COP 3330: Object-Oriented Programming Summer 2011

In Class Practice #2

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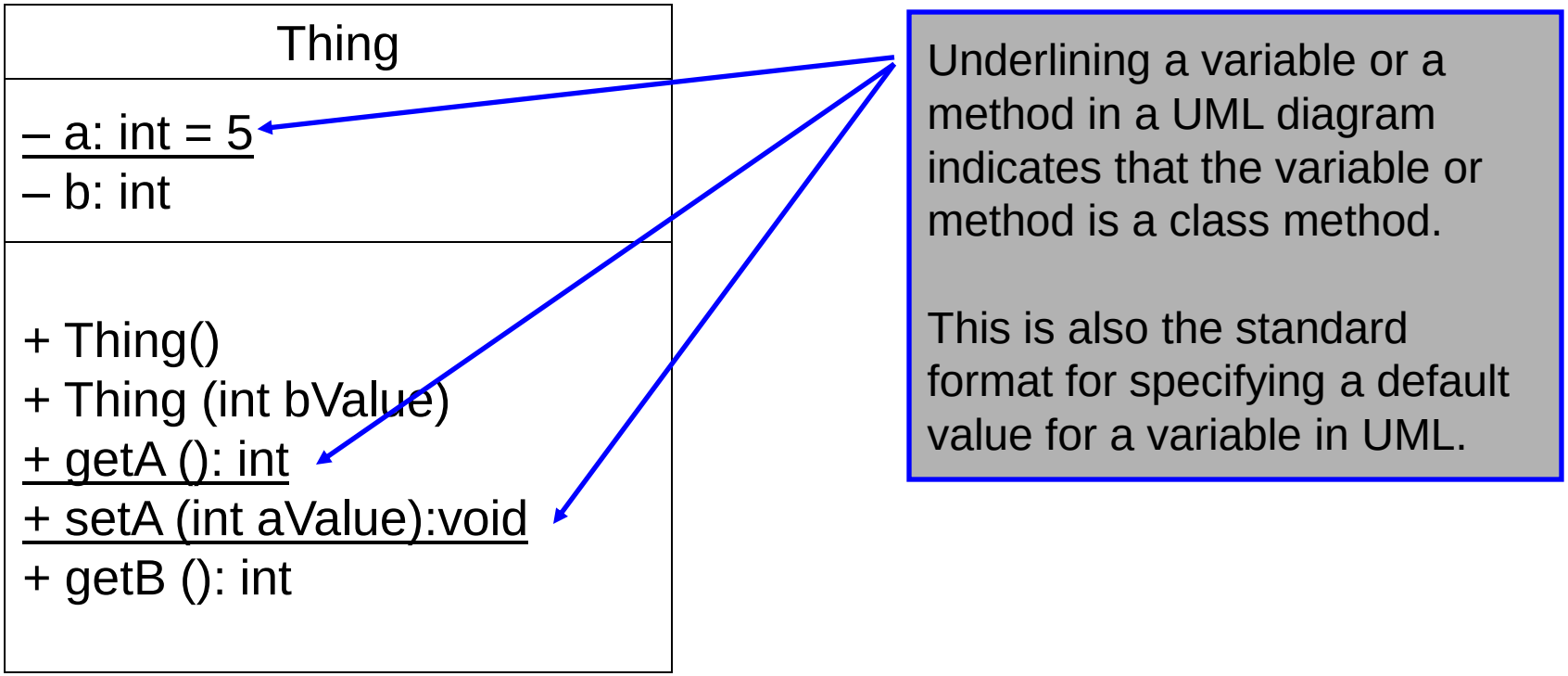
In Class Practice #2

- Let's convert the UML class diagram shown below into an implemented Java class and use that class to illustrate the differences between class variables/methods and instance variables/methods.



