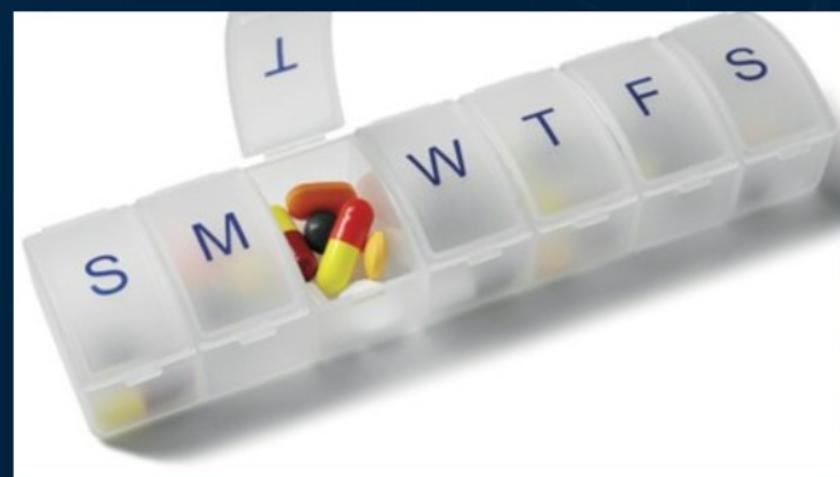


ARRAY

WHAT IS AN ARRAY?

0. Data structure / Collection of elements
1. Elements of same data type
2. Fixed number of size



First index - Array indexes starts from 0



0

1

2

3

4

5

Civil	CSE	ECE	EEE	IT	Mech
-------	-----	-----	-----	----	------



String

A vertical blue arrow pointing downwards, indicating the value "String" associated with the array element at index 0.

ARRAY DECLARATION

0

1

2

3

4

5

Civil

CSE

ECE

EEE

IT

Mech

```
String[] departments;
```

```
String departments[];
```

ARRAY INITIALIZATION

0	1	2	3	4	5
Civil	CSE	ECE	EEE	IT	Mech

```
String departments[] = {"Civil", "CSE", "ECE", "EEE", "IT", "Mech" };
```

```
String departments[] = new String[6];
```

```
departments[0] = "Civil" ;
```

```
departments[1] = "CSE";
```

```
...
```

ACCESS THE ELEMENTS OF ARRAY

```
String departments[] = {"Civil", "CSE", "ECE", "EEE", "IT", "Mech" };  
for(int i = 0; i < departments.length; i++) {  
    System.out.println(departments[i]);  
}
```

Output :

Civil
CSE
ECE
EEE
IT
Mech

CHANGE THE ARRAY ELEMENT

```
String departments[] = {"Civil", "CSE", "ECE", "EEE", "IT", "MECH" };  
departments[0] = "Aeronautical";  
  
for(int i = 0; i < departments.length; i++) {  
    System.out.println(departments[i]);  
}
```

Output :

Aeronautical
CSE
ECE
EEE
IT
Mech

LOOP THROUGH FOR-EACH

```
String departments[] = {"Civil", "CSE", "ECE", "EEE", "IT", "MECH" } ;  
for(String i : departments) {  
    System.out.println(i);  
}
```

Output :

Civil
CSE
ECE
EEE
IT
Mech

CAN PRINT AN ARRAY WITHOUT LOOP ?

```
String departments[] = {"Civil", "CSE", "ECE", "EEE", "IT", "MECH" };
```

```
Arrays.toString(departments)
```

First index - Array indexes starts from 0



0

1

2

3

4

5

CIVIL

CSE

ECE

EEE

IT

MECH

String

WHY DO ARRAY INDEXES START WITH 0?

