107學年度 第一學期　　課號：I4390

進階程式開發技術
程式作業報告

第一次程式作業

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(1) Create a class called **Lamp** that represents a lamp. Provide instance variables to represent the state of the lamp. Provide a constructor that initializes the instance variables. Provide methods for the behavior of the lamp. Write a test application to demonstrate class capabilities.

1、 **程式設計**: class Lamp
   i. **開關燈** default off
   ii. **調整亮度** deafult 5
   iii. **調整顏色** default #FFFFFF
   iv. **輸出狀態**

2、 **程式檔**: Lamp.java
   i. class Lamp

```java
public class Lamp{
    //function default
    private int r, g, b;  //color
    private boolean open;  //button
    private int brt;  //brightness

    public Lamp(){  //construction
        open = false;
        r = g = b = 255;
        brt = 5;
    }
```

   ii. turnOnOff(); //**開關燈**

```java
    public void turnOnOff(){
        this.open = !this.open;
    }
```

   iii. increaseBrt(); decreaseBrt(); getBrightness(); //**調整亮度**

```java
    public void getBrightness(){ //顯示亮度
        System.out.println("brightness : " + this.brt);
    }

    public void increaseBrt(){ //增加亮度
        if(this.brt < 10) //最大亮度:9
            this.brt++;
    }
    public void decreaseBrt(){ //降低亮度
        if(this.brt > 1) //最小亮度:1
            this.brt--;
    }
```

   iv. setColor(int r, int g, int b); getColor(); //**調整顏色**

```java
    public void setColor(int r, int g, int b){
        this.r = r;    //改變三原色值
        this.g = g;
        this.b = b;
    }
    public void getColor(){ //把int變成16進位再變成string
        String r = Integer.toHexString(this.r);
        String g = Integer.toHexString(this.g);
        String b = Integer.toHexString(this.b);
        System.out.println("color : #" + r + g + b);
    }
```

   v. getState();

```java
    public void getState(){
        if(this.open){
            System.out.println("The light is ON");
            getColor();
            getBrightness();
        }
        else System.out.println("The light is OFF");
```

3、 程式輸出:public static void main(String[] args){}

i. 開燈
ii. 增加亮度+1
iii. 減少亮度-2
iv. 設定顏色(136, 136, 136) => #888888
v. 最後輸出所有狀態
vi. code:

```
49      public static void main(String[] args){
50          Lamp lamp1 = new Lamp();     //新增一個lamp，lamp1
51          lamp1.getState();            //顯示lamp狀態
52
53          lamp1.turnOnOff();
54          lamp1.increaseBrt();
55          lamp1.decreaseBrt();
56          lamp1.decreaseBrt();
57          lamp1.setColor(136, 136, 136);
58          lamp1.getState();
59      }
```

vii. output:

```
The light is OFF
The light is ON
color : #888888
brightness : 4
```

----------End 1----------

(2) Create a class called **Account** that represents an account of a bank. Each account has data associated with it: the account serial number, the balance, and the annual interest rate. All accounts have the same interest rate. The bank account has the following functions: deposit money, withdraw money, calculate the half year interest by multiplying the current saving by the annual interest rate divided by 2, and modify the annual interest rate. Use appropriate types of variables, class variables or instance variables, to represent the data associated with the account. Use appropriate types of methods, class methods or instance methods, to perform the functions of the account. Provide constructors to initialize the instance variables. Write a test application to demonstrate class capabilities.

1、 程式設計:class Account

i. information 資訊
   1. serial_number :帳號
   2. balance : 帳戶餘額
   3. annual_interest_rate : all accounts are same :利息
ii. function 功能
   1. deposit money
   2. withdraw money
   3. calculate the interest: current_balance * annual_interest_rate /2
   4. modify the annual interest rate
iii. code
   1. class Account

```
1  public class Account {
2    private int serial_number; 帳戶帳號
3    private int balance;       帳戶餘額
4    private double interest_rate = 0.02; 年利率
5
6    public Account(int sNumber, int balance){ //constructor
7      this.serial_number = sNumber; //set serial number
8      this.balance = balance;    //set balance
9    }
```

   2. deposit();

```
11     public void disposit(int m){this.balance += m;}
```

3. withdraw();

```java
public void withdraw(int m){
  if(m < this.balance)//領取金錢是否大於餘額
    this.balance -= m;
  else {
      System.out.println("Insufficient balance"); //餘額不足
      showBalance();    //顯示餘額
      System.out.println();
    }
}
```

4. getInterest();

```java
public double getInterest(){return this.balance*this.interest_rate/2;}
```

//回傳半年利息

5. showBalance(); showAccount(); //顯示餘額、顯示帳戶資訊

```java
public void showBalance(){System.out.println("balance :" + this
    .balance);};
public void showAccount(){
  System.out.println("serial number: " + this.serial_number);
  showBalance();
  System.out.println("Half year interest: " + getInterest());
  System.out.println();
}
```

6. output
   1、 user1 新增帳戶 5312 餘額 3000
   2、 user2 新增帳戶 7963 餘額 5400
   3、 user1顯示帳戶資訊
   4、 user1存入7000元
   5、 user1顯示帳戶資訊
   6、 user2取出8000
   7、 user2取出5000
   8、 user2顯示帳戶資訊

```java
public static void main(String[] args) {
  Account user1 = new Account(5312, 3000);
  Account user2 = new Account(7963, 5400);

  user1.showAccount();
  user1.disposit(7000);
  user1.showAccount();

  user2.withdraw(8000);
  user2.withdraw(5000);
  user2.showAccount();

}
```

```
serial number: 5312 user1
balance :3000
Half year interest: 30.0

serial number: 5312
balance :10000      user1 disposit money
Half year interest: 100.0

Insufficient balance  user2 withdraw money
balance :5400

serial number: 7963 user2 account
balance :400
Half year interest: 4.0
```