



CODING  
BLOCKS

## Lecture- 35

### OOPs

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# Interfaces

Working in a group **parallelly**.

Our Codes depend in each other.

We have a prototype and how our code will look like

- Return type and number of functions.
- And if we have to implement an Interface we have to write all those functions and we cannot change those properties
- Prototype should be the same.
- Have to give a body to each function in a class
  - implements
- You can always add new functions.

# Interface Cont

- Cannot Instantiate an Interface
  - If possible, how to execute function ? no body
  - These functions are abstract, Only declaration no body
- No constructor possible
- All methods are Abstracts
- All variables are static and final!!
  - Interfacename.var in other classes
- interfaces can extend multiple interfaces!!,  
[https://github.com/Lakshya-CB/NagarroBootcampMarJava/tree/main/Lec\\_52](https://github.com/Lakshya-CB/NagarroBootcampMarJava/tree/main/Lec_52)
  - DynamicI extends StackI,
    - StackI interface with abstract methods
    - If a class extends a DynamicI , then body to all abstract functions
- One Interface or class can extend other Interface!!
  - Unlike Classes, where Not allowed Multiple Inheritance

# Generics

Given an array of Integers ,  
Write a function to display it

Given an array of String ,  
Write a function to display it

Function OverLoading, : 2 same function differ by  
input argument

What if i want to print other class, can you create a  
function like that ?

To make a Generic to accept a T type of input  
public static <T> void display(T[] arr){

}

# Demo by Creating a Student Array

```
public static void main(String[] args) {  
  
    Student[] arr2 = new Student[4];  
    arr2[0] = new Student(100, "A",10);  
    arr2[1] = new Student(21, "B",9);  
    arr2[2] = new Student(101, "C",11);  
    arr2[3] = new Student(10, "D",15);  
    arr2[3] = new Student(120, "E",5);  
  
    disp(arr2);  
  
    Collections.sort(arr); ?????????????? Lets write our own sort!!  
}  
  
public static <OO1> void disp(OO1[] arr) {  
    for (OO1 lol : arr) {  
        System.out.println(lol);  
    }  
}
```

# Demo by Creating a Student Array

Write a Generic Function

```
public String toString(){  
  
}
```

Bubble Sort According to Age, will work , but generic sorting algo?!?! a standard!!

Car implements Comparable

```
car implements Comparable<car>  
c1.compareTo(c2)// c1 > c2 in numberi, C1-C2  
if Priority of C1 is higher, return positive  
if Priority of C1 is lower, return neg
```

# Bubble Sorting Cont

## What classes should be Comparable?

```
public static <OOO extends Comparable> void buble(OOO[] arr) {  
    for (int counter = 0; counter < arr.length - 1; counter++) {  
        for (int i = 0; i < arr.length - 1 - counter; i++) {  
            if (arr[i].compareTo( arr[i + 1])>0) {  
                // Swap  
                OOO temp = arr[i];  
                arr[i] = arr[i + 1];  
                arr[i + 1] = temp;  
            }  
        }  
    }  
}  
return -this.person_space + o.person_space;
```

# Using Comparator!!

```
public static <lol> void bubble(lol[] arr, Comparator<lol> ccc) {  
    for (int counter = 0; counter < arr.length - 1; counter++) {  
        for (int i = 0; i < arr.length - 1 - counter; i++) {  
            //          if(arr[i]>arr[i+1]) {  
            //              Swap  
            //          if(arr[i].compareTo(arr[i+1])>0) {  
                if (ccc.compare(arr[i], arr[i + 1]) > 0) {  
                    lol temp = arr[i];  
  
                    arr[i] = arr[i + 1];  
                    arr[i + 1] = temp;  
                }  
            }  
        }  
    }  
}
```



# Cases

What if your Car is not implementing CComparable, then how will you do sorting?!!

Only one logic?

Any way to change that logic but use the same function ?!

Create a class with implements Comparator<car>

```

public static <OOO> void bubble(OOO[] arr, Comparator<OOO> obj) {
    for (int counter = 0; counter < arr.length - 1; counter++) {
        for (int i = 0; i < arr.length - 1 - counter; i++) {
            //          if (arr[i].compareTo( arr[i + 1])>0) {
            //              Swap
            if(obj.compare(arr[i], arr[i+1])>0) {
                OOO temp = arr[i];
                arr[i] = arr[i + 1];
                arr[i + 1] = temp;
            }
        }
    }
}

```

# Generic Classes

```
class Node <PP> {  
    PP data;  
    Node<PP> next;  
}
```

Open ArrayList to show all the interfaces and classes

Multiple Generic Classes

```
class Pair<T,V> {  
    T data1;  
    V data1;  
}
```

# Check out Collections in java

<https://www.javatpoint.com/collections-in-java>

Let us see the hierarchy of Collection framework. The java.util package contains all the [classes](#) and [interfaces](#) for the Collection framework.

