DAY -2

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Day 2: Object Orientation & JVM introduction

- Creating Class, Object, constructor, init paramaters
- Static variable and method
- Concepts of packages, Access specifier
- Inheritance, Types of inheritance in Java, Inheriting Data Member and Methods
- Role of Constructors in inheritance,Overriding super Class methods, super
- Hands On & Lab

What can goes inside an class?

```
public class A {

    int i;          //  instance variable

    static int j;   // static variable

    //method in class
    public void foo(){
        int i;      //local variable
    }

    public A(){}            //default constructor

    public A(int j)         //parameterized ctr
    {
        //........
    }

    //getter and setter
    public int getI(){return i;}
    public void setI(int i){this.i=i;}
}
```

data

1. instance data
2. static data (class data)
3. local variable

method

ctr:

default ctr
para...
copy....

gettter

setter

....

mutator: it can chage the state of object

immutator

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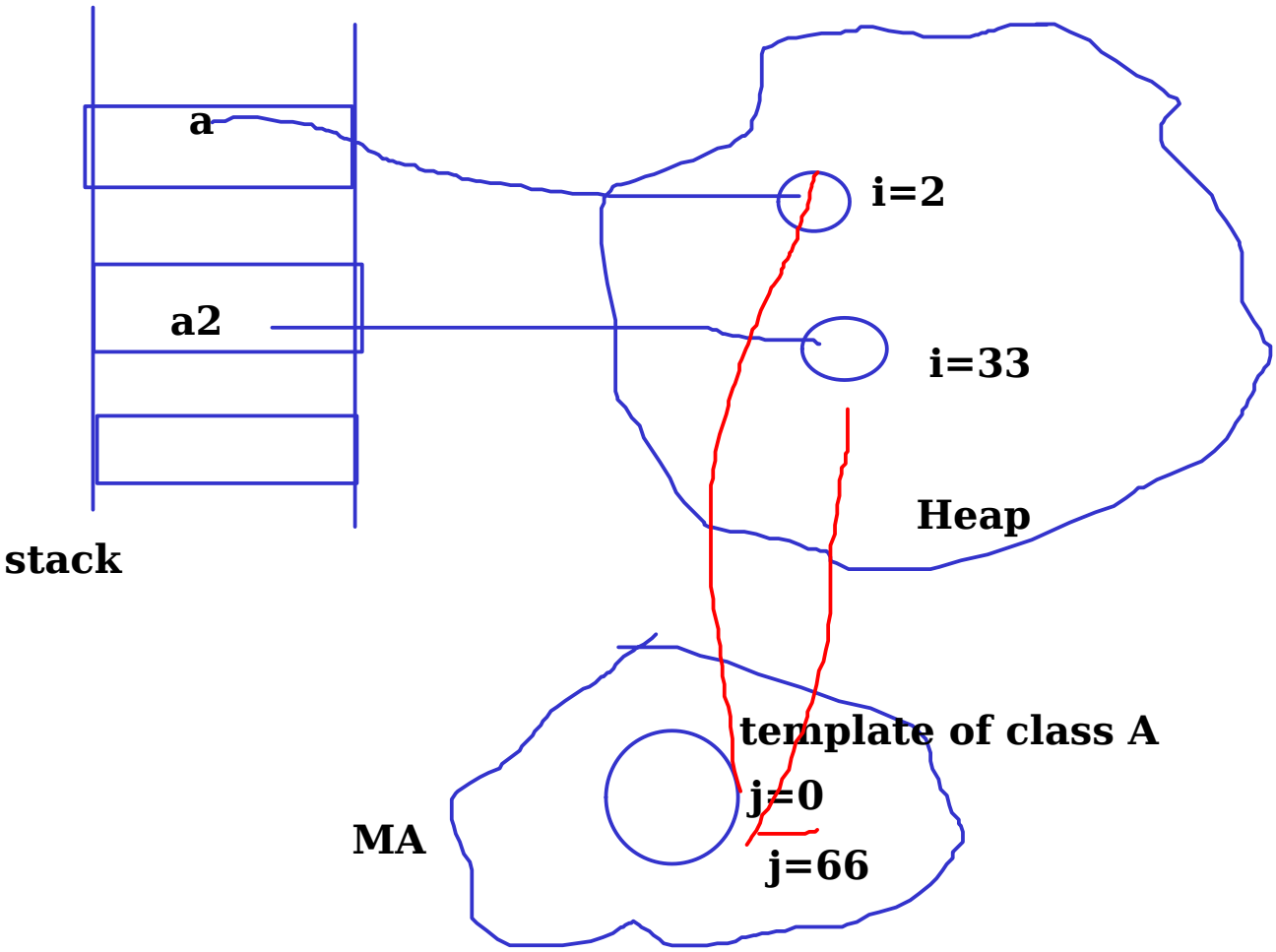
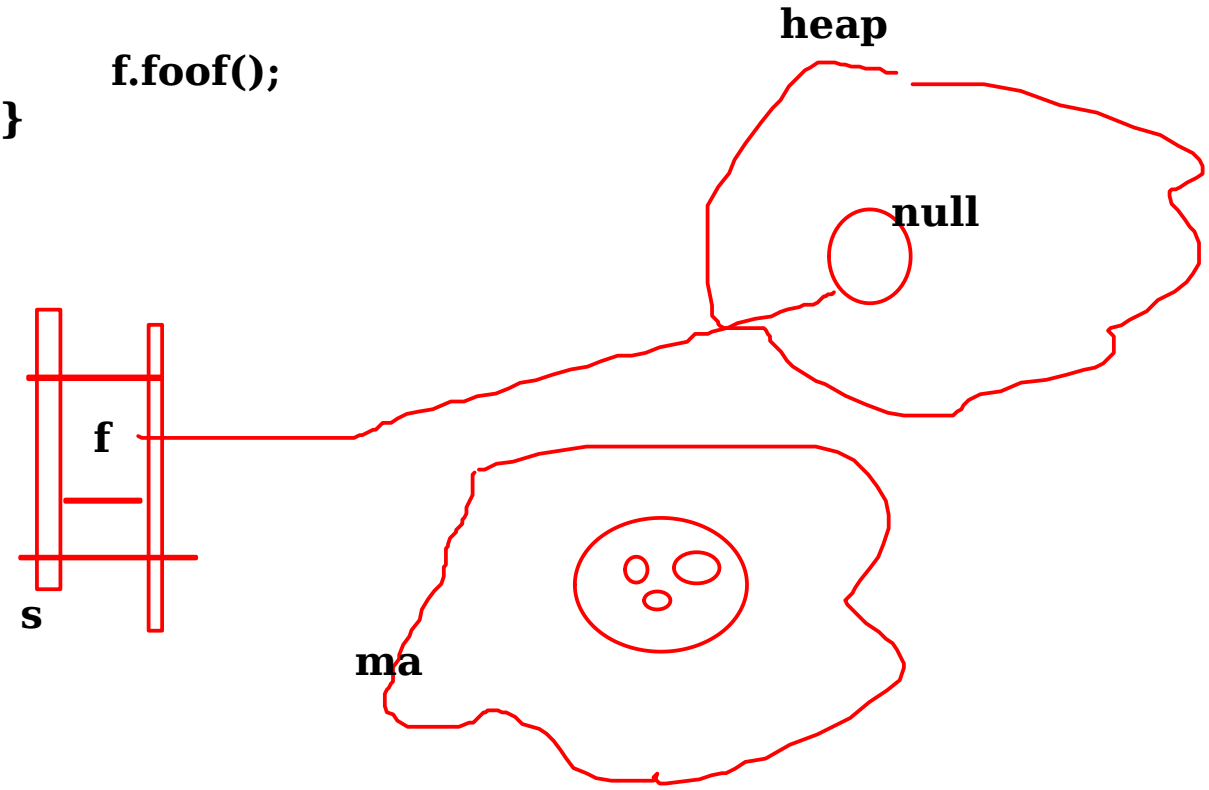
A a=new A(2);
A a2=new A(33);

