10/8/21 Introduction to Arrays & Arraylist in Java

Why do we need Arrays?

⇒ It was simple when we had to store just five integer numbers and now let's assume we have to store 5000 integer numbers. Is it possible to use 5000 variable? NO

To handle these situations, in almost all programming language we have a concept called **Array**.

Array is a data structure use to store a collection of data.

⇒ Syntax of an Array:

```
datatype [ ] variable_name = new datatype[size];
```

eg: we want to store roll numbers:

```
int[ ] rollnos = new int[5];
```

store 5 roll numbers

OR

```
int[ ] rollnos = {51, 82, 13, 15, 16};
```

represent the type of data stored in array.

All the type of data in array should be same!

⇒ Internal working of array:

```
int[ ] rollnos;   //declaration of array
```

↳ rollnos are getting defined in stack

```
rollnos = new int[5];   //initialisation
```

↳ actual memory allocation happens here

Here, object is being created in heap memory.

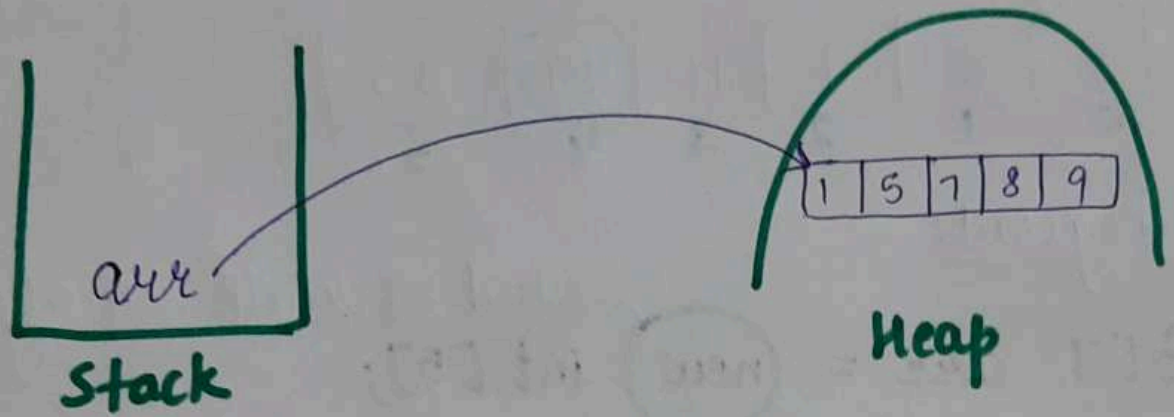
declaration of array → compile time

initialisation → run time

```
int [] arr = new int[5];
```

- `int []` : datatype
- `arr` : ref var
- `new int[5]` : creating object in heap memory.

⇒ This above concept is known as Dynamic memory allocation which means at runtime OR execution time memory is allocated.



⇒ Internal Representation of Array :

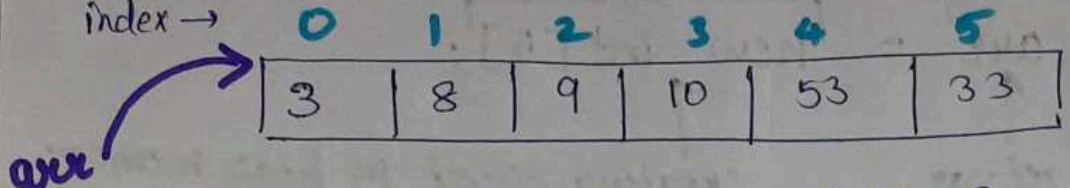
- Internally in Java, memory allocation totally depends on JVM whether it be continuous or not !

Reason 1 : Objects are stored in heap memory.

Reason 2 : In JLS (Java Language Specification) it is mentioned that heap objects are not continuous

Reason 3 : Dynamic memory allocation. Hence, array objects in Java may not be continous (depends on JVM)

⇒ Index of an array:

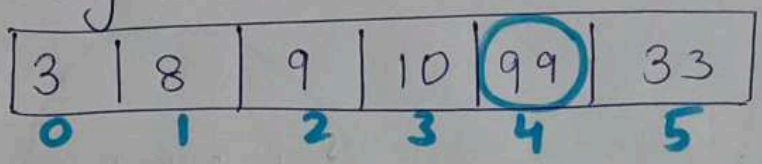


arr[0] = 3
arr[1] = 8
arr[2] = 9
arr[3] = 10
arr[4] = 53
arr[5] = 33

Suppose to change the value of certain index:

arr[4] = 99

New array will be:



