The Hong Kong Polytechnic University
Department of Electronic and Information Engineering

EIE3320 Tutorial 2: Object-Oriented Programming (Object Interaction)

(Deadline for Submission: Check the course information)

1. **(Assignment)** Change the clock.

   a. Download project files from http://www.eie.polyu.edu.hk/~enhylin/BlueJProjects.zip and decompress the zip file to your home directory.

   b. Invoking BlueJ and open the project "clock-display" in Chapter 3 by clicking "File" → "Open Project".

   c. Create a `ClockDisplay` object, and then open an inspector window for this object. With the inspector window open, call the object's methods. Watch the `displayString` field in the inspector. Read the project comment by double clicking the text note icon.

   d. Create a new class that contains the `main()` method. An example class is shown below. Click the "New Class" button in the project window and enter "MyClock" to the edit box.

```
public class MyClock
{
    public static void main(String[] args) {
        ClockDisplay hkTime = new ClockDisplay(2,30);
        ClockDisplay londonTime = new ClockDisplay(10,30);
        hkTime.timeTick();
        londonTime.timeTick();
        System.out.println(hkTime.getTime());
        System.out.println(londonTime.getTime());
    }
}
```

   e. Change the clock from a 24-hour clock to a 12-hour clock. In a 12-hour clock, 01:30 is shown as 1:30 a.m. and 21:30 is shown as 9:30 p.m. Thus the minute display shows values from 0 to 59, while the hour display shows values from 1 to 12. ***Hints***: There are two ways to make a 12-hour clock. One possibility is to store hour values from 1 to 12. On the other hand, you can leave the clock to work internally as a 24-hour clock, but change the display string of the clock display to show 04:23 p.m. when the internal value is 16:23.

2. Design a class named `Rectangle` to represent a rectangle. The class should contain the following fields and methods:
   - Two double data fields named `width` and `height` that specify the width and height of the rectangle. The default values are 1 for both width and height.
   - A no-arg constructor that creates a default rectangle.
   - A constructor that creates a rectangle with the specified width and height.
   - A method named `getArea()` that returns the area of this rectangle.
   - A method named `getPerimeter()` that returns the perimeter.

   Implement the class `Rectangle`. Write a test program that creates two `Rectangle` objects—one with width 4 and height 40 and the other with width 3.5 and height 35.9. Display the width, height, area, and perimeter of each rectangle in this order. Here is a sample run.

```
The area of a rectangle with width 4.0 and height 40.0 is 160.0
The perimeter of this rectangle is 88.0
The area of a rectangle with width 3.5 and height 35.9 is 125.64999999999999
The perimeter of this rectangle is 78.8
```

3. Open the "mail-system" project. Create a `MailServer` object. Create two `MailClient` objects. When doing this, you need to supply the `MailServer` instance, which you just created, as a parameter. You also need to specify a username for the mail client. `MailClient` objects can be used to send messages from one mail client to another (using the `sendMessage` method) and to receive messages (using the `getNextMailItem` or `printNextMailItem` methods). You may use the following class to create the `MailClient` and `MailServer` objects.

```
public class TestMail
{
    public static void main(String [] args) {
        MailServer ms = new MailServer();              // Line A
        MailClient mc1 = new MailClient(ms, "Peter");
        MailClient mc2 = new MailClient(ms, "Paul");
        mc1.sendMessage("Paul","Hello, I am Peter");
        mc2.sendMessage("Peter","Hello, I am Paul");
    }
}
```

4. This part is to use the Debugger. Set a breakpoint at Line A of `TestMail`. Then run the TestMail program. Use the *Step into* function to step into the constructor of MailServer. In the debugger, you can see the instance variables and local variables.

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