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# Java Programming Language SE – 6

## Module 7 : Advanced Class Features

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# Objectives

- Create static variables, methods, and initializers
- Create final classes, methods, and variables
- Create and use enumerated types
- Use the static import statement
- Create abstract classes and methods
- Create and use an interface

# Relevance

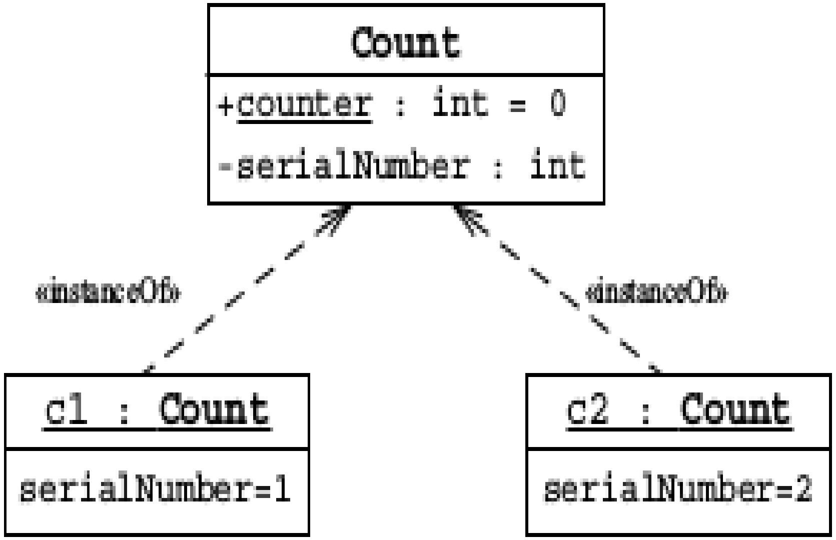
- How can you create a constant?
- How can you declare data that is shared by all instances of a given class?
- How can you keep a class or method from being subclassed or overridden?

# The static Keyword

- The static keyword is used as a modifier on variables, methods, and nested classes.
- The static keyword declares the attribute or method is associated with the class as a whole rather than any particular instance of that class.
- Thus static members are often called class members, such as class attributes or class methods.

# Class Attributes/ Static Variables

- Class attributes are shared among all instances of a class.
- it can be accessed without an instance.



# Class Methods/
# Static Methods

```
public static int getTotalCount() {
return counter;
}
```

- You can invoke static methods without any instance of the class to which it belongs.
- Static methods cannot access instance variables.

# Static Initializers

- A class can contain code in a static block that does not exist within a method body.
- Static block code executes once only, when the class is loaded.
- Usually, a static block is used to initialize static (class) attributes.

# Static Initializers: Example

```
static {
counter = Integer.getInteger("myApp.Count4.counter").intValue();
}
```

# The final Keyword

- You cannot subclass a final class.
- You cannot override a final method.
- A final variable is a constant.
- You can set a final variable once only, but that assignment can occur independently of the declaration; this is called a *blank final variable.*
- A blank final instance attribute must be set in every constructor.
- A blank final method variable must be set in the method body before being used.

# Final Variables

Constants are *static final* variables.

```
public class Bank {
private static final double
... // more declarations
}
```

# Blank Final Variables

```
private final long customerID;
public Customer() {
customerID = createID();
}
```

# Enumerated Type

```
package cards.domain;
public enum Suit {
SPADES,
HEARTS,
CLUBS,
DIAMONDS
}
```

# Enumerated Type: Example

```
package cards.domain;
public class PlayingCard {
private Suit suit;
private int rank;
public PlayingCard(Suit suit, int rank) {
this.suit = suit;
this.rank = rank;
}
public Suit getSuit() {
return suit;
}
```

# Enumerated Type

```
public String getSuitName() {
String name = ““;
switch ( suit ) {
case SPADES:
name = “Spades”;
break;
case HEARTS:
name = “Hearts”;
break;
case CLUBS:
name = “Clubs”;
break;
case DIAMONDS:
name = “Diamonds”;
break;
default:
}return name;}
```

# Enumerated Type

- Enumerated types are type-safe:

```
package cards.tests;
import cards.domain.PlayingCard;
import cards.domain.Suit;
public class TestPlayingCard {
public static void main(String[] args) {
PlayingCard card1 = new PlayingCard(Suit.SPADES, 2);
System.out.println(“card1 is the “ + card1.getRank() + “ of “ + card1.getSuitName());
// PlayingCard card2 = new PlayingCard(47, 2);
// This will not compile.
}}
```

# Advanced Enumerated Types

- Enumerated types can have attributes and methods:

```
package cards.domain;
public enum Suit {
SPADES
(“Spades”),
HEARTS
(“Hearts”),
CLUBS
(“Clubs”),
DIAMONDS (“Diamonds”);
private final String name;
private Suit(String name) {
this.name = name;
}
public String getName() {
return name;}}
```

# Advanced Enumerated Types

```
package cards.tests;
import cards.domain.PlayingCard;
import cards.domain.Suit;
public class TestPlayingCard {
public static void main(String[] args) {
PlayingCard card1 = new PlayingCard(Suit.SPADES, 2);
System.out.println(“card1 is the “ + card1.getRank()
+ “ of “ + card1.getSuit().getName());
// NewPlayingCard card2 = new NewPlayingCard(47, 2);
// This will not compile.
}}
```

# Static Imports

- A static import imports the static members from a class:

  import static <pkg_list>.<class_name>.<member_name>;

  OR

  import static <pkg_list>.<class_name>.*;

- A static import imports members individually or collectively:

  import static cards.domain.Suit.SPADES;

  OR

  import static cards.domain.Suit.*;

# Abstract Classes

```
public class FuelNeedsReport {
private Company company;
public FuelNeedsReport(Company company) {
this.company = company;
}
public void generateText(PrintStream output) {
Vehicle1 v;
double fuel;
double total_fuel = 0.0;
for ( int i = 0; i < company.getFleetSize(); i++ ) {
v = company.getVehicle(i);
```

# Abstract Classes

```
// Calculate the fuel needed for this trip
fuel = v.calcTripDistance() / v.calcFuelEfficency();
output.println("Vehicle " + v.getName() + " needs "
+ fuel + " liters of fuel.");
total_fuel += fuel;
}
output.println("Total fuel needs is " + total_fuel + " liters.");
}}
```

# Abstract Classes

- An abstract class models a class of objects in which the full implementation is not known but is supplied by the concrete subclasses.

# Interfaces

- A public interface is a contract between client code and the class that implements that interface.
- A Java interface is a formal declaration of such a contract in which all methods contain no implementation.
- Many unrelated classes can implement the same interface.
- A class can implement many unrelated interfaces.
- Syntax of a Java class is as follows:

```
<modifier> class <name> [extends <superclass>]
[implements <interface> [,<interface>]* ] {
<member_declaration>*
}
```

# Uses of Interfaces

*Interface uses include the following:*

- Declaring methods that one or more classes are expected to implement
- Determining an object’s programming interface without revealing the actual body of the class
- Capturing similarities between unrelated classes without forcing a class relationship
- Simulating multiple inheritance by declaring a class that implements several interfaces

Thank you

Web Stack Academy (P) Ltd

#83, Farah Towers,
1st floor,MG Road,
Bangalore – 560001

M:  +91-80-4128 9576
T: +91-98862 69112
E: info@www.webstackacademy.com