OO Design and Interfaces in Java
IFT 194: Lab 4

Brandon Doyle
bdoyle5@asu.edu
1215232174

Dr. Usha Jagannathan
Usha.Jagannathan@asu.edu

July 24, 2018

Summary

View the source of this document on GitHub.

Changing People

In this section we're asked to draw a trace of the program in `ChangingPeople.java`, which instantiates and modifies instances of `Person`. I've included both of these clases in Figure 1 and Figure 2.

In order to draw this simply in LaTeX, I'll define some notation: let `::` be an operator that reveals an object's scope (and contents), `->` be a reference to an instantiated class (object), `:=` define a primitive type's content, and `{}` represent scope. Then we have the following.

```
person1 :: (_name -> "Sally", _age := 13),
person2 :: (_name -> "Sam"  , _age := 15),
age := 21,
name -> "Jill"
                      |
                      V

person1 :: (_name -> "Sally", _age := 13)
person2 :: (_name -> "Sam"  , _age := 15)
age := 21
name -> "Jill"
p1 -> person1
p2 -> person2
age := 21
name -> name

                      |
                      V

person1 :: (_name -> "Sally", _age := 13)
person2 :: (_name -> "Sam"  , _age := 15)
age := 21
name -> "Jill"

p1 -> person1
age := 21
name -> name

// Updates to p1 and p2
p3 :: (_name -> name, _age := 21)
p2 -> p3
```

Figure 1: Trace of `ChangingPeople.java`.

Using the `Comparable` Interface

A Flexible Account Class

Opening and Closing Accounts

Transferring Funds

```java
package lab_4;

/**
 * Represent a person.
 *
 * @author Brandon Doyle
 */
public class Person
{
    private String _name;
    private int _age;

    /**
     * Class constructor to initialize fields.
     *
     * @param name Name of the person this object shall represent.
     * @param age  Age of the person.
     */
    public Person(String name, int age)
    {
        this._name = name;
        this._age  = age;
    }

    /**
     * Setter to modify the _name field.
     *
     * @param newName New name we'd like this Person to have.
     */
    public void changeName(String newName)
    {
        this._name = newName;
    }

    /**
     * Setter to modify the _age field.
     *
     * @param newAge New age we'd like this Person to have.
     */
    public void changeAge(int newAge)
    {
        this._age = newAge;
    }

    @Override
    public String toString()
    {
        return this._name + " - Age " + this._age;
    }
}
```

Figure 2: Person.java

```java
package lab_4;

public class ChangingPeople
{
    public static void main(String[] args)
    {
        var person1 = new Person("Sally", 13);
        var person2 = new Person("Sam", 15);
        int age = 21;
        var name = "Jill";

        // Original instantiations
        System.out.println("Original values:");
        System.out.println("person1: " + person1);
        System.out.println("person2: " + person2);
        System.out.println("age: " + age + "\tname: " + name + "\n");

        // Modify these values
        ChangingPeople.changePeople(person1, person2, age, name);

        // After modifications
        System.out.println("Values after calling changePeople:");
        System.out.println("person1: " + person1);
        System.out.println("person2: " + person2);
        System.out.println("age: " + age + "\tname: " + name);
    }

    public static void changePeople(Person p1, Person p2, int age, String name)
    {
        // Show the original values
        System.out.println("Original values:");
        System.out.println("person1: " + p1);
        System.out.println("person2: " + p2);
        System.out.println("age: " + age + "\tname: " + name + "\n");

        // Make changes to p2
        var p3 = new Person(name, age);
        p2 = p3;    // modify reference(p2) := reference(p3)

        // Update values in p1
        name = "Jack";
        age = 55;
        p1.changeName(name);
        p1.changeAge(age);

        // Print changes
        System.out.println("Inside changePeople:");
        System.out.println("person1: " + p1);
        System.out.println("person2: " + p2);
        System.out.println("age: " + age + "\tname: " + name + "\n");
    }
}
```

Figure 3: ChangingPeople.java