Thing.java | WindChill.java | UseWindChill.java | Thing2.java | 21

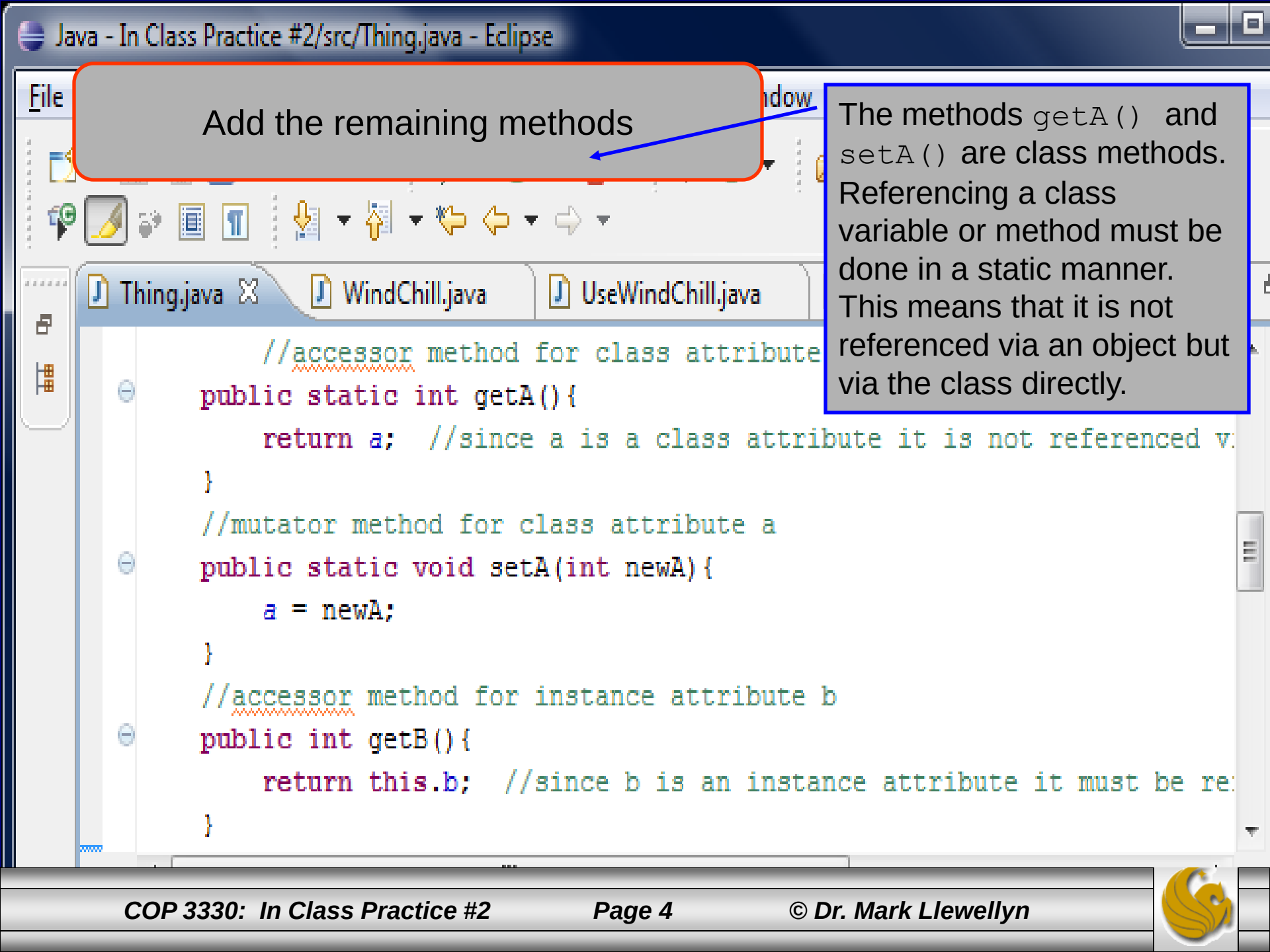
```
/* In Class Practice
 * Converting a UML d
 * Illustrating the d
 * variables and methods
 *
 * MJL May 25, 2011
 */

public class Thing {
    private static int a = 5;  //a is a class attribute
    private int b;             //b is an instance attribute

    //no-arg default constructor method
    public Thing(){
        b = 1;
    }
        //int-specific constructor method
    public Thing(int inB){
        this.b = inB;
    }
```

Create the class and add the class characteristics and constructors

Static modifier indicates a class variable.