- 0. Influenced by C Language
- 1. Address of first element

0	1	2	3	4	5
CIVIL	CSE	ECE	EEE	IT	MECH

address 0

address 1

address 2

address 3

address 4

address 5

String departments[6];

departments = &departments



Address of departments array

*departments = *(departments + 0)

*departments = "CIVIL"



Value of department[0]

*departments[1] = *(departments + 1)



Value of department[1]

*departments[n] = *(departments + n)



Value of department[n]

0

1

2

3

4

5

CIVIL

CSE

ECE

EEE

IT

MECH

String department[6];

Index 0 :

value of first element of array *(department) aka *(department + 0)

value of 2nd element of array *(department + 1)

department[0] = *(department + 0)

Index 1 :

department[1] = *(department + 1 - 1)

MULTI DIMENSIONAL ARRAY

MULTI DIMENSIONAL ARRAY

0. Arrays of array

1. Appends a [] per dimension

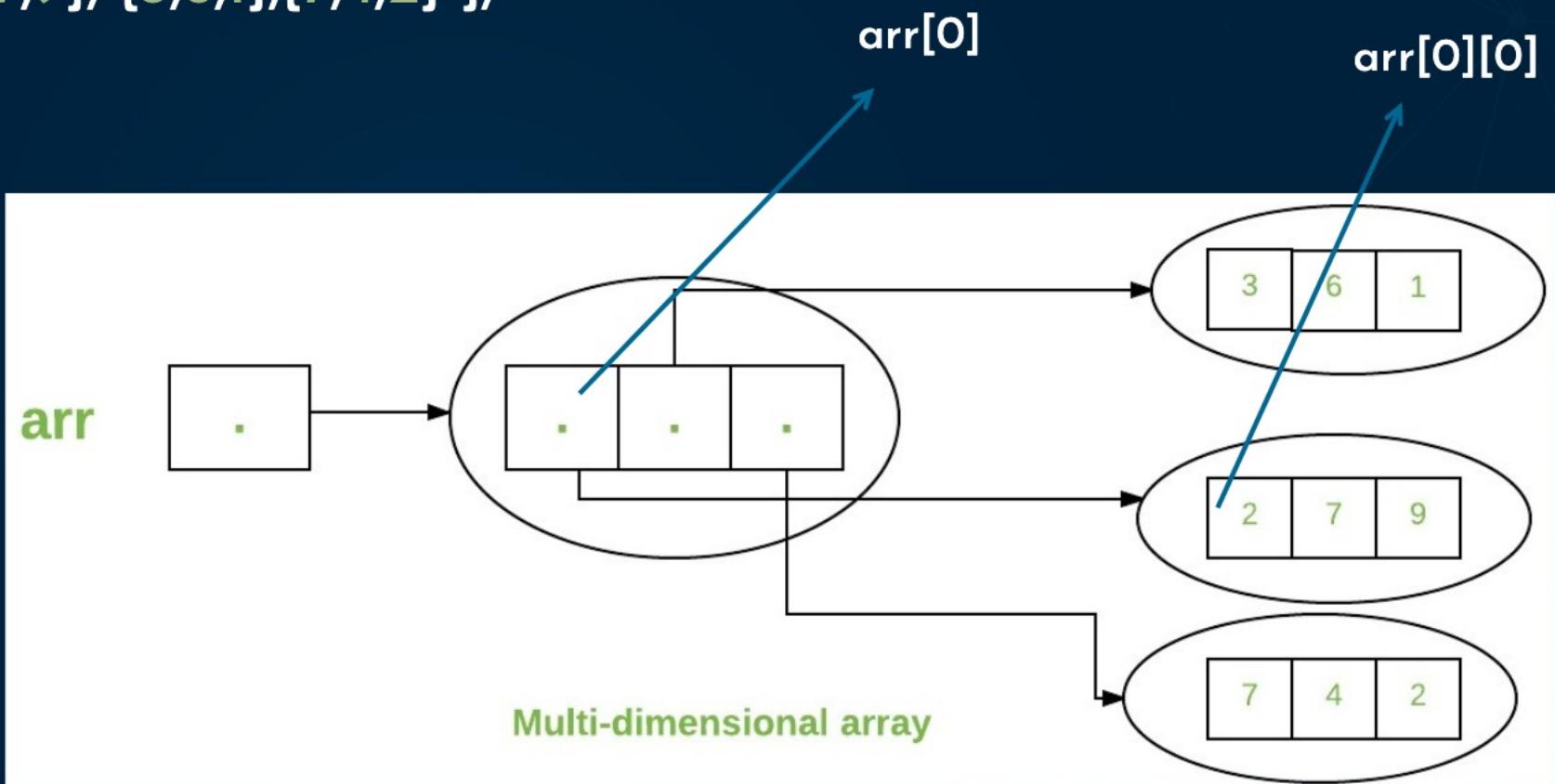
```
int intArray[][] = new int[2][4]; → a 2D array
```

```
int intArray[][][] = new int[2][4][3]; → a 3D array
```

