Java 物件導向

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注意事項！！！

1. 註解 和 生成 Javadoc (參考Ecourse - Javadoc example.pdf)
2. class named AshWednesday and AshWednesdayTester
3. 壓縮且上傳
4. 此次作業期限為 4/13

今日目標

解釋 複雜的 作業二

今日內容

1. 函式(function, method)
2. 建構子+類別成員-instance (class member)
3. 類別成員-static (class member)

函式(function, method)

```
public      static    String      calculateAshWednesday(int selectYear)
[封裝等級]      [回傳型態]                [名稱]          [資料型態   參數, …]
{
        return ...
}
```

函式(function, method) (cont.)

public static String calculateAshWednesday(int selectYear)
[封裝等級] [回傳型態] [名稱] [資料型態 參數, …]

[封裝等級] encapsulation

封裝字/可見度	public	protected	none	private
class	O	O	O	O
package	O	O	O	X
subclass	O	O	X	X
world	O	X	X	X

Constructor(建構子、建構函式、建構方法)

```java
// Constructor.java
public class Constructor {
    public Constructor(int i)
    {
        var = i ;
    }
    private int var;
    public void show()
    {
        privateShow();
    }
    private void privateShow()
    {
        System.out.println("Var = "+var);
    }
}
```

```java
// ConstructorTester.java
public class ConstructorTester {
    public static void main(String[] args) {
        Constructor cstor = new Constructor(5);
        cstor.show();
//      cstor.privateShow();
    }
}
```

- encapsulation
  - constructorTester_Line6無法直接呼叫private method(constructor_line12)
  - 需要藉由class內部呼叫(constructor_line8)
- instance
  - instance field:沒有用 static 修飾的 field(資料 constructor_line7)
  - instance method:沒有用 static 修飾的 method(方法 constructor_line8, 12)

Static

- 唯一值(永遠只佔著那一組記憶體空間)(constructor1Tester_Line8,9)
- 可以透過類別直接存取(constructor1Tester_Line5,6)

```
1  // Constructor1.java
2  public class Constructor1 {
3      public Constructor1()
4      {
5      }
6      public static int var;
7      public static void set(int i)
8      {
9          var = i;
10     }
11     public static void show()
12     {
13         System.out.println("var = "+var);
14     }
15 }
```

```
1  // CpnstructorlTester.java
2  public class CpnstructorlTester {
3      public static void main(String[] args) {
4  //         直接存取
5          Constructor1.set(5);
6          Constructor1.show();
7  //         唯一值
8          Constructor1 cstor = new Constructor1();
9          cstor.show();
10     }
11 }
```

```
var = 5
var = 5
```

解釋 複雜的 作業二

作業二

Requirements:

1. Write a class named `AshWednesday` that implements Gauss's algorithm for calculating the month and day of Ash Wednesday Sunday for any specified year.
2. Generate complete Javadocs for the AshWednesday class and AshWednesdayTester class and place them in a folder named `docs` within the project.

1. 建立AshWednesday class
2. 產出Javadoc

作業二

public interface of a class (The public constructors and **methods** of a class form the public interface of the class)

- There is a **private**, **no-argument constructor** with an empty implementation so the class can't be instantiated
- `calculateAshWednesday(int selectYear): String`

This is a class method that implements Gauss's algorithm, using the same local variables as in text (a thru e). **Must use string concatenation** to return a string (see sample output below)

1. 建立AshWednesday class
2. AshWednesday沒有attributes(field)
3. class的封裝等級為public
4. 建立一個封裝等級為private, 沒有參數的建構子(因為是private所以不能new"實體化")
5. 建立一個calculateAshWednesday的函式, 參數為int selectYear, 回傳值為字串

作業二

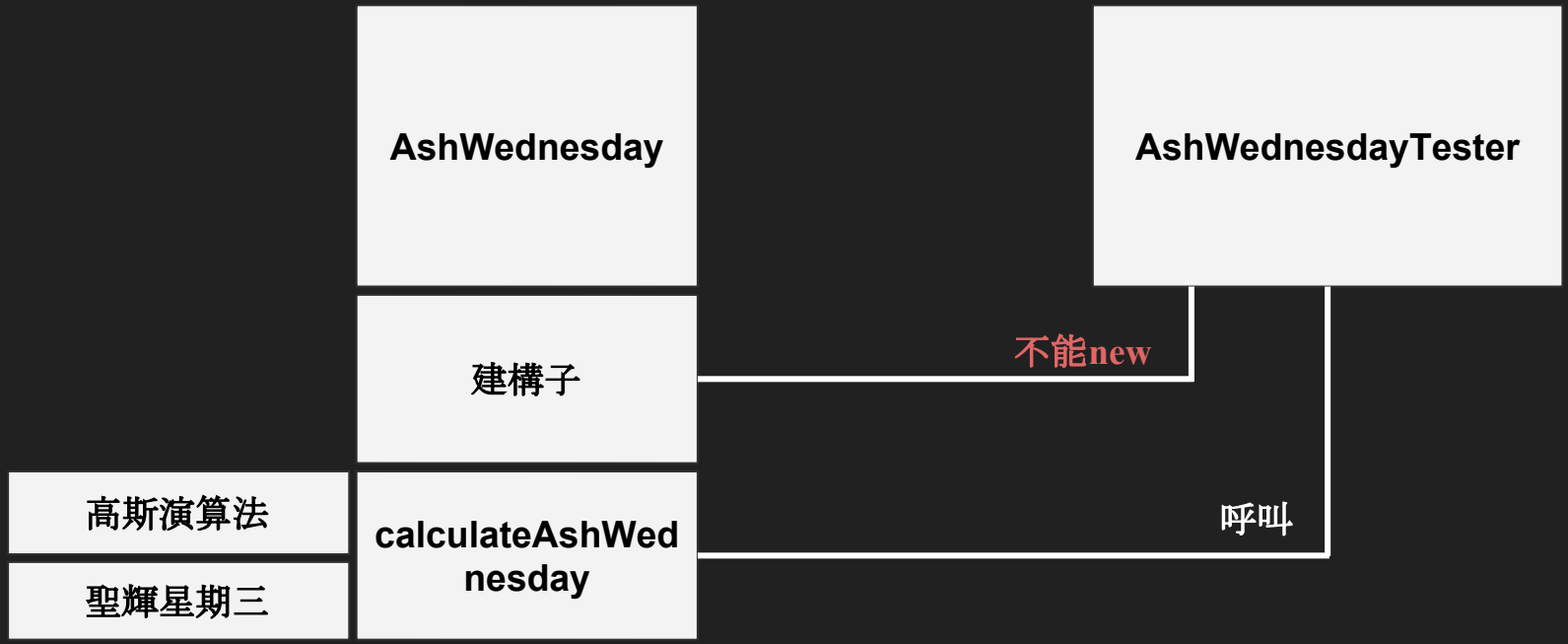
4. Write a class named `AshWednesdayTester` that invokes the static method of the AshWednesday class for the following years: 2007, 2017. The program displays the following output, exactly as shown:

1. 建立AshWednesdayTester class
2. 呼叫AshWednesday的函式, 並帶入參數2007和2017
3. 參考輸出(TA版)

```
In 2007, Easter is on month 4 and day 8
In 2007, Ash Wednesday is: month = 2 and day = 21

In 2017, Easter is on month 4 and day 16
In 2017, Ash Wednesday is: month = 3 and day = 1
```

作業二


AshWednesday
AshWednesdayTester
建構子
不能new
高斯演算法
calculateAshWed
nesday
呼叫
聖輝星期三

Gauss's algorithm(高斯演算法)

How to calculate Ash Wednesday:
Y = select year, M = 24, N = 5
a = Y mod 19
b = Y mod 4
c = Y mod 7
d = (19a + M) mod 30
e = (2b + 4c + 6d + N) mod 7
If d+e < 10, then Easter is on month = 3 and day = (d+e+22), else Easter is on month 4 and day (d+e-9).
Ash Wednesday is 40 days (Lord's day / Sunday is not included) before Easter.

Wiki復活節計算表冊

Ash Wednesday(聖燁星期三)

How to calculate Ash Wednesday:
Y = select year, M = 24, N = 5
a = Y mod 19
b = Y mod 4
c = Y mod 7
d = (19a + M) mod 30
e = (2b + 4c + 6d + N) mod 7
If d+e < 10, then Easter is on month = 3 and day = (d+e+22), else Easter is on month 4 and day (d+e-9).
Ash Wednesday is 40 days (Lord's day / Sunday is not included) before Easter.

1. 復活節前40天(不含星期日)
2. 簡單說, 復活節前46天(含星期日)

如何往前推算?天

```java
import java.util.Calendar;
import java.util.Date;

public class DateExample {
    public static void main(String[] args) {
//        month: 0-11
        Date dt = new Date(2017,1,28);
        Calendar cal = Calendar.getInstance();
        cal.setTime(dt);
        cal.add(Calendar.DATE, -1);
        Date dt2 = cal.getTime();
        System.out.println("dt = "+dt);
        System.out.println("dt2 = "+dt2);
        System.out.println("month = "+dt2.getMonth());
        System.out.println("day = "+dt2.getDate());
    }
}
```

```
dt = Wed Feb 28 00:00:00 CST 3917
dt2 = Tue Feb 27 00:00:00 CST 3917
month = 1
day = 27
```

注意:month是0-11

如何算復活節

```java
/**
 * Assignment #: 2
 * Name: Bing
 * StudentID: 605530018
 * Description: Implement Gauss's algorithm and calculate Ash Wednesday.
 */
import java.util.Calendar;
import java.util.Date;

public class AshWednesday{
    /**
     * private constructor: class can't be instantiated
     */
    private AshWednesday() {
    }
    /**
     * calculate Easter and Ash Wednesday
     */
    public static String calculateAshWednesday(int selectYear){
        String return_str = "";
        Date dt;
        int Y = selectYear,M = 24, N= 5;
        int a = Y % 19;
        int b = Y % 4;
        int c = Y % 7;
        int d = (19*a + M) % 30;
        int e = (2*b + 4*c + 6*d + N) % 7;

        if(d+e < 10){
            dt = new Date(selectYear,3-1,(d+e+22));
            return_str = "In "+selectYear+", Easter is on month 3 and day "+dt.getDate()+"\n";
        }else{
            dt = new Date(selectYear,4-1,(d+e-9));
            return_str = "In "+selectYear+", Easter is on month 4 and day "+dt.getDate()+"\n";
        }

        return return_str;
    }
}
```

如何算復活節

```java
/**
 * Assignment #: 2
 * Name: Bing
 * StudentID: 605530018
 * Description: Call AshWednesday.class.
 */
public class AshWednesdayTester {
    /**
     * Call calculateAshWednesday function.
     */
    public static void main(String[] args) {
        String ashWebStr1 = AshWednesday.calculateAshWednesday(2007);
        String ashWebStr2 = AshWednesday.calculateAshWednesday(2017);
        System.out.println(ashWebStr1);
        System.out.println(ashWebStr2);
    }
}
```

END

下課＝練習完畢+來前面簽名