Every object created using the default constructor will have a `b` value of 1.

Every object created using the int-specific constructor will have a `b` value equal to the value passes as a parameter.


Java - In Class Practice #2/src/Thing.java - Eclipse
File
Add the remaining methods
The methods getA() and setA() are class methods. Referencing a class variable or method must be done in a static manner. This means that it is not referenced via an object but via the class directly.
Thing.java
WindChill.java
UseWindChill.java
//accessor method for class attribute
public static int getA(){
return a; //since a is a class attribute it is not referenced v
}
//mutator method for class attribute a
public static void setA(int newA){
a = newA;
}
//accessor method for instance attribute b
public int getB(){
return this.b; //since b is an instance attribute it must be re
}

Construct the main method

eatIndexCalculator. | Thing.java | TestLoanClass.jav

```
    }
    //begin main method
    public static void main(String[] args){
        System.out.format("1 - The value of class attribute a is %d", Thing.a);
        System.out.format(" - Note that no objects have yet been created.\n");
        Thing object1 = new Thing(2); //create instance named object1
        System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object2 = new Thing(12); //create instance named object2
        System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
        Thing.setA(4); //change value of class attribute a
        System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
        System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
        Thing object3 = new Thing(); //create default instance named object3
        System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object4 = new Thing(); //create default instance named object3
        System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
        System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
    }//end main method
}//end class Thing
```


Console

<terminated> Thing [Java Application] C:\Program Files\Java\jre6\bin\javaw.exe (May 31, 2011 12:17:45 PM)

```
1 - The value of class attribute a is 5 - Note that no objects have yet been created.
2 - Object 1 has values of: a = 5 and b = 2
3 - The value of class attribute a is 5

4 - Object 1 has values of: a = 5 and b = 2
5 - Object 2 has values of: a = 5 and b = 12
6 - The value of class attribute a is 5

7 - The value of class attribute a is 4
8 - Object 1 has values of: a = 4 and b = 2
9 - Object 2 has values of: a = 4 and b = 12

10 - Object 1 has values of: a = 4 and b = 2
11 - Object 2 has values of: a = 4 and b = 12
12 - Object 3 has values of: a = 4 and b = 1
13 - The value of class attribute a is 4

14 - Object 1 has values of: a = 4 and b = 2
15 - Object 2 has values of: a = 4 and b = 12
16 - Object 3 has values of: a = 4 and b = 1
17 - Object 4 has values of: a = 4 and b = 1
18 - The value of class attribute a is 4
```

Execute the program

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //c
    System.out.format("4 - Object 1 ha                                    tB());
    System.out.format("5 - Object 2 ha                                    tB());
    System.out.format("6 - The value o
    Thing.setA(4); //change value of c
    System.out.format("7 - The value o
    System.out.format("8 - Object 1 ha                                    tB());
    System.out.format("9 - Object 2 ha                                    getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line 1:

The variable `a` is a class variable. Any reference to it must be a static reference via the class and not via an instance of the class.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object                                                    ct2.getB());
    System.out.format("6 - The va
    Thing.setA(4); //change value
    System.out.format("7 - The va
    System.out.format("8 - Object                                                    ct1.getB());
    System.out.format("9 - Object                                                    ject2.getB());
    Thing object3 = new Thing();
    System.out.format("10 - Objec                                                    ect1.getB());
    System.out.format("11 - Objec                                                    ect2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Creating an instance of the class

This line calls the constructor method of the `Thing` class to create an instance of the class named `object1`. When `object1` is created it's `b` value is set to 2.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("6 - The va
    Thing.setA(4); //change value
    System.out.format("7 - The va
    System.out.format("8 - Object                                                    ct1.getB());
    System.out.format("9 - Object                                                    ject2.getB());
    Thing object3 = new Thing();
    System.out.format("10 - Objec                                                    ect1.getB());
    System.out.format("11 - Objec                                                    ect2.getB());
    System.out.format("12 - Objec                                                    ect3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #2

