THE UNIVERSITY OF Bolton

SWE5202 Data Structures and Algorithms

Practical Exercises (cloning objects)

Exercise 1

From the Moodle site download and import the Java project – **CloningPartB** and run the 2 programs **Cloning003** and **Cloning004** which demonstrate the difference between shallow and deep copying.

Note that the **Person** class has 3 constructors (ctors) what are they called?

The deep copying makes use of the Cloneable interface. Try changing the following lines.

From	To
`public class Person implements Cloneable {`	`public class Person {`
`public class Date implements Cloneable {`	`public class Date {`

and run program Cloning004 again. The program still works as before

Why do we implement the Cloneable interface and what is an interface?

The following line can be found in Cloning004 -

```
p2 = (Person) p1.clone();
```

What is the purpose of `(Person)` and why is it needed?

Exercise 2

Create a new Java project called **Diary** and, in the project, create the following 3 classes called Date, Time and Appointment which can be used in an electronic organiser type application

Class name: Date (Attributes)	
private int day	day of the month (1-31)
private int month	month of the year (1-12)
private int year	year e.g. 2008

Class name: Time (Attributes)	
private int hour	hour in the day (0-23)
private int minute	minute within the hour (0-59)

Class name: Appointment (Attributes)	
private String name	who to meet
private Date date	date of appointment
private Time time	time of appointment

Program Development Stage 1

All three classes must have

1. a default constructor that initialises its attributes to sensible values.
2. a parameter constructor that sets all the attribute values based on the parameter values.
3. a copy constructor that performs shallow copying.
4. a setter method for each attribute.
5. a getter method for each attribute.
6. a toString method to return a suitably formatted string of the attribute values.

Note that Eclipse has the power to actually add the code to perform actions 2, 4 and 5. Describe how to make Eclipse do this.

Create a class called CopyTest001 that simply demonstrates shallow copying of Appointment objects.

Program Development Stage 2

For each of the 3 classes change the class definition to implement the Cloneable interface and add appropriate methods and code to enable deep copying of Appointment objects.

Create a class called CopyTest002 that simply demonstrates deep copying of Appointment objects.

Add JavaDoc comments to explain the purpose of each class and method in each class.
What is a JavaDoc comment?
(In the Eclipse IDE normal comments appear in green and JavaDoc comments appears in blue)

Program Development Stage 3

For each of the 3 classes change the class definition to implement the Comparable interface and add appropriate methods and code to enable natural ordering of Appointment objects.

Create a class called CopyTest003 that simply demonstrates sorting of Appointment objects.

Add JavaDoc comments to explain the purpose of the new methods added to each class.