**JAC444 - Lecture 2**

Classes

Segment 1

**Objectives**

**Upon completion of this lecture, you should be able to:**

▪ Define Classes and Interfaces

▪ Design Inner and Anonymous Classes

▪ Create and Work with Generic Classes

**Classes – Basics**

**In this segment you will be learning about:**

▪ Class Structure

▪ Member Variables

▪ Constructors

▪ Methods

# Class Declaration

The class declaration in Java has the following format:

**class ClassName { field(s)**

**constructor(s) method declaration(s) other class declaration(s)**

**}**

The class contains all the code you have to write. Your code must be enclosed by curly braces.

The object's’ life cycle is determined by the elements of the class as following:

1. Objects initializations – Constructors
2. Objects states – Fields
3. Class and its objects behaviors – Methods

# Class Structure

The fundamental unit of programming in Java is **class**.

**1 public class Sphere***{* Class Declaration  *static final double PI = 3.14;*

**Class Body**  *double radius;* Fields

*Point3D center;*

*public Sphere(double r, Point3D c) {*

*radius = r; center = c;* Constructor

*}*

*double volume() {*

*double v = 4.0/3.0 \* PI;* Method

*return v \* radius\*radius\*radius;*

*}*

*}*

**1** Modifiers***: public, abstract, final, strictfp***

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# Member Variables

Member variables declaration appears within the class body but outside of any methods or constructors.

**1 2 3** *type* **4** *name public static Vect~~o~~r cubeVertices; private final int id = 0;* **5** *initilizer*

1. Access modifiers: ***public, protected, private***

***static*** – variable is a class variable

***final*** – the value of the variable cannot be changed

1. Attributes ***transient*** – marker used in object serialization ***volatile*** – prevent compiler from optimization

# Access Modifiers

Constructors:

Must have the same name as the class, zero or more params. They DO NOT return anything.

private No other class can instantiate the given class.

The class may contain public class factory methods

protected Only subclasses of the given class can create instances of it publicAny class can create an instance of the given class.

(no access modifier) Only classes within the same package as the class can construct an instanceof it.

# Method Declaration

The only required elements of a method declaration are the method’s name, its return type, and a pair of parentheses ( ).

**1 2 3** *Return type* **Method Signature 6** *Checked exceptions*

*public abstract ~~i~~nt doIt(Object o) throws Exception*

**4** *Method name* **5** *Parametes List*

1. Access modifiers: ***public, protected, private,*** < >

***static*** – method is a class method

***abstract*** – method has no implementation – abstract class

1. Attributes***final*** – method cannot be overridden by a subclass

***native*** – method implemented in a language other than Java ***synchronized*** – method has a thread-safe implementation ***strictfp*** –strict constraint for floating point arithmetic

# Overloading

Defining more methods with the same name, but with different signature is called method overloading.

Java supports method name overloading so that multiple methods can share the same name.

Ex:

***class ShapeRender {***

***…***

***void draw(Shape s) { …} void draw(Rectagle r) { …}***

***void draw(Circle c, Point position) { …}***

***…***

***}***

Method Overloading - Static Polymorphism

# Package

Definition: A package is a grouping of related types providing access protection and name space management

Create a package with a ***package*** statement at the top of every source file

Use ***import*** statement at the beginning of the file to work with package elements Conventions:

Package names are written in all lowercase to avoid conflict with the names of classes or interfaces. The beginning of the package name must be a reversed Internet domain name

Example: ***on.senecacollege.cs…***

# Access Levels

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Modifier** | **Class** | **Package** | **Subclass** | **Word** |
| ***public*** | x | x | x | x |
| ***protected*** | x | x | x |  |
| ***no modifier*** | x | x |  |  |
| ***private*** | x |  |  |  |

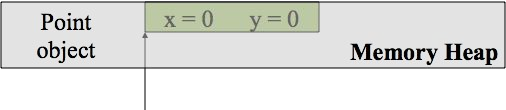
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# Creating Objects

Objects are created using the new keyword:

Point varOfTypeReference = new Point();

All objects are accessed only via an object reference



varOfTypeReference

# Data Types in Java

## There are only two data types in Java:

## 1. Primitives

* boolean
* char
* Integer (byte, short, int, long)
* float (float, double)

Examples:*: decimal* ***58L****, octal* ***027****, hexadecimal* ***0x8AF*** *double* ***18. .234E3 1.8e-1****; float* ***1.234f 0.2e-5F***

## 2. References

*String* ***myObject*** *= new String(“Java”);*

# Method Invocation

A method can be invoked only through reference variable or class name (if the method is static)

*String* ***myObject*** *= new String(“Java”); int length = myObject.length();*

Static method ***valueOf***(...) of the String class

*String val = String.valueOf(10);*

Argument passing mechanism in java is: **pass-by-value**

Pass-by-value: a copy of each actual parameter (argument) is passed.