This line has `object1` invoke both the static `getA()` and instance `getB()` methods to return the current values of these two characteristics. (a = 5 and b = 2)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
    Thing.setA(4); //change value of class attribute a
    System.out.format("7 - The valu
    System.out.format("8 - Object 1                                                    1.getB());
    System.out.format("9 - Object 2                                                    ct2.getB());
    Thing object3 = new Thing(); //
    System.out.format("10 - Object                                                     t1.getB());
    System.out.format("11 - Object                                                     t2.getB());
    System.out.format("12 - Object                                                     t3.getB());
    System.out.format("13 - The val
    Thing object4 = new Thing(); //
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

<u>Output Line #3</u>

Like line #1, this line simply prints the current value of the class variable `a` which is still 5.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
    Thing.setA(4); //change value of class attribute a
    System.out.format("7 - The
    System.out.format("8 - Object                                                    t1.getB());
    System.out.format("9 - Object                                                    ect2.getB());
    Thing object3 = new Thing();
    System.out.format("10 - Object                                                   ct1.getB());
    System.out.format("11 - Object                                                   ct2.getB());
    System.out.format("12 - Object                                                   ct3.getB());
    System.out.format("13 - The va
    Thing object4 = new Thing();
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Creating a second instance of the class

This line creates another instance of the class Thing. This instance is named `object2`. When it is constructed, the `b` value assigned to `object2` is 12.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
    public static void main(String[] args){
        System.out.format("1 - The value of class attribute a is %d", Thing.a);
        System.out.format(" - Note that no objects have yet been created.\n");
        Thing object1 = new Thing(2); //create instance named object1
        System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object2 = new Thing(12); //create instance named object2
        System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
        Thing.setA(4); //change value of class attribute a
        System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
        System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("9 - Object
                                                                          ct2.getB());
        Thing object3 = new Thing(); //
        System.out.format("10 - Object
                                                                          t1.getB());
        System.out.format("11 - Object
                                                                          t2.getB());
        System.out.format("12 - Object
                                                                          t3.getB());
        System.out.format("13 - The val
        Thing object4 = new Thing(); //
        System.out.format("14 - Object
                                                                          t1.getB());
        System.out.format("15 - Object
                                                                          t2.getB());
        System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
        System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
    }//end main method
}//end class Thing
```

Output Line #4

This line has `object1` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 5 and b = 2)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
    Thing.setA(4); //change value of class attribute a
    System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
    System.out.format("8 - Object 1 ha
    System.out.format("9 - Object 2 ha
    Thing object3 = new Thing(); //cre
    System.out.format("10 - Object 1 h
    System.out.format("11 - Object 2 h
    System.out.format("12 - Object 3 h
    System.out.format("13 - The value
    Thing object4 = new Thing(); //cre
    System.out.format("14 - Object 1 h
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #5

This line has `object2` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 5 and b = 12)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
    public static void main(String[] args){
        System.out.format("1 - The value of class attribute a is %d", Thing.a);
        System.out.format(" - Note that no objects have yet been created.\n");
        Thing object1 = new Thing(2); //create instance named object1
        System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object2 = new Thing(12); //create instance named object2
        System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
        Thing.setA(4); //change value of class attribute a
        System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
        System.out.format("8 - Object 1 ha                                              tB());
        System.out.format("9 - Object 2 ha                                              getB());
        Thing object3 = new Thing(); //cre
        System.out.format("10 - Object 1 h                                              etB());
        System.out.format("11 - Object 2 h                                              etB());
        System.out.format("12 - Object 3 h                                              etB());
        System.out.format("13 - The value
        Thing object4 = new Thing(); //cre
        System.out.format("14 - Object 1 h                                              etB());
        System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
        System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
    }//end main method
}//end class Thing
```

