Dt : 24/11/2022

Ex-program : Demonstrating "Deep Cloning Process".

EmpContact.java

```
package test;
public class EmpContact extends Object implements Cloneable{
    public String mailId;
    public long phoneNo;
    @Override
    public String toString() {
     return "MailId:"+mailId+"\nPhoneNo:"+phoneNo;
    }
    public Object startCloning() {
      Object o = null;
      try {
      o = super.clone();
      }catch(Exception e) {e.printStackTrace();}
      return o;
    }
}
```

Employee.java

```
package test;
public class Employee extends Object implements Cloneable{
     public String empId,name,desg;
     public EmpContact ec = new EmpContact();
     @Override
     public String toString() {
      return "EmpId:"+empId+"\nEmpName:"+name+"\nEmpDesg:"+desg;
     }
     public Object startCloning() {
      Employee e = null;
      try {
      e = (Employee)super.clone();
      e.ec = (EmpContact)e.ec.startCloning();
      }catch(Exception ex) {ex.printStackTrace();}
      return e;
     }
}
```

DemoObject2.java(MainClass)

```
package maccess;

import test.*;

import java.util.*;

public class DemoObject2 {

        public static void main(String[] args) {

                Scanner s = new Scanner(System.in);

                //Original Object

    Employee ob1 = new Employee();

    System.out.println("Enter the empId:");

    ob1.empId = s.nextLine();

    System.out.println("Enter the empName:");

    ob1.name=s.nextLine();

    System.out.println("Enter the empDesg:");

    ob1.desg=s.nextLine();

    System.out.println("Enter the MailId:");

    ob1.ec.mailId=s.nextLine();

    System.out.println("Enter the PhoneNo:");

    ob1.ec.phoneNo = s.nextLong();

    System.out.println("********Original Object**********");

    System.out.println("=====Display data from Objects====");

    System.out.println(ob1);

    System.out.println(ob1.ec);

    System.out.println("====hashCodes===");

    System.out.println("hashCode of Employee Object : "+ob1.hashCode());
```

```
      System.out.println("hashCode of EmpContact Object : "+ob1.ec.hashCode());
        //Cloned Object or Duplicate Object
      Employee ob2 = (Employee)ob1.startCloning();
      System.out.println("********Cloned Object**********");
      System.out.println("=====Display data from Objects====");
      System.out.println(ob2);
      System.out.println(ob2.ec);
      System.out.println("====hashCodes===");
      System.out.println("hashCode of Employee Object : "+ob2.hashCode());
      System.out.println("hashCode of EmpContact Object : "+ob2.ec.hashCode());
      s.close();
          }
}
```

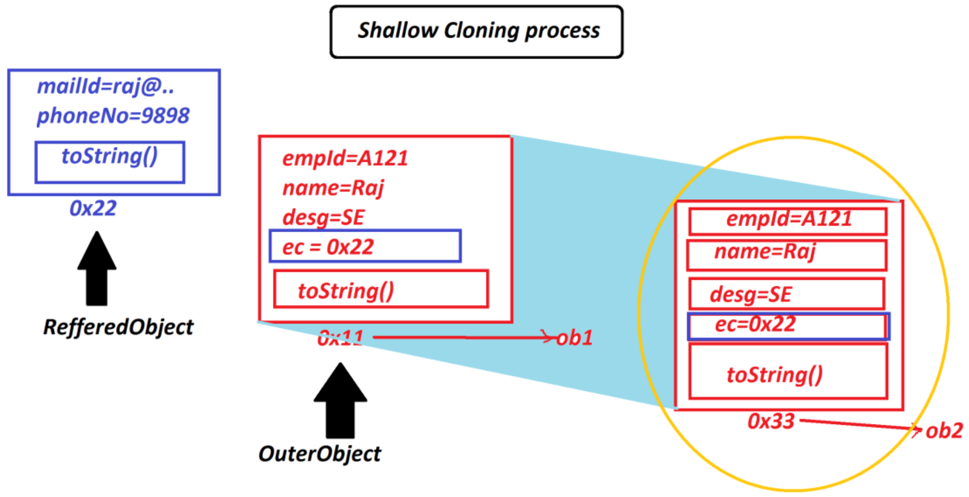
o/p:

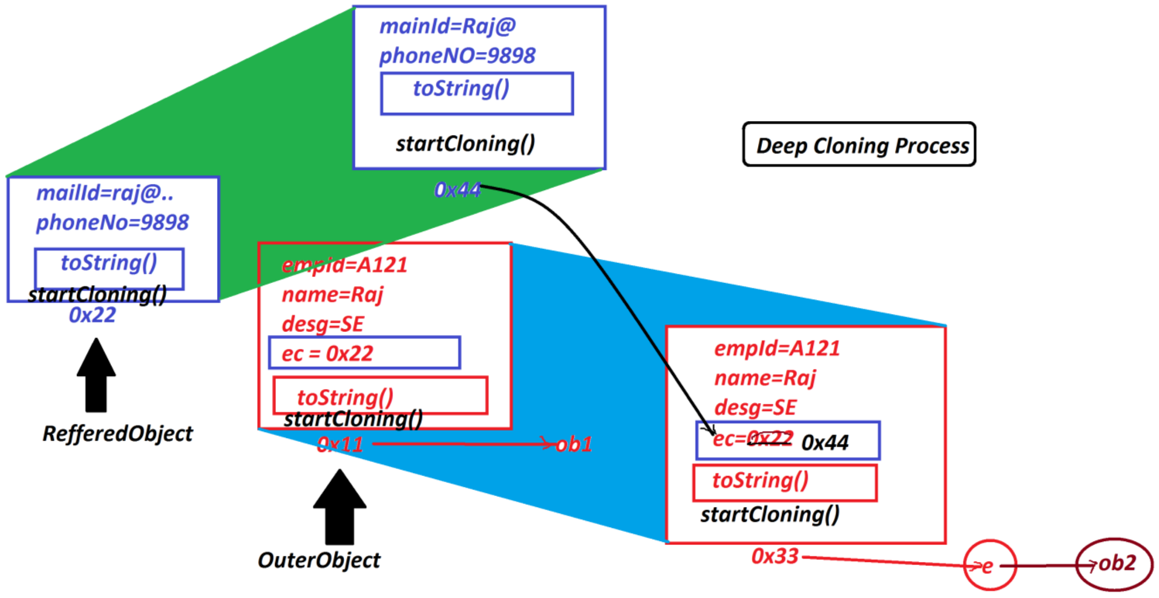
```
Enter the empId:
A222
Enter the empName:
Ram
Enter the empDesg:
TE
Enter the MailId:
ram@gmail.com
Enter the PhoneNo:
7878787812
```

```
********Original Object**********
=====Display data from Objects====
EmpId:A222
EmpName:Ram
EmpDesg:TE
MailId:ram@gmail.com
PhoneNo:7878787812
====hashCodes===
hashCode of Employee Object : 2074407503
hashCode of EmpContact Object : 999966131
********Cloned Object**********
=====Display data from Objects====
EmpId:A222
EmpName:Ram
EmpDesg:TE
MailId:ram@gmail.com
PhoneNo:7878787812
====hashCodes===
hashCode of Employee Object : 1989780873
hashCode of EmpContact Object : 1480010240
```

===

diagram:





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Note:

=>In the process of performing Deep Cloning process the reffered classes also

must be implemented from "java.lang.Cloneable" interface and the classes must be declared with User defined Object return_type method.

==

define "Cloneable"?

=>"Cloneable" is an empty interface from java.lang package and specify the Cloning process.

=>This "Cloneable" interface also known as "Marker Interface" or Tagging Interface.

Note:

=>Cloning process cannot be perfomed without implementing from "Cloneable" interface.

==

Advantage of Cloning process:

=>Part of protection and Security,Cloning process is used to take the backup of an objects.

==

Note:

=>All Collection<E> and Map<K,V> objects are Serializable and Cloneable Objects, except PriorityQueue<E>,which means PriorityQueue<E> object is Serializable but Cloneable.

==

4.equals():

=>equals() method will compare two objects and generate boolean result.