<https://leetcode.com/problems/sliding-window-maximum/>

## 2 Approach

- Approach with LinkedList (Doubly)
  - Store number lesser than my current number in my window ?
- Approach 2 Using arrays, like water tapping
  - Cut the array after k parts
  - Find Left max and right max in each K part
  -



# Static Story

Which element to make Static ?!!

- Things which belong to the whole class not just instance
- Create 2 instances of class Student(name and roll number) then explain above point . All instances share the variable
- Ask Student A, B, C how many students are there?- 10
  - so 1 variable will solve the issue,
  - If i have multiple variables then changes in the size will be hard to maintain like in
  - Bank Account {account number , balance} What about rate of Interest?!!
  - Instead of going in each instance, make the ROI static
  - Q: in LinkedList if Head is static, then what problem (show by creating)
    - All LL will have same head address , that means only a single LL
  - Q : BST , sum of greater replace, isBlanaced , make it static ?!

## Static Story Cont

Make Student Class with constructor with  
**static total number of students;**  
Then Explain using memory map

Before main is gonna run, Heap memory will have  
Blueprint of Student class

**static variables are created when the class is loaded  
in heap memory with initialized with 0;**

For each time you call a Constructor memory is allocated  
to non static members only

# How to access Static variables ?

`class_name.Variable_Name`  
`s1.Variable_Name` will also work, but a  
Static manner warning

Now change the constructor to have  
`students(){`  
`total_students ++ ;`  
`}`



# Static Functions

Access Static variables using Static Functions  
Create a linked list , call functions using context

**All these non static functions using context**

LL.disp();

"this" storing address of LL

**Instance specific**

Static function won't need Context, because you are working on static variables

**Not Instance specific**

```
Student.getTotal(); ||  
    public static void getTotal(){  
        return totalstudents  
    }
```

***Kya Static functions mein this hota hein ?***

***Can you access static function of a class  
without calling a constructor ?***

# Questions !!

- Can you access non static variables in a static function!!!?!?
  - NO!! NO context!! can be called without an instance
- Can you access non static function in static function?!  
Noo!!!
  - `public static void getTotal(){`
  - `Introduce(); // non static function ?!`
  - `return totalstudents }`
- Can you access static variables in a static fn ?!
  - Yes, of course thats the point!!
- Can you access static fn in a static fn ?!
  - yes, ofc no need for context “this”

# wrt non static fn

- Can you access non static variables in non static fn!!!?!?
  - yeah, like introduce();
- Can you access non static function in non static fn?!
  - yeah
- Can you access static variables in non static fn ?!
  - Yes
- Can you access static fn in non static fn ?!
  - yes

In function class, we made everything static, unlike OOPS class

Main is static thats why we have to make everything static

JVM runs your code like Classname.main();

if main not static then JVM will have to class a constructor.

Inner class can be made static!!! not outer!!

- Node n = new LinkedList.Node(10); if node static
- Node n = LL.new Node(10); if not static

# Final Keyword! like const in C,C++

Use final

Variable

- Cannot be changed!! , either in parsing or in constructor!! Cannot do both!!
  - example food expiry date interval

Function

- These Function cannot be Override!!

Class

- These classes cannot be Inherited!! like Math or Integer
- Can we make our interface final ?
  - Any use?!

# OverLoading ( 2 fn same name)

Can only be done :  
Number of Arguments  
Type of Arguments

Not on :  
Return Type  
Static Non Static !!  
Access Specifier(public private protected) !!

Variable number of Arguments :

```
(int... val){  
val will be an Array  
will work on any number of variables  
}
```

will work on 0 arguments (int a, int... val)

only **one** variable arguments allowed and always **at last**

# demo

```
public static int add(int a, int b) {  
    return a+b;  
}  
public static int add(int a, int b,int c) {  
    return a+b+c;  
}  
public static void add(String c) {  
    return;  
}
```

Students think , confusing return type is also  
Overloading!! but calling function is done only by the  
function name and number of variables !!  
not on static , or access specifiers

# Some extra info about arguments!!

```
public static int add(int...a) {  
    return 3;  
}
```

Question how many minimum variables are needed to run this function? answer =0;  
a is an Array of int?

then add (int...a,int b) does not work!!!  
(int b,int...a) works!! only one variable arguments.

Priority of this function using variable arguments is lower!!  
Proper function is preferred!!



# What is String[] args

A String of array!! Comandline arguments

```
for(String val : args)
    Syso(val)
```

Nothing!!

go to Run as Run configurations  
under Arguments tab  
in Program Arguments box!  
write anything " hello how are you "

print = hello ,how ,are, u

# Command Line code

Make anew folder!!

write a Code.java  
in that

```
public static void main(String[] args) {  
    for(String val : args)  
        Syso(val)  
}
```

Shift press, open power shell window, complile code  
javac .\Code.java

java Code how are you