INITIALIZATION OF A 2D ARRAY

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

2	7	9
3	6	1
7	4	2



PRINTING 2D ARRAY

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

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

Output:

2	7	9
3	6	1
7	4	2

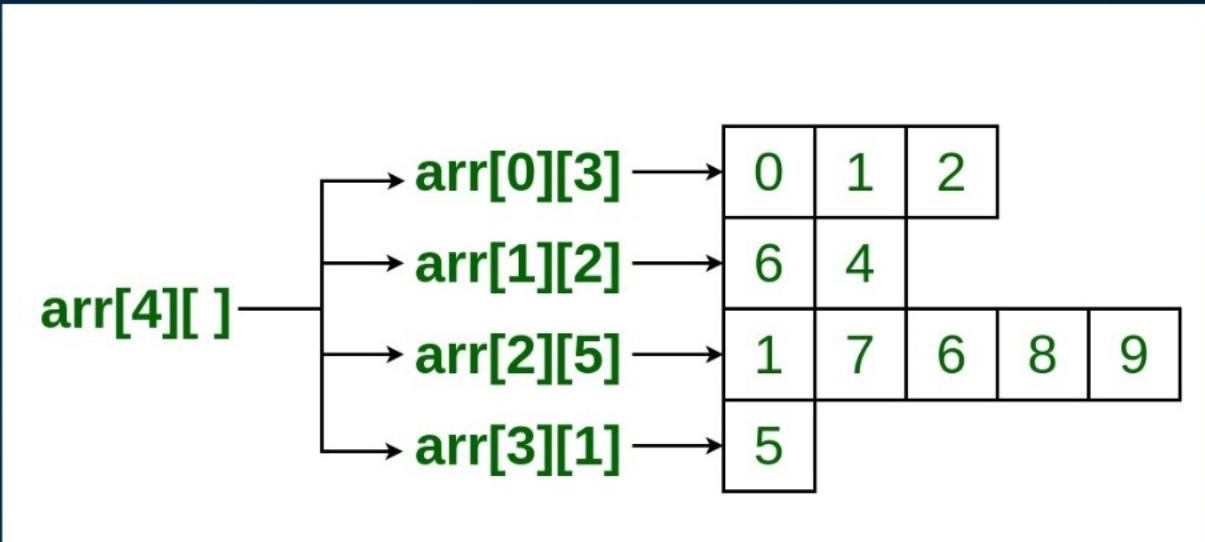
JAGGED ARRAY



JAGGED ARRAY

- Member array can be different sizes

```
int jaggedArray[][] = new int[4][];  
jaggedArray[0] = {0,1,3};  
jaggedArray[1] = {6,4};  
jaggedArray[2] = {1,7,6,8,9};  
jaggedArray[3] = {5};
```



ANONYMOUS ARRAY



ANONYMOUS ARRAY

O. Array without name

1. We can pass an array with user values without the referenced variable.

```
new int[] {0,1,3}; //Anonymous integer array
```

```
new char[] {'a','b','c'}; //Anonymous char array
```

```
new String[] {"ECE", "CSE", "IT"}; //Anonymous String array
```

```
new int[][] {{0,1,3}, {2,3}}; //Anonymous multi dimensional array
```

```
class Test {
    public static void main(String[] args)
    {
        // anonymous array
        sum(new int[]{ 1, 2, 3 });
    }

    public static void sum(int[] a)
    {
        int total = 0;

        // using for-each loop
        for (int i : a)
            total = total + i;

        System.out.println("The sum is: " + total);
    }
}
```