⇒ new keyword:

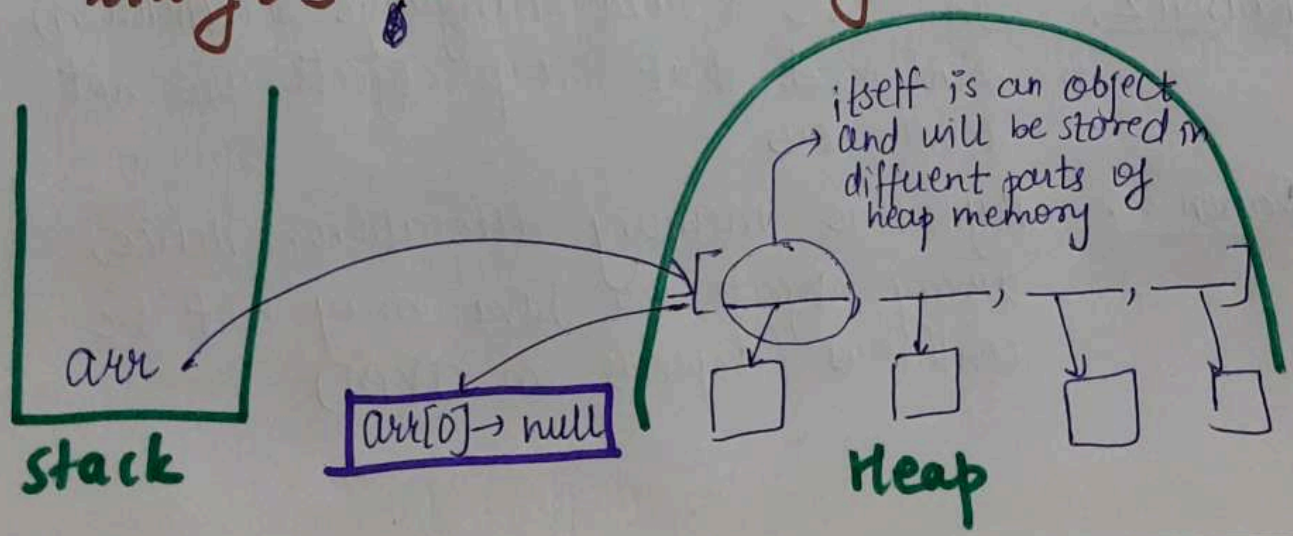
int[] arr = new int[5];

new → used to create an object

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

⇒ If we don't provide values in the array, internally by default it stores [0, 0, 0, 0, 0] for above size of array.

String[] arr = new String[4];



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

⟹ Arrays.toString(array) → internally uses for loop and gives the output in proper format.

* In an array, since we can change the objects, hence they are <u>mutable</u>.
* strings are immutable.

⟹ <u>2 D Array:</u>

3 (columns)

1	2	3
4	5	6
7	8	9

3 (rows)

