# Lab Assignment 08


Inspiring Excellence

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| **Course Code:** | **CSE111** |
| **Course Title:** | **Programming Language II** |
| **Topic:** | **Review and Polymorphism** |
| **Number of Tasks:** | **11** |

**[NO SUBMISSION]**

**[You are not allowed to change the driver codes of any of the tasks]**

# Task 1

Design the **Vaccine** and **Person** class so that the following expected output is generated.
**[**N.B: Students will get vaccines on a priority basis. So, age doesn't matter for students. All **attributes of Vaccine** class should be **Private**.**]**

| Driver Code | Output |
|---|---|
| `public class VaccineTester {`<br>`  public static void main(String[] args) {`<br>`  Vaccine astra = new Vaccine("AstraZeneca", "UK", 60);`<br>`  Vaccine modr = new Vaccine("Moderna", "UK", 30);`<br>`  Vaccine sin = new Vaccine("Sinopharm", "China", 30);`<br><br>`  Person p1 = new Person("Bob", 21, "Student");`<br>`  System.out.println("==========");`<br>`  p1.pushVaccine(astra);`<br>`  System.out.println("==========");`<br>`  p1.showDetail();`<br>`  System.out.println("==========");`<br>`  p1.pushVaccine(sin, "2nd Dose");`<br>`  System.out.println("==========");`<br>`  p1.pushVaccine(astra, "2nd Dose");`<br>`  System.out.println("==========");`<br>`  p1.showDetail();`<br>`  System.out.println("==========");`<br>`  p1.pushVaccine(astra, "2nd Dose");`<br>`  System.out.println("==========");`<br>`  p1.showDetail();`<br>`  System.out.println("==========");`<br><br>`  Person p2 = new Person("Carol", 23, "Actor");`<br>`  System.out.println("==========");`<br>`  p2.pushVaccine(sin);`<br>`  System.out.println("==========");`<br><br>`  Person p3 = new Person("David", 34);`<br>`  System.out.println("==========");`<br>`  p3.pushVaccine(modr, "2nd Dose");`<br>`  System.out.println("==========");`<br>`  p3.pushVaccine(modr, "1st Dose");`<br>`  System.out.println("==========");`<br>`  p3.showDetail();`<br>`  System.out.println("==========");`<br>`  p3.pushVaccine(modr, "2nd Dose");`<br>`  }`<br>`}` | `==========`<br>`1st dose done for Bob`<br>`==========`<br>`Name: Bob Age: 21 Type: Student`<br>`Vaccine name: AstraZeneca`<br>`1st dose: Given`<br>`2nd dose: Please come after 60 days`<br>`==========`<br>`Sorry Bob, you can't take 2 different vaccines`<br>`==========`<br>`2nd dose done for Bob`<br>`==========`<br>`Name: Bob Age: 21 Type: Student`<br>`Vaccine name: AstraZeneca`<br>`1st dose: Given`<br>`2nd dose: Given`<br>`==========`<br>`Sorry Bob, you already received both doses.`<br>`==========`<br>`Name: Bob Age: 21 Type: Student`<br>`Vaccine name: AstraZeneca`<br>`1st dose: Given`<br>`2nd dose: Given`<br>`==========`<br>`==========`<br>`Sorry Carol, Minimum age for taking vaccines is 25 years now.`<br>`==========`<br>`==========`<br>`Sorry David, invalid dose request.`<br>`==========`<br>`1st dose done for David`<br>`==========`<br>`Name: David Age: 34 Type: General Citizen`<br>`Vaccine name: Moderna`<br>`1st dose: Given`<br>`2nd dose: Please come after 30 days`<br>`==========`<br>`2nd dose done for David` |

# Task 2

We know that Nike has opened their official outlets in Bangladesh. So let's construct a **NikeBD** class so that they can keep track of their inventory and sales here.
[**Hint:** Only 3 types of products are available: “Jordan”, “Cortez” and “Kobe”]

