**JAC444 - Lecture 3**

Object-Oriented Concepts

Segment 1 - Object Class

**Objectives**

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

▪ Explore the Object Class

▪ Apply Inheritance Concept in Java

▪ Utilize Polymorphism Concept in Java

▪ Experiment with Namespace in Java - Package

**Object Class**

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

▪ java.lang.Object Class

▪ Methods of the Object Class

▪ Develop Classes using Object Class

▪ Construct a Pattern for Designing Classes in Java

# Object Class

* The class **Object** is the root of the Java class hierarchy
* It is defined in the package **java.lang**
* Every class has **Object** as a superclass

One MUST understand all methods defined in the Object class, since every class developed in Java inherits all its methods.

# Methods in Object Class

• There are 11 methods in Object class.

|  |  |
| --- | --- |
| Object | clone() |
| **boolean** | **equals(Object obj)** |
| void | finalize() |
| Class<?> | getClass() |
| **int** | **hashCode()** |
| void | notify() |
| void | notifyAll() |
| **String** | **toString()** |
| void | wait() |
| void | wait(long timeout) |
| void | wait(long timeout, int nanos) |

# toString() Method

* The **toString()** method does not take any parameters and returns a string representation of the object.
* The string must contain the state (field values) of the object.
* Every class that you develop must override this method

# equals(Object obj) Method

* The **equals** method takes an object of type Object as param and returns a boolean value. **boolean equals(Object obj)**
* The method compares the current object with the object given as param
* It is generally necessary to override the **hashCode** method whenever **equals** method is overridden

# hashCode() Method

* The **hashCode** method does not take any param and returns a integer value as *hash code value*.

(a *hash code value* is a 32-bit signed integer which represents the data stored in the object - see implementation example in the sample provided)

**int hashCode()**

* If two objects are equal according to the **equals(Object)** method, then calling the **hashCode()** method on each of the two objects must produce the same integer result.

# Class<?> getClass()

• The **getClass()** method does not take any param and returns the runtime class of this Object

**public final Class<?> getClass()**

Example of using **getClass()** method

byte[] bytes = new byte[10];

Class c = bytes.getClass();

String className = c.getName();

Instances of the class **Class** represent classes and interfaces in a running Java application

# wait() and notify() Methods

* The methods **wait()** and all its overloaded methods with **notify()** and **notifyAll()** are used in multithreading
* More about them in the lecture about **Thread** in Java
* Since these methods are inherited in all classes any object could invoke them

# Question

Read the following class: **public class** Question {

**public static void** main(String[] args) {

Question obj = **new** Question();

String s = obj.toString();

System.***out***.println(s);

}

}

*Can we invoke method toString on an object of type Question ?*

YES. Since Question class inherits from Object class all its methods.

*What is it printed?*

The string returned from the invocation of toString method in the Object class:

Question@3cd1a2f1 (name of the class @ hashcode of the obj)