Output Line #6

Like lines #1 and #3, this line simply prints the current value of the class variable `a` which is still 5.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
    Thing.setA(4); //change value of class attribute a
    System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
    System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //crea
    System.out.format("10 - Object 1 ha                                                    tB());
    System.out.format("11 - Object 2 ha                                                    tB());
    System.out.format("12 - Object 3 ha                                                    tB());
    System.out.format("13 - The value o
    Thing object4 = new Thing(); //crea
    System.out.format("14 - Object 1 ha                                                    tB());
    System.out.format("15 - Object 2 ha                                                    tB());
    System.out.format("16 - Object 3 ha                                                    tB());
    System.out.format("17 - Object 4 ha                                                    tB());
    System.out.format("18 - The value o
}//end main method
}//end class Thing
```

Changing the value of the class variable

This line changes the value of the class variable `a`, with a static invocation of the `setA` method, passing the value of 4 to the method. After executing this line, the value of `a` will be 4.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
    public static void main(String[] args){
        System.out.format("1 - The value of class attribute a is %d", Thing.a);
        System.out.format(" - Note that no objects have yet been created.\n");
        Thing object1 = new Thing(2); //create instance named object1
        System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object2 = new Thing(12); //create instance named object2
        System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("6 - The value of class attribute a is %d\n\n", Thing.a);
        Thing.setA(4); //change value of class attribute a
        System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
        System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
        Thing object3 = new Thing(); //create default instance named object3
        System.out.format("10 - Object 1 ha                                              tB());
        System.out.format("11 - Object 2 ha                                              tB());
        System.out.format("12 - Object 3 ha                                              tB());
        System.out.format("13 - The value o
        Thing object4 = new Thing(); //crea
        System.out.format("14 - Object 1 ha                                              tB());
        System.out.format("15 - Object 2 ha                                              tB());
        System.out.format("16 - Object 3 ha                                              tB());
        System.out.format("17 - Object 4 ha                                              tB());
        System.out.format("18 - The value o
    }//end main method
}//end class Thing
```

Output Line #7

Like lines #1, #3, and #6 this This line simply prints the current value of the class variable a which is now 4.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
    public static void main(String[] args){
        System.out.format("1 - The value of cl
        System.out.format(" - Note that no obj
        Thing object1 = new Thing(2); //create
        System.out.format("2 - Object 1 has va                    );
        System.out.format("3 - The value of cl
        Thing object2 = new Thing(12); //creat
        System.out.format("4 - Object 1 has va                    );
        System.out.format("5 - Object 2 has va                    );
        System.out.format("6 - The value of cl
        Thing.setA(4); //change value of class attribute a
        System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
        System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
        Thing object3 = new Thing(); //create default instance named object3
        System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object4 = new Thing(); //create default instance named object3
        System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
        System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
    }//end main method
}//end class Thing
```

Output Line #8

This line has `object1` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 2)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
    public static void main(String[] args){
        System.out.format("1 - The value of cl
        System.out.format(" - Note that no obj
        Thing object1 = new Thing(2); //create
        System.out.format("2 - Object 1 has va                                    );
        System.out.format("3 - The value of cl
        Thing object2 = new Thing(12); //creat
        System.out.format("4 - Object 1 has va                                    );
        System.out.format("5 - Object 2 has va                                    );
        System.out.format("6 - The value of cl
        Thing.setA(4); //change value of class
        System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
        System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
        Thing object3 = new Thing(); //create default instance named object3
        System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object4 = new Thing(); //create default instance named object3
        System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
        System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
    }//end main method
}//end class Thing
```

Output Line #9

This line has `object2` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 12)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created \n");
    Thing object1 = new Thing(2); //cre
    System.out.format("2 - Object 1 has                                    B());
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cr
    System.out.format("4 - Object 1 has                                    B());
    System.out.format("5 - Object 2 has                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of
    System.out.format("8 - Object 1 has                                    B());
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Creating a third instance of the class

This line creates another instance of the class Thing. This instance is named `object3`. When it is constructed using the no-arg constructor, the `b` value assigned to `object3` is 1.