**Driver Code**

```
public class NikeTester {
  public static void main(String[] args) {
    System.out.println("==========1==========");
    NikeBD.status();
    NikeBD dhaka = new NikeBD("Dhaka Banani");
    NikeBD chittagong = new NikeBD("Chittagong GEC");
    System.out.println("==========2==========");
    dhaka.details();
    System.out.println("==========3==========");
    chittagong.details();
    System.out.println("==========4==========");
    dhaka.restockProducts("Jordan", 200);
    System.out.println("==========5==========");
    String [] products = {"Jordan", "Cortez", "Kobe"};
    int [] qty = {1200, 200, 200};
    String [] products2 = {"Jordan", "Cortez", "Kobe"};
    int [] qty2 = {1200, 250, 100};
    dhaka.restockProducts(products, qty);
    System.out.println("==========6==========");
    chittagong.restockProducts(products2, qty2);
    System.out.println("==========7==========");
    NikeBD.status();
    System.out.println("==========8==========");
    dhaka.details();
    System.out.println("==========9==========");
    chittagong.details();
    dhaka.productSold("Jordan", 760, "Cortez", 90);
    chittagong.productSold("Jordan", 520, "Kobe", 70);
    System.out.println("==========10==========");
    NikeBD.status();
    System.out.println("==========11==========");
    chittagong.details();
  }
}
```

**Output**

```
==========1==========
Nike Bangladesh Status:
Branches Opened: 0
Currently Stocked: Air Jordan: 0, Cortez: 0, Zoom Kobe: 0
Sold: 0
==========2==========
Nike Dhaka Banani outlet:
Products Currently Stocked: Air Jordan: 0, Cortez: 0, Zoom Kobe: 0
Sold: 0
==========3==========
Nike Chittagong GEC outlet:
Products Currently Stocked: Air Jordan: 0, Cortez: 0, Zoom Kobe: 0
Sold: 0
==========4==========
==========5==========
==========6==========
==========7==========
Nike Bangladesh Status:
Branches Opened: 2
Currently Stocked: Air Jordan: 0, Cortez: 450, Zoom Kobe: 0
Sold: 0
==========8==========
Nike Dhaka Banani outlet:
Products Currently Stocked: Air Jordan: 0, Cortez: 200, Zoom Kobe: 0
Sold: 0
==========9==========
Nike Chittagong GEC outlet:
Products Currently Stocked: Air Jordan: 0, Cortez: 250, Zoom Kobe: 0
Sold: 0
==========10==========
Nike Bangladesh Status:
Branches Opened: 2
Currently Stocked: Air Jordan: 0, Cortez: 360, Zoom Kobe: 0
Sold: 90
==========11==========
Nike Chittagong GEC outlet:
Products Currently Stocked: Air Jordan: 0, Cortez: 250, Zoom Kobe: 0
Sold: 0
```

# Task 3

Design the child class **Striker** and **Defender** that inherits from the Football class so that the given output matches with the output generated by the driver code.

**Parent Class**

```
public class Football {
  public String name;
  public int age;
  public int stamina;

  public Football(String name, int age, int stamina) {
    this.name = name;
    this.age = age;
    this.stamina = stamina;
  }

  public void display() {
    System.out.println("Name: " + name);
    System.out.println("Age: " + age);
    System.out.println("Stamina: " + stamina);
  }

  public void calculatePerformance() {
    System.out.println("Performance is not defined yet");
  }
}
```

**Driver Code**

```
public class FootballTester {
  public static void main(String[] args) {
    Striker ronaldo = new Striker("Ronaldo", 39, 90, 901, 1000);
    Defender ramos = new Defender("Ramos", 38, 85, 1000, 100);

    System.out.println("1========");
    ronaldo.display();
    System.out.println("2========");
    ronaldo.calculatePerformance();
    System.out.println("3========");
    ramos.display();
    System.out.println("4========");
    ramos.calculatePerformance();
  }
}
```

**Output**

```
1========
Name: Ronaldo
Age: 39
Stamina: 90
Goals: 901
Shots on target: 1000
2========
Performance: 0.901
3========
Name: Ramos
Age: 38
Stamina: 85
Tackles: 1000
Interceptions: 100
4========
Performance: 0.1
```

# Task 4

Design the **Nokia** class derived from the Mobile class so that the following output is produced.

