COMS W3101-1 Programming Language: Java (Spring 2010)

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Prerequisites

- A good knowledge of programming is required.
- A good background in at least one programming language is recommended. Course overview
- Course overview See
 - http://www.cs.columbia.edu/~ramana

Syllabus Overview

- Java programming
 - JVM, data types, control structures, functions
- Object Oriented Programming principles of Java
 - Concepts of class/object, methods, inheritance, polymorphism, abstraction, data encapsulation
- Exception handling in Java
- Java Packages
- Threads, Javadoc
- Other topics.

Lecture-1

- Overview of Java
 - Programming basics
 - Java programming language philosophy
 - Java virtual machine
 - Brief introduction to "class"
 - Basic data types
 - Simple input and output
 - Control statements if, for, while, do
 - Functions

Programming basics

- Program: A task that is to be run on a computer.
 - Consists of a sequence of clear and precise instructions to the computer.
- Programming language
 - The basic rules of specifying the instructions to the computer.
 - Used to run the task on the computer.
 - To achieve the required result.

Design philosophy of Java

- Java design philosophy
 - Write Once Run Anywhere (WORA)
 - Based on "Java Virtual Machine" (JVM)
 - Uses bytecode that runs on JVM
- This is in contrast to other languages like C, C++
 - They use "Write Once Compile Anywhere" (WOCA)
 - Compiled code runs directly on the machine.



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Java Virtual Machine ... contd.

- Runs on a real machine.
- Forms an intermediate layer
 - Between a real machine and the user program
- Keeps user programs independent from the machine architectures.
- A Java program generates bytecode
- Bytecode can be run on any JVM on any machine
 - Compile Once Run Anywhere

Different kinds of Java

- J2SE Java Standard Edition
 - Basic Java programming
- J2EE Java Enterprise Edition
 - JSP, Servlets, Enterpreise Java Beans, etc. in addition to J2EE
- J2ME Java Micro Edition
 - Used for the mobile devices. Many Blackberry, Android apps are written in this.
- This course is only about J2SE.

Java - classes and objects

- Java is an Object Oriented Programming (OOP) language.
 - Real world entities are treated as objects.
 - objects are instances of class.
 - class are user defined.
 - Contain data and methods.
 - A class is a starting point for writing code in Java.
- We will cover details of OOP later.

A simple Java program

```
import java.io.*; // Include all files under "io"
public class SimpleExample // Define a class "SimpleExample
{
    public static void main (String[] args) // main method, program starts
    here
    {
        System.out.println ("Simple example");// Just print "Simple example"
    }
}
```

- To compile this
 - javac SimpleJava.java
 - Creates a file called SimpleJava.class bytecode
- To run this
 - java SimpleJava.java

Java programs - some rules

The class to be run should

- Be present in a file with the same name.
 - with a .java extension.
- Be declared public.
- ONLY the class to be run should be public.
 - This file can have other non-public classes.
- Have a main method that is
 - Declared public and static.
- Can have other functions
 - That may or may not be public, static, etc.

Programming basics in Java

- Data types
- Operators
- Input, output
- Control statements
 - if else
 - for
 - while
 - switch, case
- Functions
- Classes

Java basic data types and operators

- Basic data types
 - byte, char, short, int, long, float, double, boolean
- Operators:
 - Arithmetic: +, -, *, /, %, ++, --
 - Logical: ==, !=, >, <, >=, <=, &&, ||, !,?:</p>
 - Bitwise: &, |, ^, <<, >>, ~