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
    public static void main(String[] args){
        System.out.format("1 - The value of class attribute a is %d", Thing.a);
        System.out.format(" - Note that no objects have yet been created.\n");
        Thing object1 = new Thing(2); //create instance named object1
        System.out.format("2 - Object 1 has
        System.out.format("3 - The value of
        Thing object2 = new Thing(12); //cre
        System.out.format("4 - Object 1 has
        System.out.format("5 - Object 2 has
        System.out.format("6 - The value of
        Thing.setA(4); //change value of cla
        System.out.format("7 - The value of
        System.out.format("8 - Object 1 has
        System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
        Thing object3 = new Thing(); //create default instance named object3
        System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
        Thing object4 = new Thing(); //create default instance named object3
        System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
        System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
        System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
        System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
        System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
    }//end main method
}//end class Thing
```

Output Line #10

This line has `object1` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 2)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no
    Thing object1 = new Thing(2); //cre
    System.out.format("2 - Object 1 has                                    B());
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cr
    System.out.format("4 - Object 1 has                                    B());
    System.out.format("5 - Object 2 has                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
    System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #11

This line has `object2` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 12)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no
    Thing object1 = new Thing(2); //cre
    System.out.format("2 - Object 1 has                                    B());
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cr
    System.out.format("4 - Object 1 has                                    B());
    System.out.format("5 - Object 2 has                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
    System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #12

This line has `object3` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 1)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //cre
    System.out.format("2 - Object 1 has                                    B());
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cr
    System.out.format("4 - Object 1 has                                    B());
    System.out.format("5 - Object 2 has                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of
    System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #13

Like lines #1, #3 and #6, this line simply prints the current value of the class variable `a` which is still 4.

Console

<terminated> Thing [Java Application] C:\Program Files\Java\jre6\bin\javaw.exe (May 31, 2011 12:17:45 PM)

```
1 - The value of class attribute a is 5 - Note that no objects have yet been created.
2 - Object 1 has values of: a = 5 and b = 2
3 - The value of class attribute a is 5

4 - Object 1 has values of: a = 5 and b = 2
5 - Object 2 has values of: a = 5 and b = 12
6 - The value of class attribute a is 5

7 - The value of class attribute a is 4
8 - Object 1 has values of: a = 4 and b = 2
9 - Object 2 has values of: a = 4 and b = 12

10 - Object 1 has values of: a = 4 and b = 2
11 - Object 2 has values of: a = 4 and b = 12
12 - Object 3 has values of: a = 4 and b = 1
13 - The value of class attribute a is 4

