Take good care of these trick and don't forget to practice on them.
De kol el toro2 el 3'er mobashra ely momkn tet2al lel 7agat de, ela ganeb el tare2a el mobshra tab3an.

First of all you **MUST** solve all the **handson** and the **assignment** again and also the **project with errors** in the revision of lab 3.

## Static variable or method:

- lw et2al 7aga bet belong to the class , aw 7aga global to the class yeb2a el 7aga de static sawa2 variable aw method
- lw et2al count 3adad el variables aw el objects el created from this class da yeb2a static counter beyt3mlo ++ fel constructor

## Final variable aw method:

- lw et2al 3la el 7aga de en el definition beta3ha aw el value unique aw fixed aw unchangeable aw can't be modified aw one of a kind aw defined only once yeb2a el 7aga de final  sawa2 variable aw method

- w tb3an lw et2al 3la function can't be overriden.

- w ne5aly balna en el variable el final beya5od el value beta3to ya ema fe nafs el satr beta3 el declaration beta3o ya ema fe kol el constructors ely fel class

## ****Array of objects:

child []c=new child[3] or parent p[]=new parent[3]

el 5atwa el 2ola de 3mltaha 3alashan a3arraf el size beta3 el array 7agmo eh fel 7alteen ely maktobeen enama da maloosh 3elaqa en lazem yekon feeh 5atwa ba initialize feha object object gowa el array sawa2 be new aw be eny a5aleeh yeshawer 3la object already initialized.

**for example:**

```
parent p[]=new parent[3];
p[0] = new child1();
p[1] = new child2();
p[2] = new child1();
or
child c = new child();
p[0] = c;
p[1] = new child();
and so on.
```

lw el 5atweteen dool mat3amalosh el code haydrab menoko **NullPointerException.**

## Inheritance:

- lw et2al 3la two class en class1 is of type class2 yeb2a class1 de child w class2 parent beta3ha, aw feeh 3elaqet inheritance been el classes c1 w c2 w c3 fa sa3etha neshof meen fehom manetqy yekon el parent w ne5aleeh kda (w momkn tes2alo el mo3eed lel ta2keed)

- lw et2al feeh common features benhom kaza w kaza, yeb2a el 7agat de tet3arraf fel parent class.

****ne5aly balna koyais gedaaan** mn en lw el parent class 3ndaha parametrized constructor yeb2a lazem nendah 3alih be edna **FE AWEL SATR fe KOL EL CONSTRUCTORS** beta3et el child w neb3atlo el arguments ely howa 3ayzha "**i.e., super(x,y,k)**" la2en sa3etha el compiler lma yegy ye7awel yendah howa 3la el default constructor beta3 el parent mn warana msh haye3raf w ye3ml error 3la esm el class beta3et el child bey2ol **parent constructor cannot be applied to these types**.

## Insert object in array of objects:

- lw feeh 3ndna class feha array of objects wana 3ayza a3ml insert le object feha fa yeb2a 3ndy function beta5od el object ely 3ayza azawedo fel array w ma3ah el index ely ha7oto feeh aw yeb2a feeh index variable met3araf gowa el class be zero w kol mara azawed object fel array a3melo ++ w da leeh meza enak hateb2a 3aref enta 7ateet kam object fel array.

- **zay el handsOn el tany wel talet clinic feha array of doctors** fa 3alashan lw gena maslan ne3red esm el doctors ely fel clinic ab2a 3rfa ana ha loop 3la kam doctor la2en msh shart akoon maleet el array kolo w la2en lw lafeet 3alihom kolohom w 2olt arr[i].name w howa aslan kan fady (kan be null) haydrab meny NullPointerException , fa ya ema ab2a ba keep track ana zawedt kam object fel array da ya ema abl ma andah 3la ay 7aga meno at2aked el awel eno msh be null.

****De lw gat fel emt7an e3mlo z**ay ely kanet fel handsOn enoko te7oto el object ely etba3at fel array 3la tool msh te3mlo wa7ed geded ( **arr[index] = obj** ) 3alashan lw 3andoko static counter bey3ed 3adad el created objects sa3etha haytala3 rakam 3'alat fa ya te5alo balko mn de w te3mlo object gedeed ya ema te3mloha zay ely fel handsOn.

