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Prachi Yadav

Assignment 2

1. Define a class named Course having data members ID, Description, Duration and Fees. The class should have one parametrized constructors and GetData() function member to display the data.

-Create an array of 5 course objects and then display the data for all of them.

```
class Course{
int id;
String descript;
int duration;
int fees;
Course(int id,String descript,int duration,int fees){
this.id=id;
this.descript=descript;
this.duration=duration;
this.fees=fees;
}
void GetData(){
System.out.println("Course id:"+id+"\nCourse Description:"+descript+"\nCourse Durartion:"+duration+"\nCourse Fees:"+fees);}

public static void main(String[]args){

Course co=new Course(1001,"B.Tech",6,78900);
co.GetData();
System.out.println("################################");

 Course c[] = new Course[5];
 c[0]=new Course(1002,"DITISS",4,8000);
 c[1]=new Course(1003,"DAC",4,790870);
```

```
c[2]=new Course(1004,"DBDA",4,78900);
c[3]=new Course(1005,"DESD",4,90000);
c[4]=new Course(1006,"DMC",4,2800000);
System.out.println("Course Object 1 data:");
//System.out.println();
System.out.println("################################");
c[0].GetData();
System.out.println();
System.out.println("Course Object 2 data:");
System.out.println("################################");
c[1].GetData();
System.out.println();
System.out.println("Course Object 3 data:");
System.out.println("################################");
c[2].GetData();
System.out.println();
System.out.println("Course Object 4 data:");
System.out.println("################################");
c[3].GetData();
System.out.println();
System.out.println("Course Object 5 data:");
System.out.println("################################");
c[4].GetData();
System.out.println();
}
}
```

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```
osboxes ~ Java OOP assign2 gedit Course.java
osboxes ~ Java OOP assign2 java Course
Course id:1001
Course Description:B.Tech
Course Durartion:6
Course Fees:78900
##############################
Course Object 1 data:
##############################
Course id:1002
Course Description:DITISS
Course Durartion:4
Course Fees:8000
```

```
Course Object 2 data:
##################################
Course id:1003
Course Description:DAC
Course Durartion:4
Course Fees:790870

Course Object 3 data:
##################################
Course id:1004
Course Description:DBDA
Course Durartion:4
Course Fees:78900
```

```
Course Object 4 data:
##################################
Course id:1005
Course Description:DESD
Course Durartion:4
Course Fees:90000

Course Object 5 data:
##################################
Course id:1006
Course Description:DMC
Course Durartion:4
Course Fees:2800000
```

2. Modify program 1 to add a default constructor and a SetData() member function.

-Create an array of 3 student using the default constructor and another array of 2 students using the parametrized constructor, and then display the data of all 5 course objects.

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```
class Student{
int id;
String descript;
int duration;
int fees;
//default constructor
Student(){}
//setData() method
void  setData(int id,String descript,int duration,int fees){
this.id=id;
this.descript=descript;
this.duration=duration;
this.fees=fees;
}
Student(int id,String descript,int duration,int fees){
this.id=id;
this.descript=descript;
this.duration=duration;
this.fees=fees;
}
void getData(){

System.out.println("Course id:"+id+"\nCourse Description:"+descript+"\nCourse
Durartion:"+duration+"\nCourse Fees:"+fees);}

public static void main(String[]args){
      Student s=new Student(100,"DESD",6,900000);
           Student arr[]=new Student[3];

           System.out.println("Course Object 1 Data:");
```

```
        System.out.println("######################");
        s.setData(101,"DAC",6,9000);
        s.getData();
        System.out.println();
        System.out.println("Course Object 2 Data:");
        System.out.println("######################");
        s.setData(102,"DMC",6,100000);
        s.getData();
        System.out.println();
        System.out.println("Course Object 3 Data:");
        System.out.println("######################");

        s.setData(103,"DBDA",6,15000);
        s.getData();
        System.out.println();

        Student [] arr1=new Student[2];
        System.out.println("Course Object 4 Data:");
        System.out.println("######################");
        arr1[0]=new Student(104,"DITISS",6,12000);
        arr1[0].getData();
        System.out.println();
        System.out.println("Course Object 5 Data:");
        System.out.println("######################");
        arr1[1]=new Student(105,"DASSD",7,15000);
        arr1[1].getData();


}
}
```