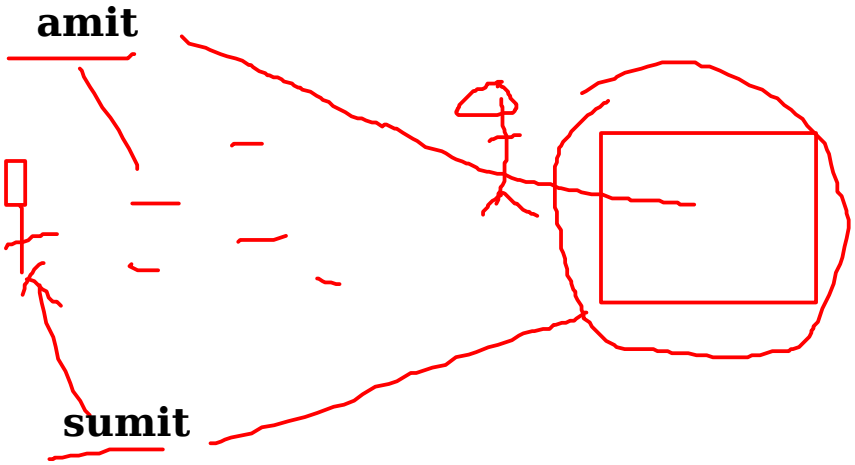



```
class Foo{
	static void foof() {
		System.out.println("it is a static method foof");
	}
}
public class DemoQ {

	public static void main(String[] args) {
		Foo f=null;
		f.foof();    A.foof();
	}
}
```

java compiler is more intelligent then c++ compiler
it also code optimization (JVM*)

```
class Foo{
	static void foof() {
		System.out.println("it is a static method foof");
	}
}
public class DemoQ {

	public static void main(String[] args) {
		Foo f=null;

		f.foof();
	}
}
```





What can goes inside an class?

```
public class A {

    int i;          //  instance variable

    static int j;   // static variable

    //method in class
    public void foo(){
        int i;      //local variable
    }

    public A(){}            //default constructor

    public A(int j)         //parameterized ctr
    {
        //........
    }

    //getter and setter
    public int getI(){return i;}
    public void setI(int i){this.i=i;}
}
```

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Creating Classes and object

```
class Account{

    public int id;
    public double balance;

    //.......
    //......

}

public class AccountDemo{
    public static void main(String[] args) {
        Account ac=new Account();
        ac.id=22;
    }
}
```

killing encapsulation

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Correct way?

```
class Account{
    private int id;
    private double balance;
    public int getId() {
        return id;
    }
    public void setId(int id) {
        this.id = id;
    }
    public double getBalance() {
        return balance;
    }
    public void setBalance(double balance) {
        this.balance = balance;
    }
}

public class AccountDemo{
    public static void main(String[] args) {
        Account ac=new Account();
        //ac.id=22; will not work
        ac.setBalance(2000);//correct way
    }
}
```

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Constructors: default, parameterized and copy

- Initialize state of the object
- Special method have same name as that of class
- Can't return anything
- Can only be called once for a object
- Can be private
- Can't be static*
- Can overloaded but can't overridden*
- Three type of constructors
  - ❖ Default, Parameterized and Copy constructor

```
class Account{
    private int id;
    private double balance;

    //default ctr
    public Account() {
        //........
    }

    //parameterized ctr
    public Account(int i, double b) {
        this.id=i;
        this.balance=b;
    }

    //copy ctr
    public Account(Account ac) {
            //........
        }
}
```

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Need of “this” ?

```
class Account{
   private int id;
   private double balance;

   //default ctr
   public Account() {
       //........
   }

   //parameterized ctr
   public Account(int id, double balance) {
       id=id;
       balance=balance;
   }

   //copy ctr
   public Account(Account ac) {
           //........
       }
```

which id assigned to which id ?