## super to call 7aga fel parent:

lw ana 2oltelak hatly el value ely 3nd el parent msh beta3et el child (sawa2 variable aw function ) yeb2a bandah 3aliha be kelmt super (i.e., **super.color**) , w de msh hate7sal ela lw el variable aw el function dool kan feeh zayohom be nafs el esm fel child.

## Abstract class:

lw 2al 3la class enaha can't be instantiated aw can't create an object from it aw can't a hold a reference from itself yeb2a el class de abstract

abstract method:
lw et2al 3la method enaha can't have a body, aw is not defined in its class, aw it will only be defined in the child's class, aw ca't have a definition except in the child's class, aw it will be empty in the parent (sa3etha es2alo el mo3eed asdo body fady wla mn 3'er body aslan) , **w aham mn da kolo en kda ka2eny 2olt e3ml el class kman abstract bs be taree2a 3'er mobashra.**

## Constructor chaining:

yeb2a sa3etha el constructor ely beya5od 3adad parameters aktar beyndah 3la ely beya5od 3adad 2a2al , and so on
w da yet3ml lw 2olt class feha aktar mn constructor using each other, aw apply the constructor chaining concept to reduce code redundancy, aw avoid redundant code in constructors.

## Copy constructor:

a constructor for duplicating objects, aw a constructor for copy object, aw constructor for copying values of object into another one, aw create 2 duplicated objects, create objects with same values.

## Override function:

- momkn tet2al redefine the function in parent, describe another definition in the child, aw this method uses a different definition than the one defined in parent, aw this function is doing something different than the parent, aw the functionality of this function in the child is different.

- w ne5aly balna mn el **access modifier** eno lazem yekon ad ely fel parent aw a3la

****w brdo el return type lazem yekon ya ema nafs el type ely fel parent aw el subtype** ( y3ni lw fel parent bet3ml return le shape momkn teraga3 fel child circle maslan)

## Overload function:

- define the same function with different parameters, aw write the function's definition twice using different datatypes passed to it.
- e7na momkn ne3ml overload le function met3arraf fe parent 3ady w ne3arraf el tanya fel child.

## Encapsulation:

lw 2olna emshy 3la rules el encapsulations yeb2a **e3ml kol el attributes private** w e3mlaha get w set 7ata lw el attributes de kan mn demnha objects aw array of object mn classes tanya fa yet3mlha get w set 3ady (**ma3ada el 7agat el static 5aleha nesebha zay default aw public**),

****w ne5aly balna enena lma** negy ne3ml autogeneration lel getters wel setters fa de hate3ml da le kol el attributes ma3ada el final variables 3alashan malhash set, fa sa3etha nerga3 tany ne3ml generate le getters bs w nerga3 ne5tar el 7aga el final.

**instanceof operator: (***obj_name instanceof ClassName***)**

- de 3adatan benst5dmha lma yeb2a 3andy array of parent beyshawer 3la children wana 3ayza a3raf howa enta dlw2ty betshawer 3la instance mn anhy child wla mn el parent 3alashan lw 3ayza a3ml 7aga mo3ayana.
- yeb2a ma2sood enena nesta5dem instanceof de lma yet2al if the object was an instance of xxxx (w xxxx de hateb2a esm class) then e3ml kaza , aw if the object was originally a type of xxxx, aw check on the type of object if it's xxxx, aw if the object was pointing to xxxx.

**Downcasting:**

de 3'aleban hane3mlha lw ana 3andy array of parent shayel children wana 3nd child be 3eno 3ayza aroo7 andah 3la attribute aw function defined fe class el child da msh fel parent, fa sa3etha lazem a3ml downcasting el awel w b3deen andah 3la el 7aga de, w de **lazem 3alashan ne3mlha lazem nekon mesta5dmeen ablaha instanceof.**

**Using different packages:**

lw et2al fel em7tan ne3ml different package yeb2a ne5aly balna en el trick hateb2a fe 7agteen , awaln enena ne3ml import saneyan el access modifiers beta3et el 7agat w enena msh hane3raf nesta5demha mn 3'er el get wel set lw el access modifier kan default.