14 - Object 1 has values of: a = 4 and b = 2
15 - Object 2 has values of: a = 4 and b = 12
16 - Object 3 has values of: a = 4 and b = 1
17 - Object 4 has values of: a = 4 and b = 1
18 - The value of class attribute a is 4
```

Execute the program

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created \n");
    Thing object1 = new Thing(2); //cre
    System.out.format("2 - Object 1 has                                    B());
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cr
    System.out.format("4 - Object 1 has                                    B());
    System.out.format("5 - Object 2 has                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of
    System.out.format("8 - Object 1 has                                    B());
    System.out.format("9 - Object 2 has                                    etB());
    Thing object3 = new Thing(); //crea
    System.out.format("10 - Object 1 ha                                    tB());
    System.out.format("11 - Object 2 ha                                    tB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Creating a fourth instance of the class

This line creates another instance of the class Thing. This instance is named `object4`. When it is constructed using the no-arg constructor, the `b` value assigned to `object4` is 1. Note that while `object3` and `object 4` have the same values for their `b` attribute they are not the same object!

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cre
    System.out.format("4 - Object 1 has
    System.out.format("5 - Object 2 has
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cla
    System.out.format("7 - The value of
    System.out.format("8 - Object 1 has
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #14

This line has `object1` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 2)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no
    Thing object1 = new Thing(2); //cre
    System.out.format("2 - Object 1 has                                    B());
    System.out.format("3 - The value of
    Thing object2 = new Thing(12); //cr
    System.out.format("4 - Object 1 has                                    B());
    System.out.format("5 - Object 2 has                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of class attribute a is %d\n", Thing.a);
    System.out.format("8 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("9 - Object 2 has values of: a = %d and b = %d\n\n", Thing.getA(), object2.getB());
    Thing object3 = new Thing(); //create default instance named object3
    System.out.format("10 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #15

This line has `object2` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 12)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has                                                    B());
    System.out.format("5 - Object 2 has                                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of
    System.out.format("8 - Object 1 has                                                    B());
    System.out.format("9 - Object 2 has                                                    etB());
    Thing object3 = new Thing(); //crea
    System.out.format("10 - Object 1 ha                                                    tB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #16

This line has `object3` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 1)

Why the output looks like it does. . .

va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has                                                    B());
    System.out.format("5 - Object 2 has                                                    B());
    System.out.format("6 - The value of
    Thing.setA(4); //change value of cl
    System.out.format("7 - The value of
    System.out.format("8 - Object 1 has                                                    B());
    System.out.format("9 - Object 2 has                                                    etB());
    Thing object3 = new Thing(); //crea
    System.out.format("10 - Object 1 ha                                                    tB());
    System.out.format("11 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("12 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #17

This line has `object4` invoke both the `getA()` and `getB()` methods to return the current values of these two characteristics. (a = 4 and b = 1)

Why the output looks like it does. . .

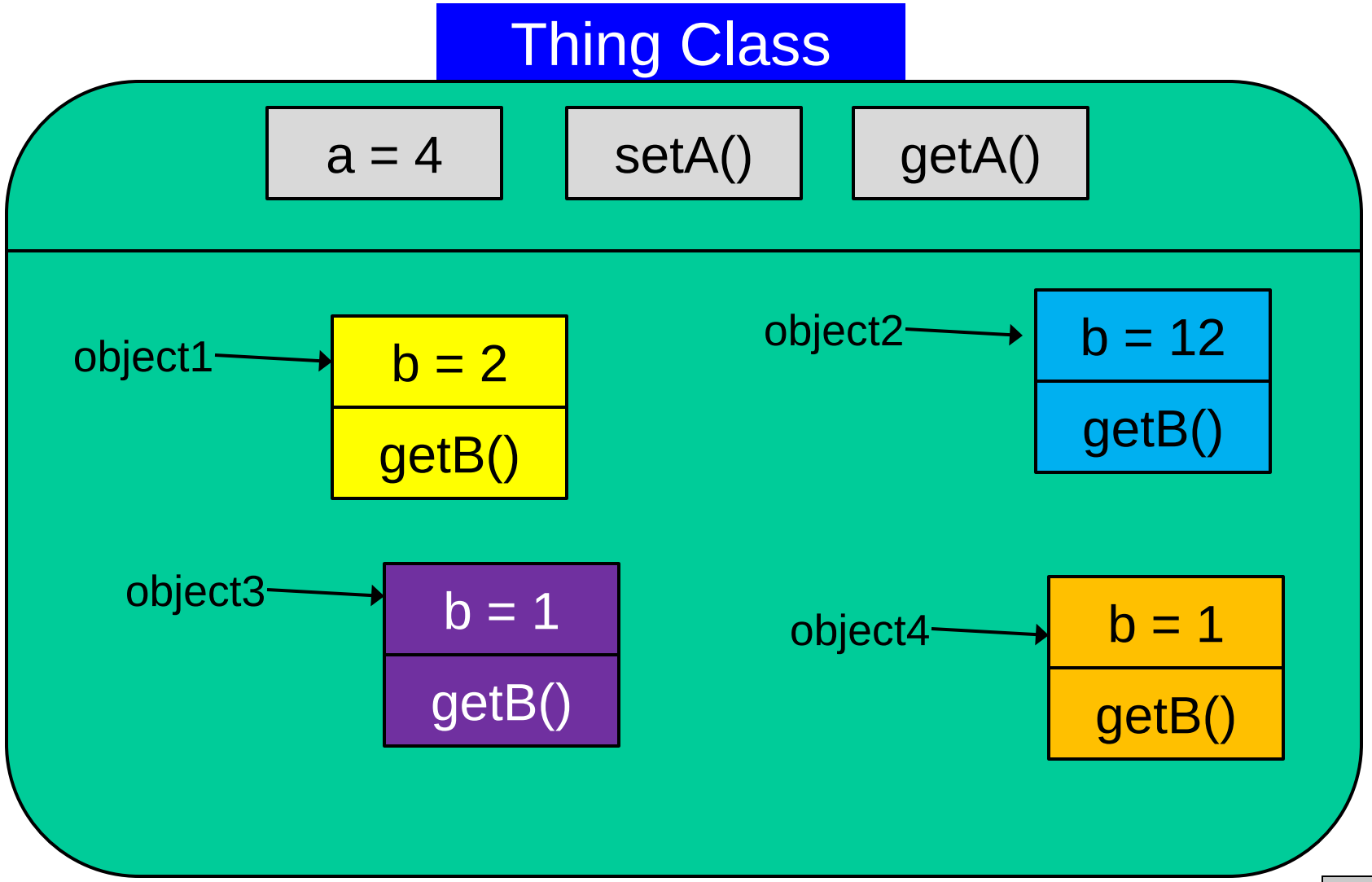
va | UseWindChill.java | Thing2.java | 19