⟹ `int[][] arr = new int[size][];`

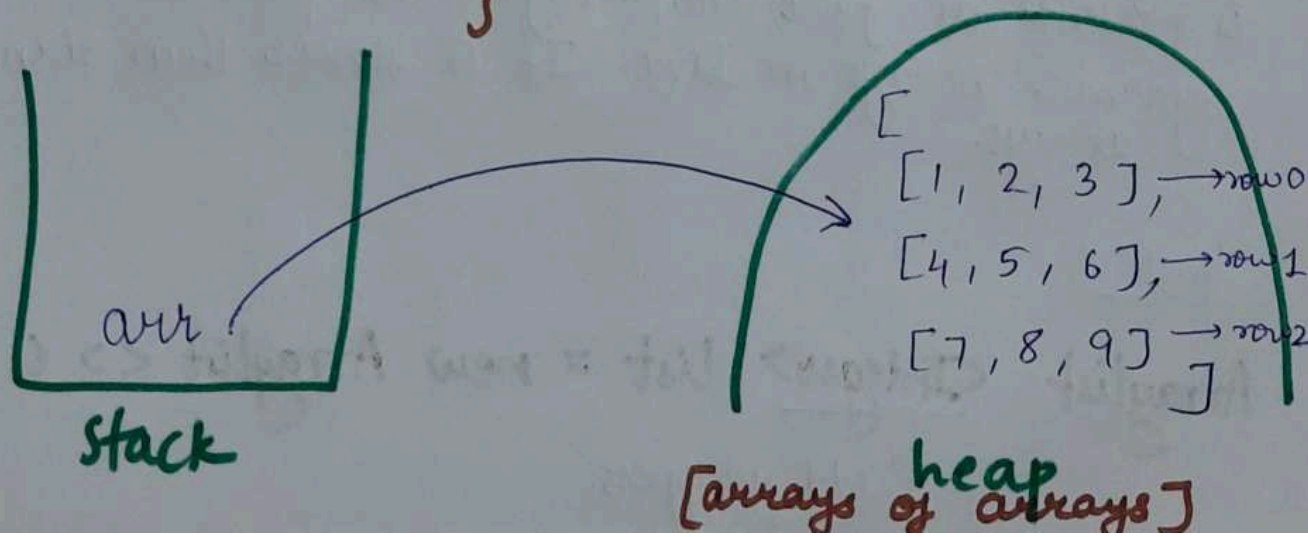
row ↓ column ↓

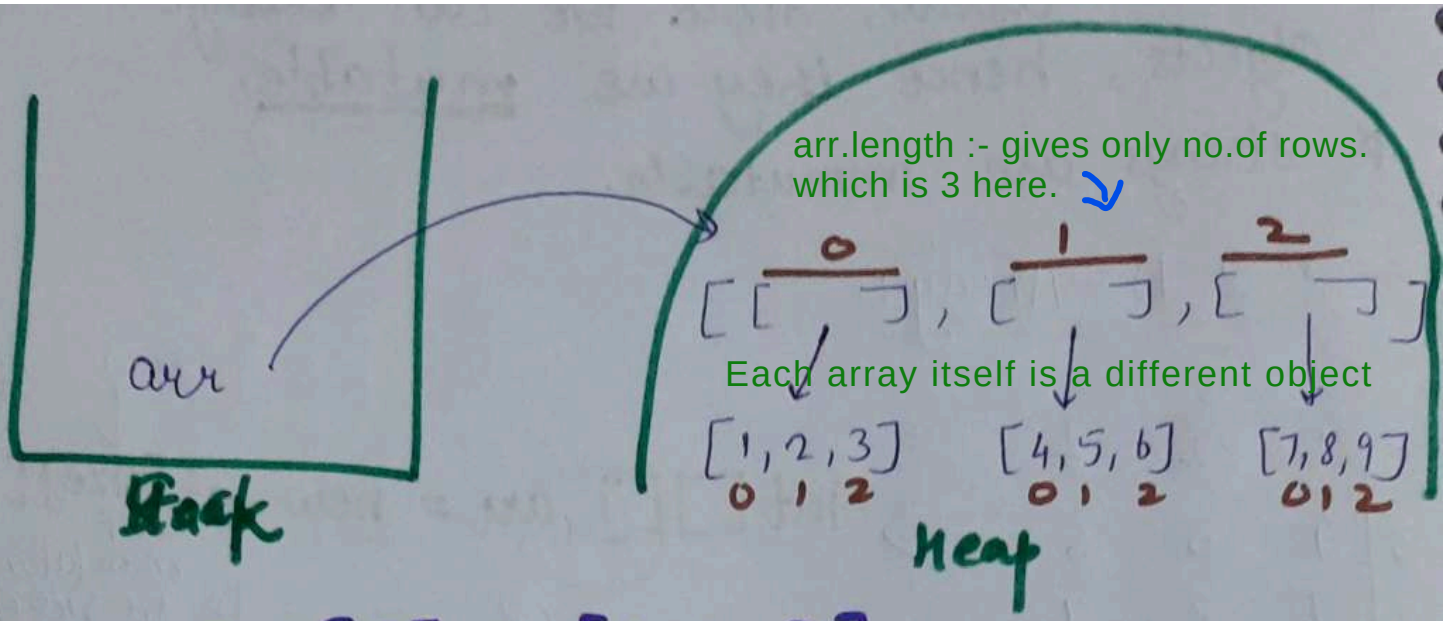
size → mandatory to give size of row

[] → not mandatory

OR

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





arr[0] = [1, 2, 3]

arr[0][2] = 3

element

⇒ Arraylists:

Arraylist is a part of collection framework and is 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 <> ( );
```

add wrappers.

⇒ 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.