**Parent Class**

```
class Mobile {
  public String model;
  public String IMEICode;
  public boolean simCardStatus;

  public Mobile(String model, String IMEICode, boolean simCardStatus) {
    this.model = model;
    this.IMEICode = IMEICode;
    this.simCardStatus = simCardStatus;
    System.out.println("Model " + model + " is manufactured.");
  }

  public String getCountryName(String countryCode) {
    if (countryCode.equals("880")) {
      return "Bangladesh";
    } else if (countryCode.equals("455")) {
      return "USA";
    }
    return null;
  }

  public void activateSimCard() {
    if (!simCardStatus) {
      simCardStatus = true;
      System.out.println("SIM card is activated successfully.");
    }
  }

  @Override
  public String toString() {
    return "Mobile Phone Detail:\nModel: " + model + "\nIMEICode: " + IMEICode + "\nSIM Card Status: " +
simCardStatus;
  }
}
```

```
//Driver code below
```

| Driver Code | Output |
| --- | --- |
| public class MobileTester {<br>  public static void main(String[] args) {<br>  Nokia N3110 = new Nokia("N3110", true, "IMEI-102", 0);<br>  System.out.println(N3110);<br>  System.out.println("1=======================");<br>  Nokia N1100 = new Nokia("N1100", false, "IMEI-124", 100);<br>  System.out.println(N1100);<br>  System.out.println("2=======================");<br>  System.out.println(N3110.dialCall("88017196xxxx"));<br>  System.out.println("3=======================");<br>  N3110.rechargeSIMCard(200);<br>  N1100.rechargeSIMCard(300);<br>  System.out.println("4=======================");<br>  System.out.println(N3110.dialCall("88017196xxxx"));<br>  System.out.println("5=======================");<br>  System.out.println(N1100.dialCall("45517196xxxx"));<br>  System.out.println("6=======================");<br>  N1100.activateSimCard();<br>  System.out.println("7=======================");<br>  System.out.println(N1100.dialCall("45517196xxxx"));<br>  System.out.println("8=======================");<br>  System.out.println(N1100.dialCall("96617196xxxx"));<br>  }<br>} | Model N3110 is manufactured.<br>Mobile Phone Detail:<br>Model: N3110<br>IMEICode: IMEI-102<br>SIM Card Status: true<br>Balance: 0.0 TK<br>1=======================<br>Model N1100 is manufactured.<br>Mobile Phone Detail:<br>Model: N1100<br>IMEICode: IMEI-124<br>SIM Card Status: false<br>Balance: 100.0 TK<br>2=======================<br>Insufficient balance! Please recharge.<br>3=======================<br>Recharge successful! Current balance 200.0 TK.<br>Recharge successful! Current balance 400.0 TK.<br>4=======================<br>Dialing the number 88017196xxxx to Bangladesh region.<br>5=======================<br>No SIM card available! Please check the SIM card connectivity.<br>6=======================<br>SIM card is activated successfully.<br>7=======================<br>Dialing the number 45517196xxxx to USA region.<br>8=======================<br>Dialing is not allowed in this region. |

# Task 5

Design the **Dragon** class and **Phoenix** class derived from the MagicalCreature class so that the following output is produced.

**Parent Class**

```
public class MagicalCreature {
  public String name;
  public int age;
  public MagicalCreature(String name, int age) {
    this.name = name;
    this.age = age;
  }
  public void makeSound() {
    System.out.println(name + " makes a magical sound.");
  }
  public void displayInfo() {
    System.out.println("Name: " + name + "\nAge: " + age);
  }
  public void performMagic() {
    System.out.println(name + " performs a generic magic.");
  }
}
```

**Driver Code**

```
public class MagicalTester {
  public static void main(String[] args) {
    Dragon drake = new Dragon("Drake", 500, 75);
    Phoenix fawkes = new Phoenix("Fawkes", 200, 5);
    drake.displayInfo();
    drake.makeSound();
    drake.performMagic();
    drake.fly();
    System.out.println("====================");
    fawkes.displayInfo();
    fawkes.makeSound();
    fawkes.performMagic();
    fawkes.regenerate();
  }
}
```

**Output**

```
Name: Drake
Age: 500
Drake roars with a fiery breath!
Drake breathes fire with power level: 75
Drake flies through the sky.
====================
Name: Fawkes
Age: 200
Fawkes sings an enchanting song.
Fawkes is reborn with 5 rebirth cycles.
Fawkes regenerates its body in a burst of
flames.
```

# Task 6

Design the **Bondhus** class derived from the SocialMedia class so that the following output is produced.