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```
osboxes ... OOP assign2 Student javac Student.java
osboxes ... OOP assign2 Student java Student
Course Object 1 Data:
######################
Course id:101
Course Description:DAC
Course Durartion:6
Course Fees:9000

Course Object 2 Data:
####################
Course id:102
Course Description:DMC
Course Durartion:6
Course Fees:100000
```

```
Course Object 3 Data:
########################
Course id:103
Course Description:DBDA
Course Durartion:6
Course Fees:15000

Course Object 4 Data:
#########################
Course id:104
Course Description:DITISS
Course Durartion:6
Course Fees:12000
```

```
Course Object 5 Data:
#############################
Course id:105
Course Description:DASSD
Course Durartion:7
Course Fees:15000
```

3. Write a program to define constructors and finalize of a class and construct 3 objects and then show that it is not a guarantee that finalizer will be invoked for each object.

```
class Finalize{
        String name;
        int id;

        //parameterized constructor
            Finalize(String name, int id){
                this.name=name;
```

```
                this.id=id;

        }
        //finalize method
    public void finalize()
{
 System.out.println("Garbage collector invoked!!!!");
}

         void display() {
        System.out.println("Name:"+name+"\nId:"+id);

         }



        public static void main(String[] args)  {

                Finalize f1=new Finalize("Prachi",10);
                Finalize f2=new Finalize("Swati",11);
            Finalize f3=new Finalize("Nonu",12);

                        f1.display();
                        f2.display();
                        f3.display();


         f1=null;
         f2=null;
         f3=null;
          System.gc();
```

```
System.out.println("Objects are unreferenced");
f1.display();          //it is only for check reference variable is exists or not
f2.display();
f3.display();


}
}
```

```
osboxes ~ Java OOP assign2 java Finalize
Name:Prachi
Id:10
Name:Swati
Id:11
Name:Nonu
Id:12
Garbage collector invoked!!!!
Garbage collector invoked!!!!
Garbage collector invoked!!!!
Objects are unreferenced
Exception in thread "main" java.lang.NullPointerException
        at Finalize.main(Finalize.java:41)
```

4 Write a program to demonstrate the use of final keyword with

a) class

```
final class A{                    //final class
int a=10;
}
class Final extends A{
public static void main(String []args){
Final f=new Final();
System.out.println(f.a);}
}
}
```

```
osboxes ~ Java OOP assign2 javac Final.java
Final.java:5: error: cannot inherit from final A
class Final extends A{
                    ^
1 error
```

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b) method

```
class A{
int a=10;
final void A(){
System.out.println("Hello!!! I am in class A");
}
}
class Final extends A{
//ovveride the parent class method
void A(){
System.out.println("hello!! I am final");}
public static void main(String []args){
Final f=new Final();
f.A();     //call the method
System.out.println(f.a);}
}
```

```
osboxes ~ Java OOP assign2 javac Final.java
Final.java:8: error: A() in Final cannot override A() in A
void A(){
     ^
  overridden method is final
1 error
```

c) data member(primitive value and reference variable and show that you can not refer this reference variable to other objects but can change the data field of a final reference variable)

```
public class FinalVar{
  final int x = 10;

  public static void main(String[] args) {
    FinalVar f = new FinalVar();
    f.x = 25;
    System.out.println(f.x);
```

```
 }
}
```

```
osboxes ~ Java OOP assign2 javac FinalVar.java
FinalVar.java:6: error: cannot assign a value to final variable x
    f.x = 25; // will generate an error: cannot assign a value to a final variab
le
      ^
1 error
```

