

static Keyword in Java

- Static variables
- Static methods



Static Fields

- A *static field* (a.k.a. *class field* or *class variable*) is shared by all objects of the class.
- A non-static field (a.k.a. *instance field* or *instance variable*) belongs to an individual object.



Static Fields (cont'd)

- A static field can hold a constant shared by all objects of the class:

```
public class RollingDie
{
    private static final double slowDown = 0.97;
    private static final double speedFactor = 0.04;
    ...
}
```

Reserved
words:
static
final

- A static field can be used to collect statistics or totals for all objects of the class (for example, total sales for all vending machines)



Static Fields (cont'd)

- Static fields are stored with the class code, separately from instance variables that describe an individual object.
- public static fields, usually global constants, are referred to in other classes using “dot notation”: `ClassName.constName`

```
double area = Math.PI * r * r;  
setBackground(Color.BLUE);  
c.add(btn, BorderLayout.NORTH);  
System.out.println(area);
```



Static Fields (cont'd)

- Usually static fields are NOT initialized in constructors (they are initialized either in declarations or in public static methods).
- If a class has only static fields, there is no point in creating objects of that class (all of them would be identical).
- Math and System are examples of the above. They have no public constructors and cannot be instantiated.



Static Methods

- Static methods can access and manipulate a class's static fields.
- Static methods cannot access non-static fields or call non-static methods of the class.
- Static methods are called using “dot notation”: `ClassName.statMethod(...)`

```
double x = Math.random();  
double y = Math.sqrt (x);  
double avgGPA = Student.computeSchoolGPA ();  
Vic.stackHasCD();
```

Static Methods (cont'd)

```
public class MyClass
{
    public static final int statConst;
    private static int statVar;

    private int instVar;
    ...
    public static int statMethod(...)
    {
        statVar = statConst;
        statMethod2(...);

        instVar = ...;
        instMethod(...);
    }
}
```

Static
method

OK

Errors!



Non-Static Methods

- A non-static method is called for a particular object using “dot notation”:

```
vendor.addMoney(25);  
die1.roll();
```

- Non-static methods can access all fields and call all methods of their class — both static and non-static.