5.wait()

6.notify()

7.notifyAll():

=>These three methods are used to establish communication b/w threads.

8.getClass():

=>getClass() method is used to display the class name of an object.

9.finalize():

=>finalize() method will check the object is eligible for garbage collection process or not

==

faq:

define Garbage Collection Process?

=>The process of identifying anonymous objects and destroying is known as Garbage Collection process.

=>The objects which are created without name are known as Anonymous Objects.

=>This garbage Collection Process is performed by ExecutionEngine using predefined method "gc()".

=>This gc() method is part of ExecutionEngine and executes contineously like Daemon thread.

Behaviour of gc() method:

=>gc() will identify all anonymous objects and call finalize() to check the objects are eligible for Garbage Collection or not,then thay are destroyed.

Note:

=>This gc() method available from "Runtime" class and "System" class.

==

Ex:

Display.java

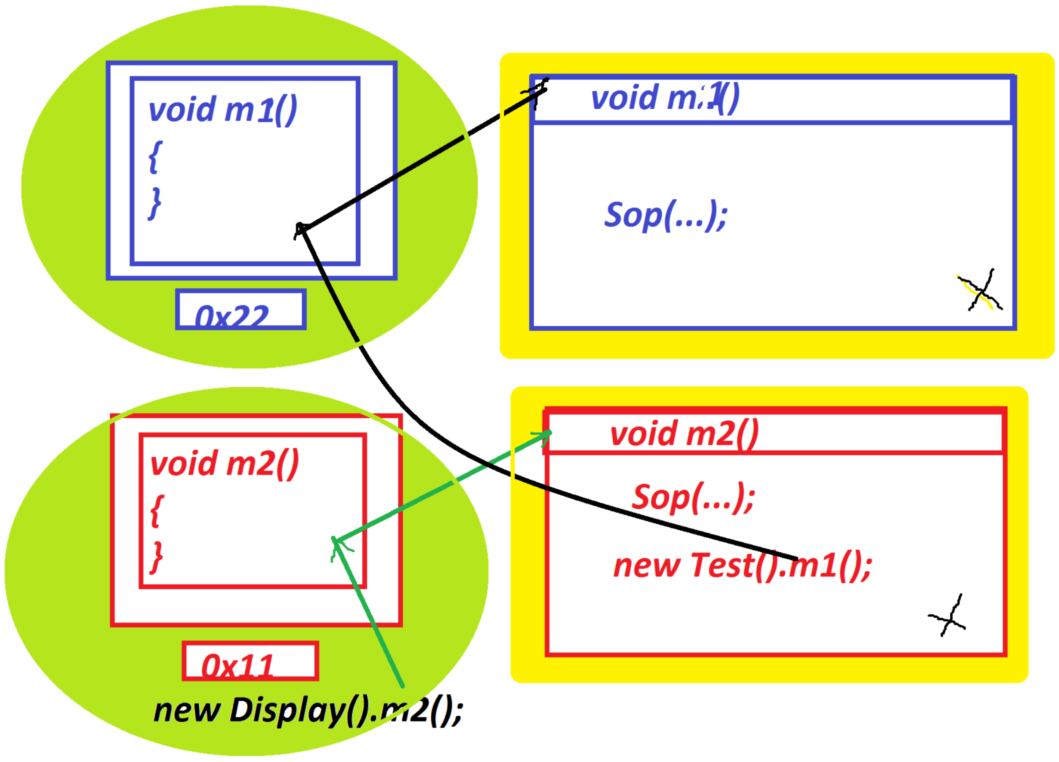
```
package test;
public class Display {
      public void m2() {
       System.out.println("=====m2()====");
       new Test().m1();
      }
}
```

Test.java

```
package test;
public class Test {
     public void m1() {
      System.out.println("====m1()====");
     }
}
```

DemoObject3.java

```
package maccess;
import test.*;
public class DemoObject3 {
     public static void main(String[] args) {
         new Display().m2();
     }
}
```


void m1()
{
}
0x22
void m1()
Sop(...);
void m2()
{
}
0x11
new Display().m2();
void m2()
Sop(...);
new Test().m1();