```
public class Student
{
   int rollNo;
   String name;
    Student(int r,String n){          //constructor
    this.rollNo=r;
    this.name=n;
    }
  void display(){                         //method to display data
  System.out.println("Student RollNo:"+rollNo+"\nStudent Name:"+name);
  }
  public static void main(String[]args){
      final Student s = new Student(102,"Prachi");
      s.display();
      Student s1 = new Student(103,"Vish");
      s1.display();

      // object is a reference variable with final keyword so we can't assign it
       s=s1;
   }
}
```

```
osboxes ~ Java OOP assign2 javac Student.java
Student.java:21: error: cannot assign a value to final variable s
       s=s1;
       ^
1 error
```

```
public class Student
{
   int rollNo;
   String name;
   public void setData(int rollNo,String name) {
      this.rollNo=rollNo;
      this.name = name;
   }

  void display(){
  System.out.println("Student RollNo:"+rollNo+"\nStudent Name:"+name);
  }
  public static void main(String[]args){
      final Student s = new Student();
      s.setData(101,"Prachi");
       s.setData(102,"Heena");
       s.display();
   }
}
```

```
osboxes ~ Java OOP assign2 javac Student.java
osboxes ~ Java OOP assign2 java Student
Student RollNo:102
Student Name:Heena
```

Yes we can change value of final reference object variable

5. write a program to demonstrate the use of following operators.

a)right shift with sign bit operator >>

```
import java.util.Scanner;
public class Operator {
   public static void main(String[] args)
   { Scanner s=new Scanner(System.in);
     System.out.print("Enter the value of a:");
```

```
        int a = s.nextInt();
        System.out.println("a after right shift by 1 bit(a>>1): " + (a >> 1));
        System.out.println("a after right shift by 2 bit(a>>2): " + (a >> 2));
    }
}
```

```
osboxes ~ Java OOP assign2 javac Operator.java
osboxes ~ Java OOP assign2 java Operator
Enter the value of a:12
a after right shift by 1 bit(a>>1): 6
a after right shift by 2 bit(a>>2): 3
```

b)left shift operator <<

```
import java.util.Scanner;
public class Operator {
    public static void main(String[] args)
    { Scanner s=new Scanner(System.in);
       System.out.print("Enter the value of a:");
        int a = s.nextInt();
        System.out.println("a after left shift by 1 bit(a<<1): " + (a<<1));
        System.out.println("a after left shift by 2 bit(a<<2): " + (a<<2));
    }
}
```

```
osboxes ~ Java OOP assign2 javac Operator.java
osboxes ~ Java OOP assign2 java Operator
Enter the value of a:15
a after left shift by 1 bit(a<<1): 30
a after left shift by 2 bit(a<<2): 60
```

c)right shift with zero fill operator >>>

```
import java.util.Scanner;
public class Operator {
    public static void main(String[] args)
    { Scanner s=new Scanner(System.in);
       System.out.print("Enter the value of a:");
        int a = s.nextInt();
```

```
      //System.out.println("a after left shift by 1 bit(a<<1): " + (a<<1));
      //System.out.println("a after left shift by 2 bit(a<<2): " + (a<<2));
       System.out.println("a after right shift by 1 bit(a>>>1): " + (a>>>1));
      System.out.println("a after right shift by 2 bit(a>>>2): " + (a>>>2));

   }
}
```

```
osboxes ~ Java OOP assign2 javac Operator.java
osboxes ~ Java OOP assign2 java Operator
Enter the value of a:10
a after right shift by 1 bit(a>>>1): 5
a after right shift by 2 bit(a>>>2): 2
```

6. write a program to demonstrate

a) Labeled break

```
class Break
{
public static void main(String [] args)
{
int i=4;
label:
while(i<20)
{
        if(i==10)
                break label;
        System.out.println("Value of i:"+i);
        i++;
}

System.out.println("Hello i am out of loop");
}
```

}

```
osboxes ~ Java OOP assign2 javac Break.java
osboxes ~ Java OOP assign2 java Break
Value of i:4
Value of i:5
Value of i:6
Value of i:7
Value of i:8
Value of i:9
Hello i am out of loop
```

b) Labeled continue