- Which id assigned to which id?
- “this” is an reference to the current object required to differentiate local variables with instance variables

Refer next slide…

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“this” used to resolve confusion…

```
class Account{

    private int id;
    private double balance;

    //default ctr
    public Account() {
        //........
    }

    //parameterized ctr
    public Account(int id, double balance) {
        this.id=id;
        this.balance=balance;
    }

    //copy ctr
    public Account(Account ac) {
```

refer to instance variable

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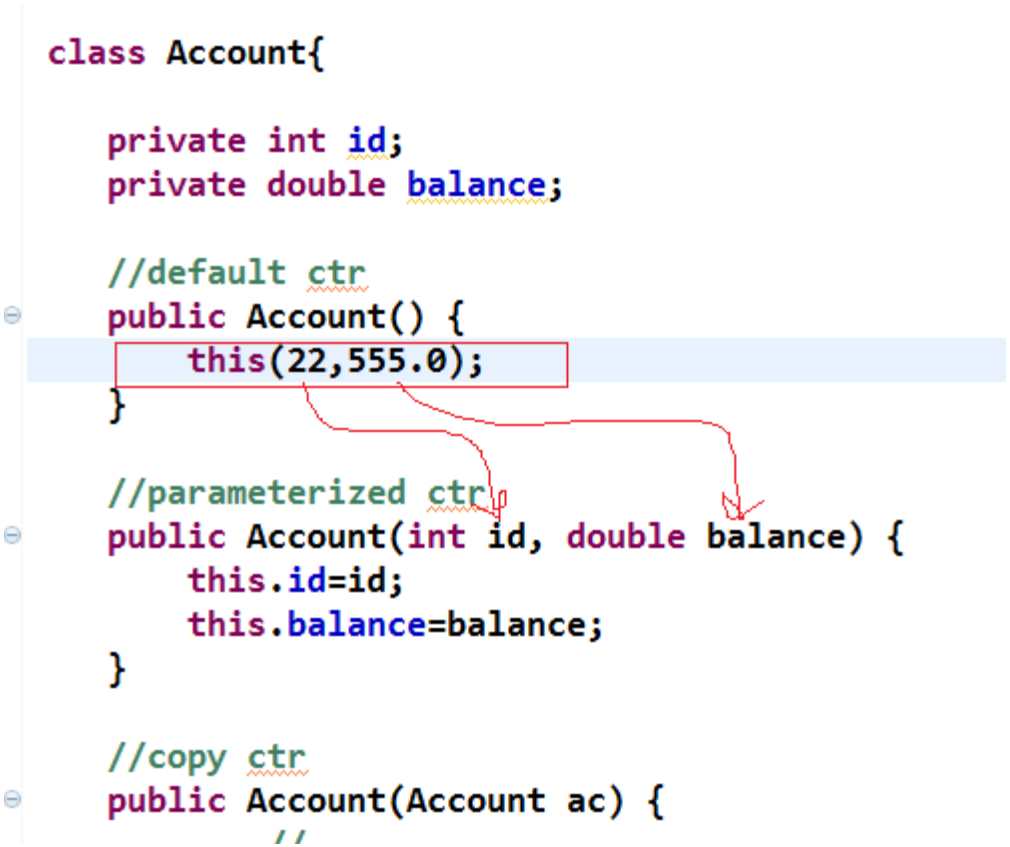
this : Constructor chaining?

- Calling one constructor from another ?



```
class Account{

    private int id;
    private double balance;

    //default ctr
    public Account() {
        this(22,555.0);
    }

    //parameterized ctr
    public Account(int id, double balance) {
        this.id=id;
        this.balance=balance;
    }

    //copy ctr
    public Account(Account ac) {
            //
```