**Parent Class**

```
public class SocialMedia{
  public String userName;
  public String email;

  public SocialMedia(String name, String mail){
    userName = name;
    email = mail;
  }
  @Override
  public String toString() {
    return userName + "'s profile:"+ "\nUser Name: " + userName + "\nEmail:" + email;
  }
}
```

**Driver Code**

```
public class SocialMediaTester{
  public static void main(String []args){
    Bondhus f1 = new Bondhus("Sheldon", "sheldon@qmail.com");
    Bondhus f2 = new Bondhus("Penny", "penny@qmail.com");
    Bondhus f3 = new Bondhus("Leonard", "leonard@qmail.com");
    System.out.println("1----------------------------");
    f1.showSentbox();
    System.out.println("2----------------------------");
    f2.showSentbox();
    System.out.println("3----------------------------");
    f2.sendMessage("Hi");
    f2.sendMessage("Hello");
    f2.sendMessage("NiHao");
    f3.sendMessage("Hola");
    f3.sendMessage("Sheldon, please.");
    System.out.println("4----------------------------");
    f2.showSentbox();
    System.out.println("5----------------------------");
    f1.showSentbox();
    System.out.println("6----------------------------");
    f1.sendMessage("Bazinga!");
    f2.sendMessage("Well, duh!");
    f3.showSentbox();
    System.out.println("7----------------------------");
    f2.showSentbox();
    f2.sendMessage("Bye.");
    f2.sendMessage("Oh! No");
    System.out.println("8----------------------------");
    f1.showSentbox();
    System.out.println("9----------------------------");
    System.out.println(f1);
    System.out.println("10----------------------------");
    System.out.println(f2);
  }
```

**Output**

```
1----------------------------
Sheldon's Sentbox:
No sent messages.
2----------------------------
Penny's Sentbox:
No sent messages.
3----------------------------
4----------------------------
Penny's Sentbox:
Hi
Hello
NiHao
5----------------------------
Sheldon's Sentbox:
No sent messages.
6----------------------------
Leonard's Sentbox:
Hola
Sheldon, please.
7----------------------------
Penny's Sentbox:
Hi
Hello
NiHao
Well, duh!
Sentbox is full.
8----------------------------
Sheldon's Sentbox:
Bazinga!
9----------------------------
Sheldon's profile:
User Name: Sheldon
Email:sheldon@qmail.com
Messages Sent: 1
```

| | |
|---|---|
| }<br> | 10----------<br>Penny's profile:<br>User Name: Penny<br>Email:penny@qmail.com<br>Messages Sent: 5 |

# Task 7

Write the **Mango** and the **Jackfruit** classes derived from Fruit class so that the following code generates the output below:

**Parent Class**

```
public class Fruit{
  private boolean formalin = false;
  private String name = "";
  public Fruit(boolean formalin, String name){
    this.formalin = formalin;
    this.name = name;
  }
  public String getName(){
    return name;
  }
  public boolean hasFormalin(){
    return formalin;
  }
}
```

**Driver Code**

```
public class FruitTester{
  public static void testFruit(Fruit f){
    System.out.println("----Printing Detail-----");
    if(f.hasFormalin()){
      System.out.println("Do not eat the "+f.getName()+".");
      System.out.println(f);
    }else{
      System.out.println("Eat the "+f.getName()+".");
      System.out.println(f);
    }
  }
  public static void main(String [] args){
    Mango m = new Mango();
    testFruit(m);
    Jackfruit j = new Jackfruit();
    testFruit(j);
  }
}
```

**Output**

```
----Printing Detail-----
Do not eat the Mango.
Mangos are bad for you
----Printing Detail-----
Eat the Jackfruit.
Jackfruits are good for you
```

# Task 8

Write the **CSEStudent** and **CSE111Student** classes derived from Student class so that the following code generates the output below

**Parent Class**

```
public class Student{
  public String msg = "I love BU";
  public String shout(){
    return msg;
  }
}
```

| Driver Code | Output |
|---|---|
| `public class StudentTester{`<br>`  public static void printShout(Student s){`<br>`  System.out.println("------------------");`<br>`  System.out.println(s.msg);`<br>`  System.out.println(s.shout());`<br>`  }`<br>`  public static void main(String [] args){`<br>`  Student s = new Student();`<br>`  CSEStudent cs = new CSEStudent();`<br>`  CSE111Student cs111 = new CSE111Student();`<br>`  System.out.println(s.msg);`<br>`  System.out.println(cs.msg);`<br>`  System.out.println(cs111.msg);`<br>`  printShout(s);`<br>`  printShout(cs);`<br>`  printShout(cs111);`<br>`  }`<br>`}` | `I love BU`<br>`I want to transfer to CSE`<br>`I love Java Programming`<br>`------------------`<br>`I love BU`<br>`I love BU`<br>`------------------`<br>`I love BU`<br>`I want to transfer to CSE`<br>`------------------`<br>`I love BU`<br>`I love Java Programming` |