**Interface:**

- da kelmto implements msh extends w betetketeb b3d el extends lw feeh inheritance
  ***class Circle extends Shape implements Interface1, Interface2***

- by default lma akteb function kda void fun();, hea automatic public w abstract msh lazem akteb gambaha 7aga. w mayenf3sh yeb2a feeh function leha body mn 3'er ma nekteb gambaha default aw static w tb3an kol wa7da leha est5dmha.

- lw 3ayza andah 3la el default function beta3et el interface fel class ely bet3mlo implement ba3ml kda (***InterfaceName.super.functionName***)

- el default functions lazem yet3mlha override lw el class bet3ml implement le aktar mn interface 3andohom nafs esm el function.

- 2a2dar a3ml variable aw array mn el interface bs lazem yeshawer aw yeb2a initialized be instances mn el classes ely bey3mloloh implement, (**nafs fekret el array of parent ely beyshawer 3la children mafeesh ay e5telaf 5ales**)

- lma agy a3ml override lel functions ely gowah lazem akteb gambohom public 3alashan homa aslan kda w mayenf3sh 2a2al el access level beta3thom la2eno sa3etha haytala3 error.

## toString function:

de dayman betragga3 string bey represent el class, for example

```
class rectangle
{
    int x, y;
    String color;

    String toString()
   {
       return "x value is "+x + "\ny value is "+y +  "\ncolor value is "+ color;
   }
}
```

## Comparing strings:

string1.equals(string2)  aw  string1.equals("Ahmed")  not    string1 == string2

## Exceptions:

- lw et2al el code beta3ak el mafrood ye throw exception lw 7asal kaza w sekt yeb2a tes2al elmo3eed exception no3o eh , fa lw et2al ay 7aga yeb2a **throw new Exception("ay msg")** , w yareet dayman el msg ely hanektbha teb2a mo3abera 3n el ma3na

- w lw et2al el code ye throw exception esmo kaza (esm 3'areeb), yeb2a da user defined exception (w lw msh mota2aked brdo es2al el mo3eed hal da java defined wla user defined) tayeb lw user defined , yeb2a mankmlsh el gomla w neroo7 ne3ml class 3la tool bel esm da bet **extends Exception** w howa el constructor bet3ha ekto super("ay msg") sawa el msg de mab3ota fel constructor beta3 el user defined class aw la2. w lma negy ne7defo hayb2a feeh ablaha akeed condition w nekteb throw new ClassName("el msg")

- tayeb lw tele3 error bey2ol **unreported exception** da ma3nah enak bet7def checked exception mn 3'er ma te3mlo **handle (te7oto fe try w catch)** aw te2ol 3ns esm el function eno **throws ClassName**.

- lw et2al b2a e3ml handle lel exception da w lma ye7sal e3ml function kaza ( y3ni ++ 7aga aw 5aly variable maslan be qema mo3ayana aw endah 3la function mo3ayana aw ay 7aga yeb2a ne3ml zay ma met2al)

- aw tala3 lel user message bet2ol kaza yeb2a gowa el catch ya ema nekteb System.out.print("xxxx"); ya ema lw el msg de kona ba3tenha fel constructor beta3 super yeb2a ne3ml kda

```
try {}
catch( ClassName obj )
{
```

```
    System.out.print(obj);
}
```

**Tips for fast coding:**

1) awalan lw hane3ml el 7agat private fa na5od kelmet private copy paste gamb kol el variables msh nektebha be edna

2) ne3ml getters w setters le kol el 7agat el private sawa2 han3ozha aw la2 w sawa2 matloba fel so2al aw la2

3) lma negy nekteb gomla lel print 3la el shasha nesta5dem el e5tesar ely howa sout w b3daha nedoos ctrl w space (fa el gomla hatetla3 fel suggestion list w teb2a selected) w doso enter fa howa haykamel el gomla w b3d kda ektebo feha.

w lma ne3oz nekteb aktar mn variable 3alashan ne3rdhm na5od el gomla copy paste be 3adad el variables w ne3addel fel kalam w esm el variable w 5alas.

4) lma negy ne3ml objects be different values nektebha mara w b3d kda na5od el satr da copy paste be 3adad marat el objects w ne3'ayar fel values (da lw msh loop)

**PLEAAASE nerakez koyais gedan lw hane3ml copy paste 3alashan man3oksh w ne3'lat.**

***Rbna ma3ako isA :))***