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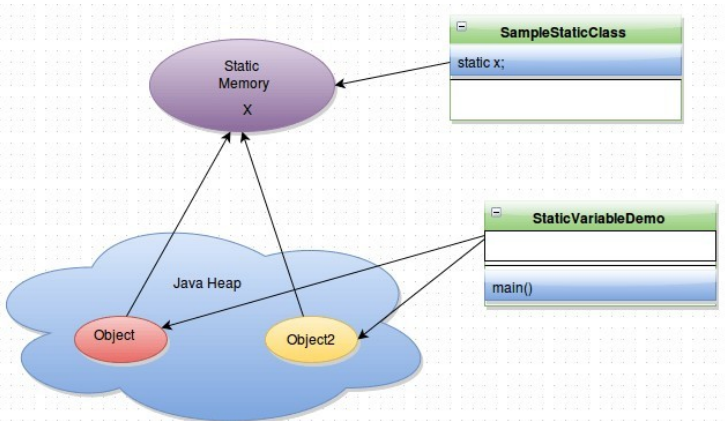
Static method/variable

- Instance variable –per object while static variable are per class
- Initialize and define before any objects
- Most suitable for counter for object
- Static method can only access static data of the class
- For calling static method we don't need an object of that class

How to count number of account object in the memory?



Now guess why main was static?

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Using static data..

```
class Account{

    private int id;
    private double balance;

    // will count no of account in application
    private static int totalAccountCounter=0;

    public Account(){
        totalAccountCounter++;
    }

    public  static int  getTotalAccountCounter(){
        return totalAccountCounter;
    }

}
```

static variable

static method

We can not access instance variable in static method but can access static variable in instance method

```
Account ac1=new Account();
Account ac2=new Account();

//How maany account are there in application ?

System.out.println(Account.getTotalAccountCounter());

System.out.println(ac1.getTotalAccountCounter());
```

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Initialization block

- We can put repeated constructor code in an Initialization block…
- Static Initialization block runs before any constructor and runs only once…

```
class Account{

    private int id;
    private double balance;

    public Account(){
        //this is common code
    }
    public Account(int id , double balance){
        //this is common code

        this.id=id;
        this.balance=balance;
    }

}
```

code repetition.

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Initialization block

```
class Account{
   private int id;
   private double balance;
   private int accountCounter=0;

   static{
       System.out.println("static block: runs only once ...");
   }

   {
       System.out.println("Init block 1: this runs before any constructor  ...");
   }

   {
       System.out.println("Init block 2: this runs after inti  block 1 , before any const execute  ...");
   }
}
```

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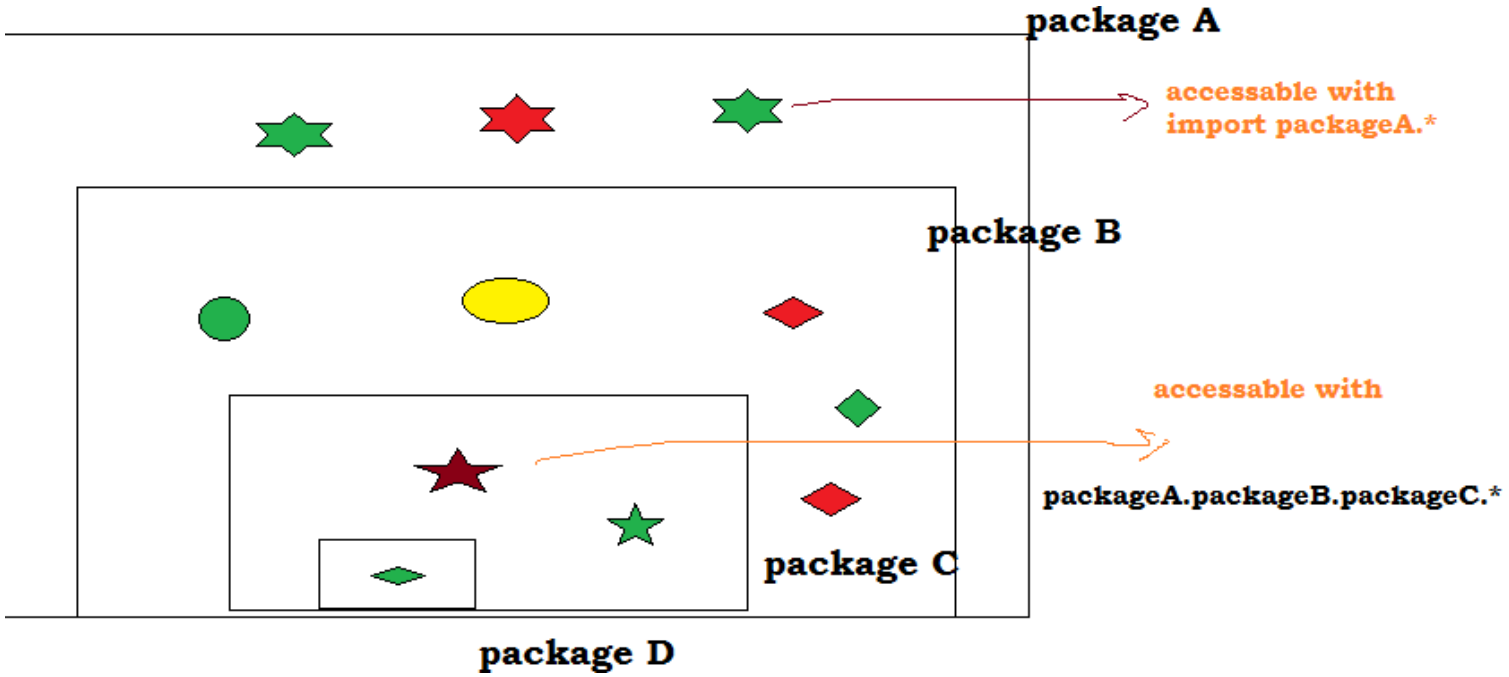
Packages

