5. Objects and Classes :: Class Variables

A variable declared using the **static** reserved word tells the Java compiler that the variable is a **class variable** rather than an **instance variable**. Class variables do not appear in objects of the class, but rather, class variables **belong to the class**.

```
public class Static {
  static void main(String[] args) {
    Static obj1 = new Static();
    Static obj2 = new Static();
    Static obj3 = new Static();
    obj1.someMethod(); obj1.someMethod(); obj1.someMethod();
    obj2.someMethod(); obj2.someMethod();
    obj3.someMethod();
    System.out.println(obj1.getCounter());
  }
  private static int mCounter = 0;
  public Static() { }
  public int getCounter() {
    return mCounter;
  }
  public void someMethod() {
    ++mCounter;
  }
}
```

5. Objects and Classes :: Declaring Constants

The reserved word **final** specifies that the associated identifier cannot be changed, i.e., it is **constant**. Constants are generally declared as **static** and since constants cannot be changed, there is no harm in declaring them as **public**:

```
public class Math {
  public static final double PI = 3.14159265;
  public void someMethod() {
    double z = PI;
  }
}
```

A public class constant may be accessed outside of the class by writing *classname.classvariable*:

```
public class C {
  public C() {
    double z = Math.PI * Math.PI;
  }
}
```

5. Objects and Classes :: Class Methods

Methods can also be declared as **static** and in this case, rather than being called an **instance method**, the method is called a **class method**. Class methods belong to the class as well and are not part of objects of the class. Every Java application must have a *main*() method which is a class method:

```
public class Main() {
  public static void main(String[] args) {
    ...
  }
}
```

The *java.lang.Math* class has several static methods for performing mathematical operations:

```
static double Math.abs(double a)            absolute value of a
static double Math.log(double a)            log base e of a
static double Math.log10(double a)          log base 10 of a
static double Math.max(double a, double b)  maximum of a and b
static double Math.min(double a, double b)  minimum of a and b
static double Math.pow(double a, double b)  returns a to the bth power
static int Math.round(double a)             returns a rounded up or down
static double Math.sqrt(double a)           returns square root of a
```

5. Objects and Classes :: Class Methods (continued)

Class variables and class methods are fairly rare in OO programming.

However, **class constants**, that are shared among all objects of a class, are fairly common. Since a constant never changes value, there is no need for each object to contain the constant; it naturally belongs to the class.