The sum is : 6

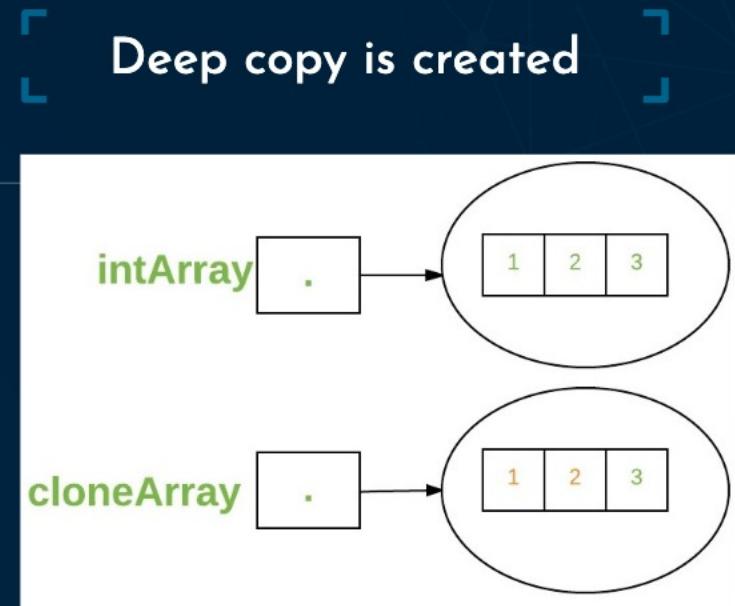
CLONING OF AN ARRAY

```
class Test
{
    public static void main(String args[])
    {
        int intArray[] = {1,2,3};

        int cloneArray[] = intArray.clone();

        System.out.println(intArray == cloneArray);

        for (int i = 0; i < cloneArray.length; i++) {
            System.out.print(cloneArray[i]+ " ");
        }
    }
}
```



Output :

False

1 2 3

CLONING OF A 2D ARRAY

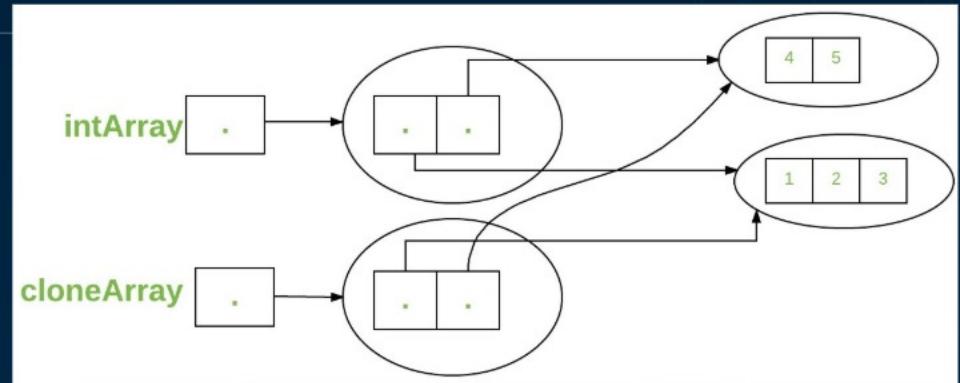
```
class Test
{
    public static void main(String args[])
    {
        int intArray[][] = {{1,2,3},{4,5}};

        int cloneArray[][] = intArray.clone();

        System.out.println(intArray == cloneArray);

        System.out.println(intArray[0] == cloneArray[0]);
        System.out.println(intArray[1] == cloneArray[1]);
    }
}
```

Shallow copy is created



Output :



What will be the output?

```
class TestReturnArray{  
  
    static int[] get(){  
        return new int[]{10,30,50,90,60};  
    }  
  
    public static void main(String args[]){  
  
        int arr[] = get();  
  
        for(int i=0;i<arr.length;i++){  
  
            System.out.println(arr[i]);  
        }  
    }  
}
```

10
30
50
90
60

What will be the output?

```
class GFG
{
    public static void main (String[] args)
    {
        int[] arr = new int[2];
        arr[0] = 10;
        arr[1] = 20;

        for (int i = 0; i <= arr.length; i++)
            System.out.println(arr[i]);
    }
}
```

Runtime error:

10

20

Exception in thread "main"
java.lang.ArrayIndexOutOfBoundsException:
at GFG.main(File.java:12)

ARRAYS

WHAT IS ARRAYS CLASS?