- Packages are Java's way of grouping a number of related classes and/or interfaces together into a single unit.
- Packages act as "containers" for classes.



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Java Foundation Packages

- Java provides a large number of classes groped into different packages based on their functionality.
- The six foundation Java packages are:

java.lang
- Contains classes for primitive types, strings, math functions, threads, and exception

java.util
- Contains classes such as vectors, hash tables, date etc.

java.io
- Stream classes for I/O

java.awt
- Classes for implementing GUI – windows, buttons, menus etc.

java.net
- Classes for networking

java.applet
- Classes for creating and implementing applets

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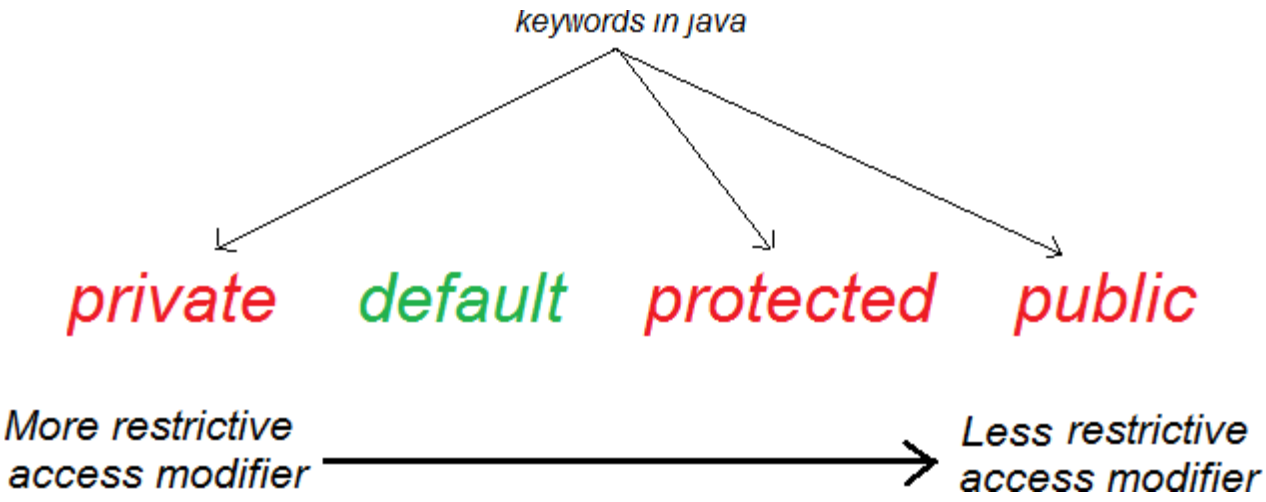
Visibility Modifiers

