index2]= temp;
    }
}
```

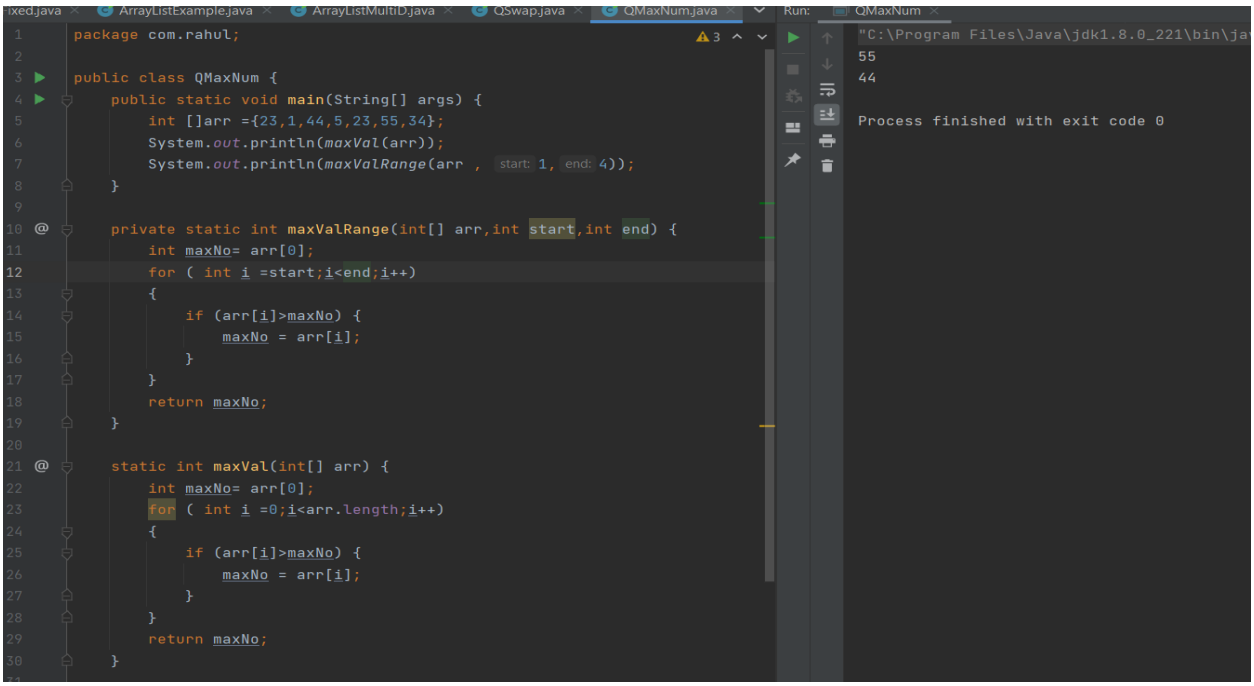
```
"C:\Program Files\Java\jdk1.8.0_221\b
[1, 4, 3, 2, 5, 6, 7]

Process finished with exit code 0
```

QMax



```java
package com.rahul;

public class QMaxNum {
    public static void main(String[] args) {
        int []arr ={23,1,44,5,23,55,34};
        System.out.println(maxVal(arr));
    }