0. The Arrays class in `java.util` package is a part of the Java Collection Framework.
1. It consists of only static methods and the methods of Object class to access Java Arrays.

QUESTION 1

This 2D array of string like

<"luke", "shaw">

<"wayne", "rooney">

<"rooney", "ronaldo">

<"shaw", "rooney">

Where the first string is “child”, second string is “Father”.

And given “ronaldo” we have to find his no of grandchildren

Here “ronaldo” has 2 grandchildren.

So our output should be 2.

QUESTION 2

Given a set of numbers <49, 36, 8, 10, 12> we want to find sum of weights based on the following conditions

1. 5 if a perfect square
2. 4 if multiple of 4 and divisible by 6
3. 3 if even number

Sort the numbers based on the weight in descending order.

Output : <Number, weightage>

<36,12> <12,7> <49,5> <10,3> <8,3>

QUESTION 3

If the given string length is odd print the pattern below otherwise print 0.

```
P      M  
R     A  
O   R  
G  
O   R  
R     A  
P      M.
```

QUESTION 4

Get 2 matrix from user and multiply it.

Example input

1	2	5	6	7
3	4	8	9	10

Output format should be

21	24	27
47	54	61

QUESTION 5

Given an array of n elements. Our task is to write a program to rearrange the array such that elements at even positions are greater than all elements before it and elements at odd positions are less than all elements before it.

Input : arr[] = {1, 2, 3, 4, 5, 6, 7}
Output : 4 5 3 6 2 7 1

Input : arr[] = {1, 2, 1, 4, 5, 6, 8, 8}
Output : 4 5 2 6 1 8 1 8

MORE QUESTIONS

6. Write a function left/right rotate(ar[], d, n) that rotates arr[] of size n by d elements.
7. Reversal and Block swap algorithm for array rotation
8. Rotate Matrix by 90 degrees clockwise Inplace
9. Print Matrix in Spiral form.
10. Addition, Subtraction, Multiplication, Scalar Multiplication, Transpose, Saddle point, Adjoint , Inversion, Rank of Matrix Check whether the given is identity/square/vertical/diagonal.. Matrix or not.

ARRAY ROTATION :

Rotate by +90:

1. Transpose
2. Reverse each row

Rotate by -90:

Method 1 :

1. Transpose
2. Reverse each column

Method 2 :

1. Reverse each row
2. Transpose

Rotate by +180:

Method 1: Rotate by +90 twice

Method 2: Reverse each row and then reverse each column (Transpose)

Rotate by -180:

Method 1: Rotate by -90 twice

Method 2: Reverse each column and then reverse each row

Method 3: Rotate by +180 as they are same

JAVA GAMING PROJECTS WITH ARRAY

1. Tic Tac Toe Java Game
2. Snake and ladder Game
3. Mine Sweeper Game
4. Chess
5. Sudoku

& Many more

1. WHICH IS NOT AN ARRAY?

1
2
3
4

A

1 D Array

1	2
2	4
3	6

B

2 D Array

1	2			
2	4	6	8	
3	6	9	12	15

C

Jagged Array

2. WHICH IS AN ARRAY?



3. WHAT IS THE OUTPUT?

```
public class Main {  
    public static void main(String[] args) {  
        int[] a;  
        a[0] = 5;  
        System.out.println(a[0]);  
    }  
}
```

```
Main.java:4: error: variable a might not have been initialized  
        a[0] = 5;  
               ^  
1 error
```

REFERENCE

- <https://www.geeksforgeeks.org/top-50-array-coding-problems-for-interviews/>
- <https://www.geeksforgeeks.org/category/data-structures/matrix/>
- <https://algorithms.tutorialhorizon.com/top-40-problems-on-arrays/>
- <https://leetcode.com/tag/array/>
- <https://www.hackerrank.com/domains/data-structures?filters%5Bsubdomains%5D%5B%5D=arrays>