# Task 9

```
1  public class Trace {
2   public int sum, temp;
3   public Trace(int sum, int temp){
4     this.sum = sum;
5     this.temp = temp;
6   }
7  }
8  class Quiz5{
9   public int sum = 12, x = 2, y = 6;
10  public Trace trace;
11  public Quiz5(Trace t){
12    trace = t;
13    int x = trace.temp + y;
14    sum = sum + (t.sum--) + y;
15    System.out.println(trace.sum + " " + sum + " " + x);
16    sum -= 10;
17  }
18  public void methodA(int sum, int temp){
19    sum = 3 + sum - trace.sum;
20    x = sum + 12 + y;
21    y = trace.temp + temp + sum;
22    this.sum = y + methodB(trace.temp, trace) + trace.temp;
23    System.out.println(sum + " " + y + " " + this.sum);
24  }
25  public int methodB(int x, Trace temp){
26    int sum = x + temp.sum + this.x;
27    temp.temp = sum + this.sum;
28    System.out.println(x + " " + temp.temp + " " + sum);
29    return sum;
30  }
31 }
```

```
Trace p = new Trace(3, 4);
Quiz5 q = new Quiz5(p);
q.methodA(4, 8);
q.methodA(5, 10);
```

| **Output** | | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

# Task 10

```
1  public class Test {
2   public static int a=3;
3   public int b=7, c;
4   public Test(){
5     methodA(a+4);
6   }
7   public void methodA(int a){
8     Tracing t = new Tracing(2,7);
9     a = Tracing.a+ Test.a;
10    c = b + a + t.methodB();
11    System.out.println(this.a+" "+this.b+" "+c);
12  }
13 }
14 class Tracing {
15  public static int a = 9, y = 5;
16  public int x, b;
17  public Tracing(int a, int b){
18    x += a;
19    y += b;
20    this.a = this.x;
21    this.b = this.y;
22  }
23  public int methodB(){
24    System.out.println(this.a+" "+this.b+" "+x);
25    b = y - this.b + Test.a;
26    x += this.b;
27    return this.b;
28  }
29 }
```

```
Tracing t2 = new Tracing(4, 3);
Test ex = new Test();
t2.methodB();
ex.methodA(Test.a);
```

| Output | | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

# Task 11

```
1  public class A {
2          public static int temp = 3;
3          public int sum;
4          public int y;
5          public A(int x) {
6              y = A.temp - 1 + x;
7              sum = this.temp + 2;
8              A.temp -= 2;
9          }
10         public void methodA(int y, int[] n) {
11             int x = 0;
12             n[0] += 1;
13             this.y = this.y + y + temp;
14             A.temp += 1;
15             x = x + 2 + n[0];
16             n[0] = sum + 2;
17             System.out.println(x + " " + this.y + " " + this.sum);
18         }
19 }
20 public class B extends A {
21         public static int x = 1;
22         public B() {
23             super(5);
24             sum = 2;
25             y = A.temp + 1;
26             B.x = 3 + temp + B.x;
27             A.temp -= 2;
28         }
29         public B(B b) {
30             super(2);
31             sum = 3;
32             this.sum = sum + this.sum%2 + 2;
33             B.x = b.x + B.x;
34         }
35         public void methodB(int m, int n) {
36             int[] y = {2, 3};
37             this.y = y[0] + this.y + m;
38             B.x = this.y + 2 + A.temp - n;
39             methodA(B.x, y);
40             this.sum = B.x + y[1] + this.sum;
41             System.out.println(B.x + " " + (y[0]+y[1]) + " " + this.sum);
42         }
43 }
```

Write the output of the following tester code:

| int[] n = {23};<br>A a1 = new A(3);<br>B b1 = new B();<br>B b2 = new B(b1);<br>a1.methodA(1, n);<br>b2.methodB(3, 2);<br>a1.methodA(1, n); | Output | | |
|---|---|---|---|
| | x | y | sum |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |