08 Memory Management

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Agenda :

1. Introduction To Stack
2. Types Of Memory In Java

1. Introduction To Call Stack

For Below Code :

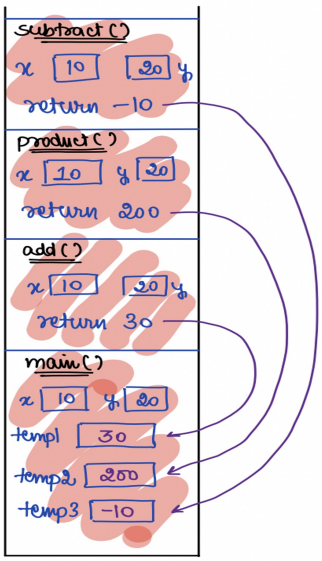
```
int add(int x, int y) {
   return x + y;
}

int product(int x, int y) {
   return x * y;
}

int subtract(int x, int y) {
   return x - y;
}

public static void main() {
   int x = 10;
   int y = 20;
   int temp1 = add(x, y);
   int temp2 = product(x, y);
   int temp3 = subtract(x, y);
   System.out.println(temp1 + temp2 + temp3);
}
```

Following is the Call Stack Execution :



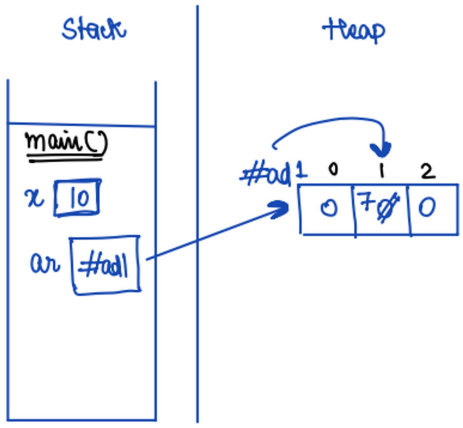
2. Types Of Memory In Java

1. Stack :- **All the primitive data type and reference will be stored in stack.**

2. Heap :- **Container of that reference is stored in heap. Arrays, ArrayList, Objects are created inside heap.**

Example :

```
public static void main() {
   int x = 10;
   int[] ar = new int[3];
   System.out.println(ar); // #ad1
   System.out.println(ar[2]); // 0
   ar[1] = 7;
}
```



Note:

Primitive data types: [int, float, double, char, boolean, long] memory will be assigned in stack.
Reference/ address of the container: will be stored in stack.
Container: [Array/ Arraylist] will be stored in heap.

3. Questions

1. Predict the output :

```
static int[] fun(int[]a) {
   a = new int[2];
   a[0] = 50; a[1] = 60;
   return a;
}

public static void main(String args[]) {
   int[]a = {10,20,30};
   a = fun(a);
   System.out.println(a[0]);
}
```

Choices

10
50
Error

Explanation:

When fun method is called on array a, then a new integer array is allocated on the heap memory.
But since, we are returning the new array in the main method, so now the changes done in fun method persists.

2. Predict the output :

```
static void test(int[]a) {
   a = new int[2];
   a[0] = 94;
}

public static void main(String args[]) {
   int[]a = {10,20,30};
   test(a);
   System.out.println(a[0]);
}
```

Choices:

10
94
Error

Explanation:

Inside the test function, a new integer array with length 2 is allocated on the heap memory, and the reference to this array is assigned to the parameter variable a. Hence, now the variable 'a' inside test function and main function point to different references.