```
class Break
{
public static void main(String [] args)
{
int i=4;
label:
while(i<20)
{
        if(i==10)
                continue label;
        System.out.println("Value of i:"+i);
        i++;
}
System.out.println("Hello I am out of loop");
}
}
```

```
osboxes ~ Java OOP assign2 javac Break.java
osboxes ~ Java OOP assign2 java Break
Value of i:4
Value of i:5
Value of i:6
Value of i:7
Value of i:8
Value of i:9
```

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7. Demonstrate the use of 'this' keyword

a) To refer to current object.

```
class This
{
   int a;
   int b;
   // Parameterized constructor
   This(int a, int b)
   {
      this.a = a;         //refer current object
      this.b = b;
   }
   void display()
   {
      System.out.println("a=" + a +" "+"b="+ b);
   }
   public static void main(String[] args)
   {
      This T = new This(10,20);
      T.display();
   }
    }
```

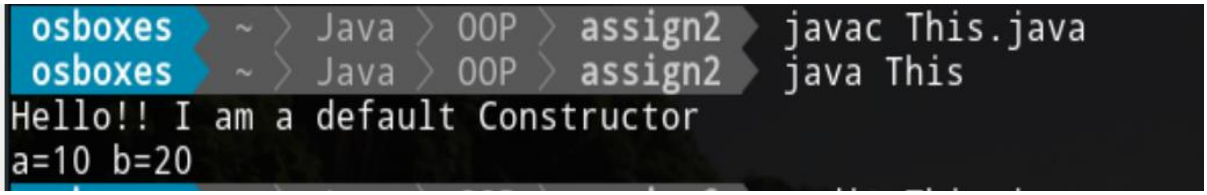
```
osboxes ~ Java OOP assign2 javac This.java
osboxes ~ Java OOP assign2 java This
a=10 b=20
```

b) Inside a constructor to call another constructor.

```
class This
{
   int a;
   int b;
```

```
   This(){
   System.out.println("Hello!! I am a default Constructor");
    }
   // Parameterized constructor
   This(int a, int b)
   {  this();            //call constructor
      this.a = a;         //refer current object
      this.b = b;
   }

   void display()
   {
      System.out.println("a=" + a +" "+"b="+ b);
   }
   public static void main(String[] args)
   {
      This T = new This(10,20);
      T.display();
   }
}
```

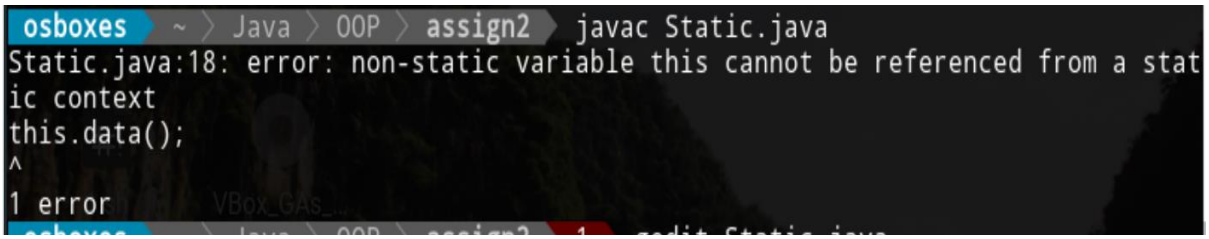


And also show that this can not be used in static context area.