- **For instance variable and methods**
  - Public Protected
  - Default (package level) Private
- **For classes**
  - Public and default



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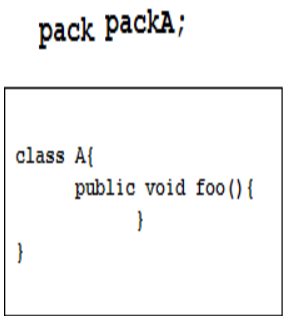
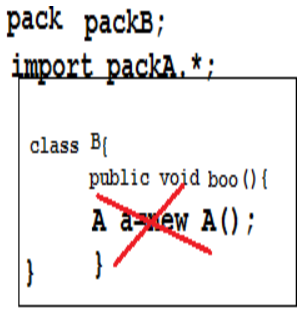
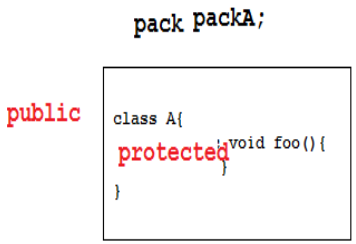
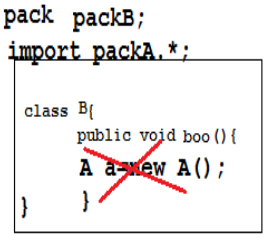
Visibility Modifiers

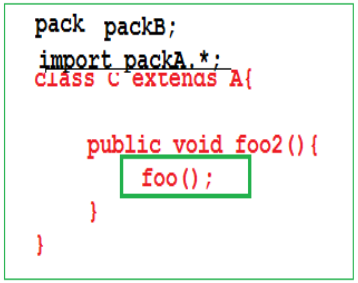
- class A has default visibility
  - hence can access in the same package only.
- Make class A public, then access it.
- Protected data can access in the same package and all the subclasses in other packages provide class itsef is public











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Want to accept parameter from user?

java.util.Scanner (Java 1.5)

```
Scanner stdin = Scanner.create(System.in);

int n = stdin.nextInt();
String s = stdin.next();

boolean b = stdin.hasNextInt()
```

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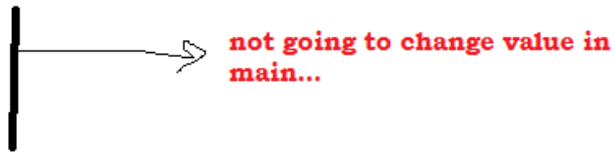
Call by value

- Java support call by value
- The value changes in function is not going to reflected in the main.

```
public class CallByValue {
    public static void main(String[] args) {
        int i=22;
        int j=33;
        System.out.println("value of i before swapping:"+i);
        System.out.println("value of j before swapping:"+j);
        swap(i,j);
    }

     static void swap(int i, int j) {
        int temp;
        temp=i;
        i=j;
        j=temp;
    }
}
```



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Call by reference

- Java don’t support call by reference.
- When you pass an object in an method copy of reference is passed so that we can mutate the state of the object but can’t delete original object itself

```
class Foo{
    private int i;
    public Foo(int i){
        this.i=i;
    }
    public int getI(){return i;}
    public void setI(int t){i=t;}
}
public class CallByref {

    public static void main(String[] args) {
        Foo f1=new Foo(22);
        Foo f2=new Foo(33);
        swap(f1,f2);
    }

     static void swap(Foo f1, Foo f2) {
        Foo temp;
        temp=f1;
        f1=f2;
        f2=temp;
        // f1.setI(55);
    }
```

do not effect f1 , f2 in main

can change state of f1

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