```
public static void main(String[] args){
    System.out.format("1 - The value of class attribute a is %d", Thing.a);
    System.out.format(" - Note that no objects have yet been created.\n");
    Thing object1 = new Thing(2); //create instance named object1
    System.out.format("2 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("3 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object2 = new Thing(12); //create instance named object2
    System.out.format("4 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("5 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("6 - The value
    Thing.setA(4); //change value of c
    System.out.format("7 - The value o
    System.out.format("8 - Object 1 ha                                              tB());
    System.out.format("9 - Object 2 ha                                              getB());
    Thing object3 = new Thing(); //cre
    System.out.format("10 - Object 1 h                                              etB());
    System.out.format("11 - Object 2 h                                              etB());
    System.out.format("12 - Object 3 h                                              etB());
    System.out.format("13 - The value of class attribute a is %d\n\n", Thing.a);
    Thing object4 = new Thing(); //create default instance named object3
    System.out.format("14 - Object 1 has values of: a = %d and b = %d\n", Thing.getA(), object1.getB());
    System.out.format("15 - Object 2 has values of: a = %d and b = %d\n", Thing.getA(), object2.getB());
    System.out.format("16 - Object 3 has values of: a = %d and b = %d\n", Thing.getA(), object3.getB());
    System.out.format("17 - Object 4 has values of: a = %d and b = %d\n", Thing.getA(), object4.getB());
    System.out.format("18 - The value of class attribute a is %d\n", Thing.a);
}//end main method
}//end class Thing
```

Output Line #18

Like lines #1, #3, #6,and #13, this line simply prints the current value of the class variable `a` which is still 4.

What the objects look like at the end of exection



Console

<terminated> Thing [Java Application] C:\Program Files\Java\jre6\bin\javaw.exe (May 31, 2011 12:17:45 PM)

```
1 - The value of class attribute a is 5 - Note that no objects have yet been created.
2 - Object 1 has values of: a = 5 and b = 2
3 - The value of class attribute a is 5

4 - Object 1 has values of: a = 5 and b = 2
5 - Object 2 has values of: a = 5 and b = 12
6 - The value of class attribute a is 5

7 - The value of class attribute a is 4
8 - Object 1 has values of: a = 4 and b = 2
9 - Object 2 has values of: a = 4 and b = 12

10 - Object 1 has values of: a = 4 and b = 2
11 - Object 2 has values of: a = 4 and b = 12
12 - Object 3 has values of: a = 4 and b = 1
13 - The value of class attribute a is 4

14 - Object 1 has values of: a = 4 and b = 2
15 - Object 2 has values of: a = 4 and b = 12
16 - Object 3 has values of: a = 4 and b = 1
17 - Object 4 has values of: a = 4 and b = 1
18 - The value of class attribute a is 4
```

Execute the program