```
class Static{
static int a=2000;
static int b=1000;
Static(int a,int b){
this.a=a;
this.b=b;}
```

```
static void data(){
System.out.println("hello i am static method");
}

void display(){
System.out.println("Value of a="+a+" "+"value of b="+b);
}
public static void main(String[]args){
Static s=new Static(10,1000);
s.display();
this.data();          //call static method using this
}
}
```



8. Demonstrate the use of 'super' keyword.

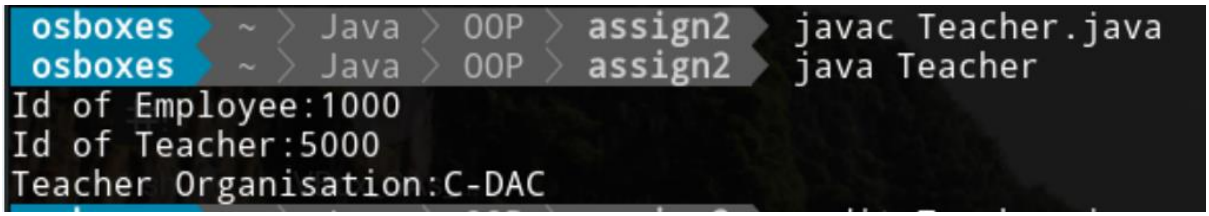
a) To refer to a member of super class.

```
class Employee{
int id=1000;
static String org="C-DAC";
}

class Teacher extends Employee{
int id=5000;
```

```
void display(){
System.out.println("Id of Employee:"+super.id+"\nId of Teacher:"+id);
System.out.println("Teacher Organisation:"+org);}

public static void main(String[]args){
    Teacher t=new Teacher();
    t.display();
    }
    }
```



b) To call super class constructor from sub class constructor.

```
class Employee{
int id;
static String org="C-DAC";
//constructor  of parent class
Employee(int id){
System.out.print("Employee Id:");
System.out.println(this.id=id);
System.out.println("Employee Org:"+org);
}

}

class Teacher extends Employee{
int id;
int age;
//constructor of child class
```

```
Teacher(int id,int age){
super(1000);                    //super() use to call parent class constructor in child class
this.id=id;
this.age=age;
}
void display()                  //to display data
{
System.out.println("Teacher Id:"+id+"\nTeacher Age:"+age);
System.out.println("Teacher Org:"+org);}

public static void main(String[]args){
    Teacher t=new Teacher(1002,23);          //object create of child class
    t.display();                             //call display method
    }
    }
```

```
osboxes ~ Java OOP assign2 javac Teacher.java
osboxes ~ Java OOP assign2 java Teacher
Employee Id:1000
Employee Org:C-DAC
Teacher Id:1002
Teacher Age:23
Teacher Org:C-DAC
```

9. Write a program to make a request to invoke garbage collector

```
class Simple{
public void finalize(){
System.out.println("Garbage Collector invoked!!!");
}
public static void main(String[]args){
Simple s=new Simple();
Simple s1=new Simple();
s=null;                 //unreferenced
```

```
s1=null;

System.gc();  //calling garbage collector method(finalize method automatic invoked)

}

}
```

```
osboxes ~ Java OOP assign2 java Simple
Garbage Collector invoked!!!
Garbage Collector invoked!!!
```

10. Write a program to demonstrate the use of nested class and its objects when nested class is a

a) private member of the outer class

```
class Outer{
private int a=10;     //private member
void display(){
class Inner{              //nested class
void msg()
{
System.out.println("Private data of Outer class:"+a);
}
}
Inner i=new Inner();        //nested class object
i.msg();
}
public static void main(String[]args){
Outer o=new Outer();        //outer class object
o.display();
}
}
```

```
osboxes ~ Java OOP assign2 javac Outer.java
osboxes ~ Java OOP assign2 java Outer
Private data of Outer class:10
```

b) public member of the outer class.

```
class Outer1{
public int a=10;                  //public member of outer class
public void disp(){
System.out.println("Hello Java");
}
class Inner{
void msg(){
```

```
System.out.println("Public data of outer class:"+a);          //access data of outer class
}
}
public static void main(String[]args)
{
Outer1 o=new Outer1();   //outer class object
Outer1.Inner i=o.new Inner();  //nested class object
i.msg();
o.disp();
}
}
```

```
osboxes ~ Java OOP assign2 javac Outer1.java
osboxes ~ Java OOP assign2 java Outer1
Public data of outer class:10
Hello Java
```