    static int maxVal(int[] arr) {
        int maxNo= arr[0];
        for ( int i =0;i<arr.length;i++)
        {
            if (arr[i]>maxNo) {
                maxNo = arr[i];
            }
        }
        return maxNo;
    }
}
```

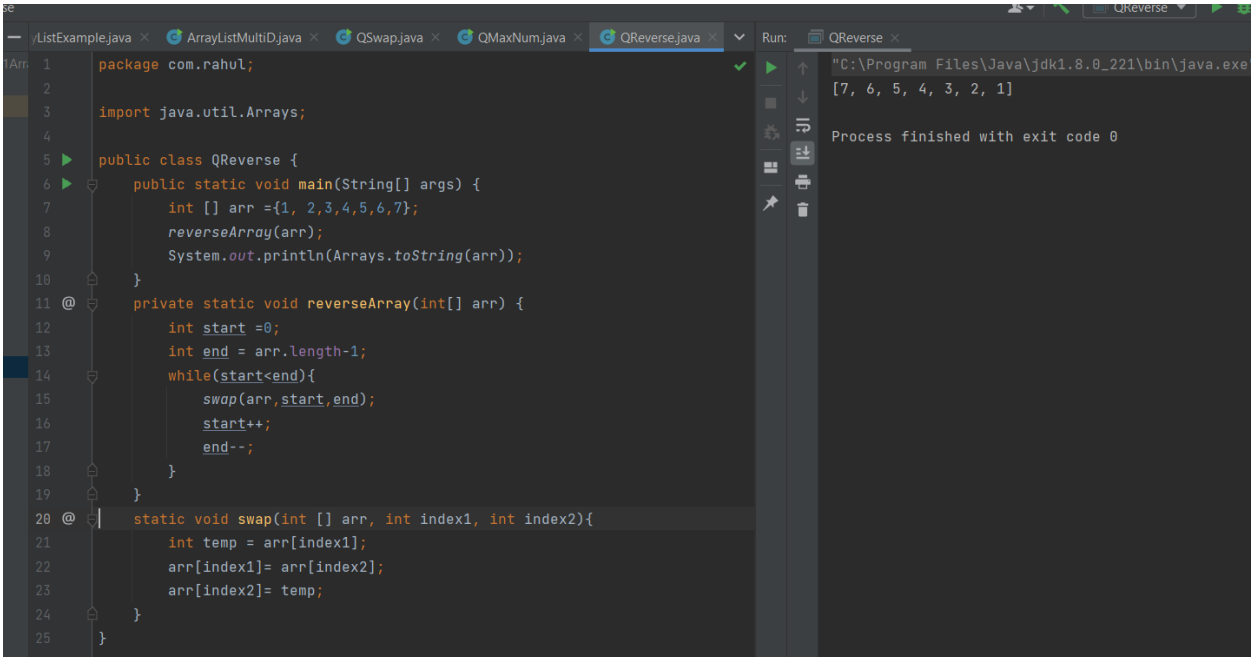
```
"C:\Program Files\Java\jdk1.8.0_221\bi
55

Process finished with exit code 0
```



```java
package com.rahul;

public class QMaxNum {
    public static void main(String[] args) {
        int []arr ={23,1,44,5,23,55,34};
        System.out.println(maxVal(arr));
        System.out.println(maxValRange(arr , start: 1, end: 4));
    }

    private static int maxValRange(int[] arr,int start,int end) {
        int maxNo= arr[0];
        for ( int i =start;i<end;i++)
        {
            if (arr[i]>maxNo) {
                maxNo = arr[i];
            }
        }
        return maxNo;
    }

    static int maxVal(int[] arr) {
        int maxNo= arr[0];
        for ( int i =0;i<arr.length;i++)
        {
            if (arr[i]>maxNo) {
                maxNo = arr[i];
            }
        }
        return maxNo;
    }
```

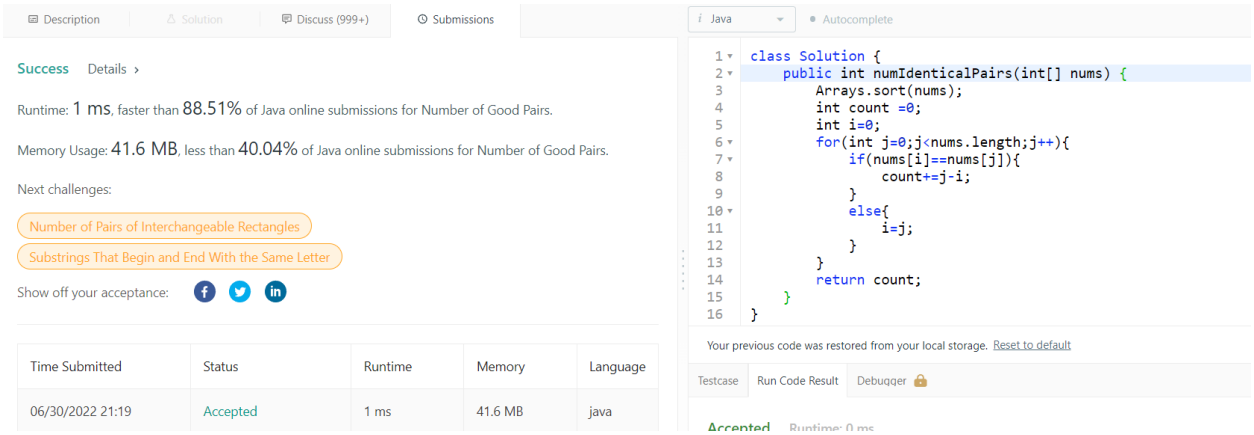
```
"C:\Program Files\Java\jdk1.8.0_221\bin\ja
55
44

Process finished with exit code 0
```

Q Reverse



Leetcode Problems

Q Number of Good pairs



Time Complexity :O(nlogn)

https://leetcode.com/problems/number-of-good-pairs/submissions/