SLIIT
Discover Your Future

BSc (Hons) in Information Technology
Year 2

Lab Exercise 5

IT2030 – Object Oriented Programming   Semester 1, 2019

Objectives:

- Write Programs that make uses abstract classes, interfaces and Exception Handling

Exercise 1   **Compulsory**

We will modify an existing program to convert it into an abstract class. The code is at https://goo.gl/gbMxU6

```
// Lab Sheet on Abstract Classes
// Starter Code

class Animal {
   private String name;
   public Animal(String name) {
       this.name = name;
   }
  public String speak() {
      return "";
  }
  public void display() {
      System.out.println("My name is " + this.name + ".  " + this.speak() + ".");
  }
}

class Dog extends Animal {
   public Dog(String name) {
      super(name);
   }
   public String speak() {
       return "Bow Wow";
   }
}

class Cat extends Animal {
  public Cat(String name) {
      super(name);
   }
  public String speak() {
      return "Meow Meow";
  }
}

class ToyCat extends Cat {
  String manufacturer;
  public ToyCat(String name, String manufacturer) {
     super(name);
     this.manufacturer = manufacturer;
  }
  public void display() {
     super.display();
     System.out.println("I am from " + manufacturer + ".");
  }
}

class Main {
  public static void main(String[] args) {
     Animal animal1 = new Animal("test");
     animal1.display();

     Cat mycat = new Cat("Micky");
     mycat.display();

     Dog mydog = new Dog("Rover");
     mydog.display();

     ToyCat mytoy = new ToyCat("kittie","Toysrus");
     mytoy.display();

  }
}
```

a) Make the Animal class an abstract class and make the speak method an abstract method. Modify the main function.

What needs to be removed and why?

b) Add default constructors to each of the classes. Display a message givingdetails of the name of the constructor.

e.g.

```
public Animal() {
        System.out.println("Animal constructor called");
}
```

Create an object of the ToyCat class and call the default constructor. What will be the output? Can you explain how why the output appears as displayed?

Exercise 2 **Compulsory**

We will write two classes that implement a given interface. The code is at https://goo.gl/7bXxem

```
// Interface Lab Sheet

interface ICompute {
    void calculate();
    void display();
}

class Person {
   private String name;
   private double basicSal;
   private double otRate;
   private double otHrs;
   private double netSal;
}

class Box  {
   private int length, width, height;
   private int volume;
}
```

```
class Main {
  public static void main(String[] args) {
      ICompute ob1 = new Person("Danushka",40000, 1000, 5);
      obj1.calculate();
      obj1.display();

      ICompute ob2 = new Box(10, 20, 30);
      obj2.calculate();
      obj2.display();
      }
}
```

a) Implement the Person making use of the ICompute interface

   i) Write a constructor
   ii) implements the methods in ICompute. In the compute() method calculate netSal

b) Implement the Box Class making use of the ICompute interface

   i) Write a constructor.
   ii) implements the methods in ICompute. In compute() calculate the volume

c) Create variables of Box and Person Type and create objects calculate and display values.

d) Describe any advantage you see in using interface type variables seen in the original main function code variables obj1, obj2 as opposed to using object type variables

Exercise 3

We will write a program that will allow us to enter a given number of marks and calculate the average. We will use a try catch block in the code. The code is at https://goo.gl/i6F3Pq

Complete the comments given in the code. See the following links for specific expceptions that you can use.

https://docs.oracle.com/javase/8/docs/api/java/util/InputMismatchException.html
https://docs.oracle.com/javase/8/docs/api/java/lang/ArithmeticException.html
https://docs.oracle.com/javase/8/docs/api/java/lang/ArrayIndexOutOfBoundsException.html

```
// Lab Sheet on Try Catch Blocks

class Main {
  public static void main(String[] args) {

      int maxSubjects;
      int [] marks = new int[5];
      int total;
      double avg;

      try {
      // 1. Input a value for maxSubjects
      //    from keyboard
      // 2. Using a for loop
      //    input marks
      // 3. Calculate the avg marks
      // 4. Use a try catch block to
      //    prevent the following
      //    run time errors
      //   (a) Input valid integers to the
      //         inputs
      //   (b) ArithmeticException division
      //        by zero
      //   (c) ArrayIndexOutOfBounds
      //         Exception
      } catch (Exception e) {

      }

      finally {
         System.out.println("This code will be gurrentied to run");
      }

      System.out.println("The end");

  }
}
```