9/12/23
Monday

DSA - Day 1
Array Day 1

ARRAYS AND APPARELS?

- Why do we need Arrays?

It was simple when we had to store just five integers/some numbers and now lets assume we have to store 5000 integer numbers is it possible to use 5000 variables? [no]
To handle these situations, in almost all programming languages we have a concept cln Arrays.

Array is a data structure, in almost all programming languages used to store collection of data.

- Syntax:

compile time → datatype [ ] variable_name = new datatype [size]; ← runtime

Ex: int [] nos = new int [5]; or int [] nos = {1, 2, 3, 4, 5};

- datatype [ ] variable_name; //declaration of array.

represents the type of data stored in the array.

- All the data in the array should have same datatype.

- variable_name = new datatype [size]; //initialization

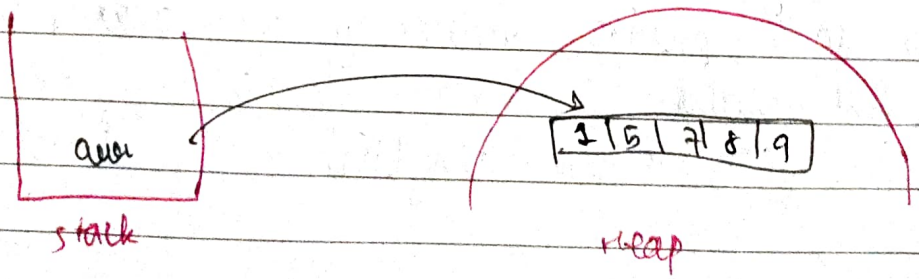
↳ actual memory allocation happens here

Here, object is being created in heap memory.

[Memory is allocated at runtime or execution time]

```
import java.util.Arrays;
```

Ex: int arr[] = {1,5,7,8,9};



⇒ Internal Representation of Array:

- Internally in Java, memory allocation totally depends on JVM whether it be continuous or not! b/c:

① Objects are stored in heap memory.
② In JLS (Java Language Specification) it is mentioned that heap objects are not continuous.
③ Dynamic memory allocation, Hence, array objects in Java may not be continuous (depends on JVM)

⇒ Index of an array:

In Java, the first index of first element is 0, index of second element is 1 and so on.

Ex: int arr[] = {1,2,3,4,5};

Then, arr[0]=1 arr[1]=2 arr[2]=3 arr[3]=4 arr[4]=5

If we write,

arr[4]=6;

then: array becomes [1|2|3|4|6]

⇒ new keyword:

It is used to create an object.

int[] arr = new int[5];

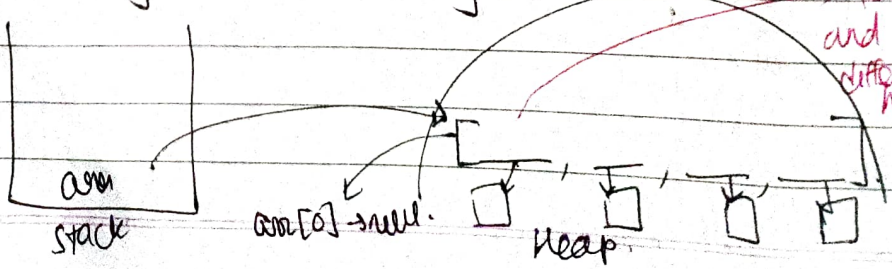
Here, it will create an object in heap memory of array size 5.

⇒ Null array:

If we don't provide values in the array, internally by default it stores [0,0,0,...] for int array. for string array [null, null, null]

Ex: String[] arr = new String[4];

Note: arr itself is an object and will be stored in different part of heap memory.



NOte • primitives (int, char, etc) are stored in stack.
• All other objects are stored in heap memory

⇒ Arrays.toString(arrays) > internally uses for loop and gives the output in proper format.

• Arrays are mutable [i.e we can change the objects]

2D Arrays

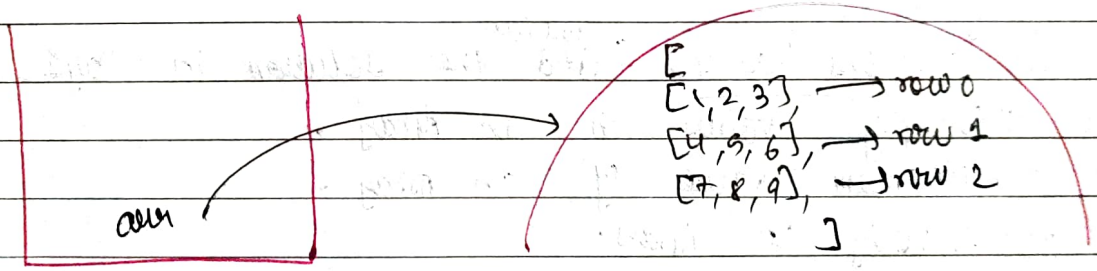
Syntax:

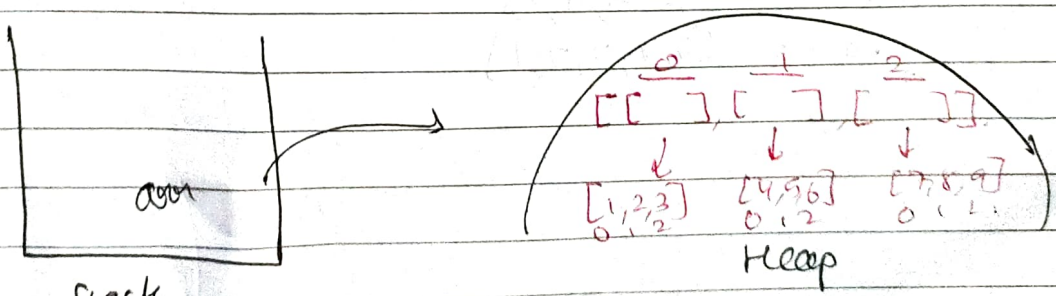
```
int[][] arr = new int[size][ ]
```

row, column.
mandatory to give size of row
next mandatory.

or

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





eg, arr[0] : [1,2,3]
but
arr[0][0] = 1.

use when you dk the size of array

import java.util.ArrayList;

ArrayList:

ArrayList is a part of collection framework and present in java.util.package. It provides us with dynamic arrays in Java. It is slower than standard arrays.

Syntax:

```
ArrayList <Integer> List = new ArrayList< >();
```

(datatype, variable)

⇒ Internal working of ArrayList:

- Size is fixed internally.
- Suppose arraylist gets filled by some amount.
  a) It will make an arraylist of say double the size of arraylist initially.
  b) Old elements are copied in the new arraylist.
  c) Old ones are deleted.

⇒ Questions (Basics)

You can find the solution in Day1_Code Folder

Q1) Swapping values in an Array.
Q2) Maximum value of an Array.
Q3) Reversing an Array.