Introduction to Java

188230 Advanced Computer Programming

Asst. Prof. Dr. Kanda Runapongsa Saikaew
(krunapon@kku.ac.th)
Department of Computer Engineering
Khon Kaen University

Agenda

- What Java Is
- Why Java
- Installing Java
- Running Your First Java Program

What Java Is

- Java (with a capital J) is a high-level, third generation programming language, like C++
- You can use Java to write computer applications that compute numbers, process words, play games, store data, etc.
- Java is a programming language and environment invented by James Gosling and others in 1994

Java Compiler and Interpreter

- Java programs that have been compiled into byte code still need an interpreter to execute them on any given platform
- The interpreter reads the byte code and translates it into the native language of the host machine on the fly
- Java compiler is **javac**
- Java interpreter is **java**

Agenda

- What Java Is
- Why Java
- Getting Java Software
- Installing Java
- Running Your First Java Program

Why Java

- Java is simple
- Java is object-oriented
- Java is platform independent
- Java is safe
- Java is high performance
- Java is multi-threaded
- Java is dynamic(ly linked)
- Java is garbage collected

Java is Simple

- Java was designed to make it much easier to write bug free code
- Java is easy to read and write
- Java does not need users to do memory allocation and deallocation
- Java is easy to learn

Java is Object-Oriented

- Simpler and easier to read programs
- More efficient reuse of code
- Faster time to market
- More robust and error-free code

Java is Platform Independent

- A Java program never really executes natively on the host machine
- Rather a special native program called the Java interpreter reads the byte code and executes the corresponding native machine instructions
- To port Java programs to a new platform, all you need to do is run it with an interpreter written for the new platform
- You don't even need to recompile

Java is Safe

- Java was designed from the ground up to allow for secure execution of code across a network
- Most notably there are no pointers in Java
- Java programs cannot access arbitrary addresses in memory
- Java implements a robust exception handling mechanism to deal with both expected and unexpected errors

Java is High Performance

- Java byte codes can be compiled on the fly to code that rivals C++ in speed using a "just-in-time compiler."
- There are native-machine-architeture compilers for Java that produce executable code that does not require a separate interpreter
- These will produce executable code that does not require a separate interpreter, and that is indistinguishable in speed from C++

Java is Multi-Threaded

- A process has a self-contained execution environment
  - Each process has its own memory space
- Threads are sometimes called lightweight processes
  - Creating a new thread requires fewer resources than creating a new process
- Java is inherently multi-threaded
- A single Java program can have many different processes executing independently and continuously

Java is Dynamic(ly linked

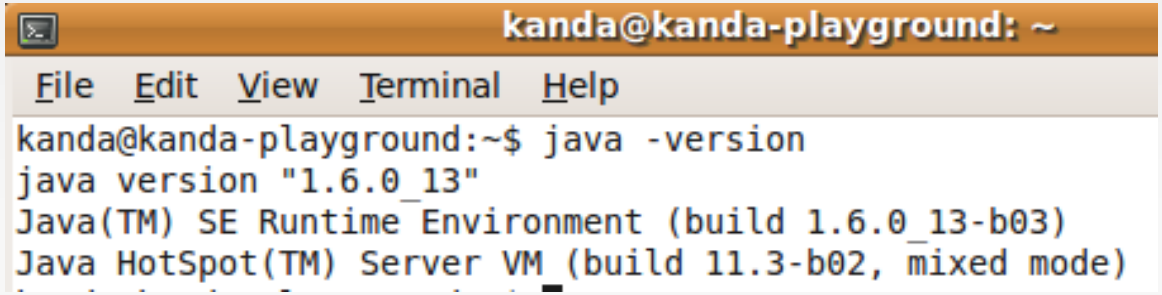
- Java does not have an explicit link phase
- Java source code is divided into .java files
- The compiler compiles these into .class files containing byte code
- Java .class files tend to be quite small, a few kilobytes at most
- It is not necessary to link in large runtime libraries to produce an executable
  - Instead the necessary classes are loaded from the user's local system

Java is Garbage Collected

- Objects are created by Java's "new" operator, and memory for new objects is allocated on the heap at run time
- Garbage collection is the process of automatically freeing objects that are no longer referenced by the program
- This frees the programmer from having to keep track of when to free allocated memory, thereby preventing many potential bugs and headaches.

Installing Java

- Go to http://www.google.com
  - Type ”install java on Windows' if you use Windows
- Java Downloads for All Operating Systems
  - http://www.java.com/en/download/manual.jsp
- Choose Java SE with the latest version (Version 6 update 13)



Developing Your First Java Program

- Use text editor to write a file ”HelloWorld.java”

```
public class HelloWorld {
    public static void main(String[] args) {
            System.out.println(”Hello World”);
    }
}
```

Compiling and Running Program

- To compile a Java program
  - Use command javac <filename.java>
  - Example: javac HelloWorld.java
- To run a Java program
  - Use command java <filename>
  - Example: java HelloWorld

Sample Compiling and Running

```
kanda@kanda-playground:~/java/codes/intro$ more HelloWorld.java
public class HelloWorld {
        public static void main(String[] args) {
                System.out.println("Hello World");
        }
}
kanda@kanda-playground:~/java/codes/intro$ javac HelloWorld.java
kanda@kanda-playground:~/java/codes/intro$ java HelloWorld
Hello World
```

Summary

- Java is a safe, robust, garbage-collected, object-oriented, high-performance, multi-threaded, interpreted, architecture-neutral, cross-platform programming language
- Java complier is javac and Java interpreter is java
  - To compile a program: javac filename.java
  - To run a program: java filename

References

- http://www.javaworld.com/javaworld/jw-08-1996/
- http://citec.us/forum/index.php?showtopic=3116
- Elliotte Rusty Harold, ”The Java Developer's Resource”, available at http://ibiblio.org/java/books/jdr/chapters/intro.htm