

Java Technology and Development

A five-day hands-on overview of the Java language and environment

Audience: Programmers, Technical IT Managers, World-Wide Web Administrators and Developers, other IT Personnel and Consultants.

Overview: The Java programming language attracts enormous interest throughout the on-line community. IT professionals are also recognizing the importance of such technologies. This course will provide an understanding of what Java is, its history, how it works and is used, its application areas, industry support, competing technologies, and so forth.

The course includes a number of practical exercises spread over the five-day period.

Objective: The aim of this course is to provide a proper description and overview of Java as a programming language and distributed system technology. At the end of the course the student will have a sufficient understanding of Java to enable him or her to undertake software development using Java in various situations, including the development of executable content for the World-Wide Web and the construction of stand-alone applications.

Note: Java is strongly derived from C so knowledge of C or C++ is needed for this course.

Day One—The Java Language

An Overview of Java

An examination of why Java is the sensation it is; where it came from and what it can do:

- history
- comparing Java to other languages
- buzzwords: simple, object-oriented, distributed, robust, secure, architecture neutral, portable, interpreted, high-performance, multithreaded, and dynamic.

The Basic Java Language

An overview of the more straightforward of Java's features together with a brief comparison of Java with its ancestors: C/C++:

- tokens
- reserved words

- types and data values
- operators
- garbage collection

Java Tools

A look at Sun's Java Development Toolkit (JDK):

- why choose the JDK?
- JDK for Windows95/NT4:
 - appletviewer
 - javac
 - javah
 - java
 - javadoc
 - javap
 - jdb
 - rmic
 - jar
 - javakey

A quick look at some other tools:

- IBM VisualAge for Java
- Microsoft Visual J++

Programming Java Applications

Writing standalone applications in Java:

- program structure and environment
- application versus applet
- a whole new phylum: aglets, servlets, beans

More Basic Java

More data types:

- arrays
- strings

The flow of control:

- if, switch, for, while, do
- labeled statements

Some of the changes Java 1.1 has brought to the language:

- desktop colors
- internationalization
- deprecated features
- 'blank' finals
- anonymous arrays
- type wrappers

Day Two—More Java Language/Java Applets

Object-Oriented Programming with Java

An examination of the features that make Java an Object-Oriented language:

- classes and objects
- constructors and object finalization

- methods, overriding and parameter passing
- initializers
- inheritance and the IS-A/HAS-A relationships
- accessing run-time type information
- encapsulation: packages visibility modifiers and techniques
- abstract classes
- interfaces

The New Java 1.1 Object-Oriented Features

Java 1.1 introduced a number of features that substantially increased the power and flexibility of the language:

- reflection
- inner classes:
 - nested top-level classes
 - member classes
 - local classes
 - anonymous classes
- instance initializers

More Java Language

An examination of the ways in which Java promotes creating robust software:

- exceptions
- using and understanding threads:
 - the Runnable interface
 - synchronization: mutual exclusion and critical sections
 - conditions

Java Applets

Java and executable content on the World-Wide Web:

- applet capabilities
- the <APPLET> tag
- responsive applets
- dual-purpose applets and applications

Day Three—User Interfaces & Java's Abstract Windowing Toolkit

An AWT Overview

A look at the basic concepts underlying Java's "window on the world:

- the Abstract Windowing Toolkit (AWT):
 - aim
 - fundamental organization

Using Java for simple graphics programming:

- primitive graphics tools
- sounds in applets

Multimedia and Interactivity

Multimedia is one of the driving forces behind Java:

- color handling
- fonts
- images
- animation and double buffering

More AWT

The building blocks of a Java User Interface:

- components:
 - button
 - checkbox
 - scrollbar
 - menu
 - label, text area and text field
 - canvas
- containers:
 - panel
 - frame
 - window
 - dialog
- event handling
- layout managers

AWT Enhancements

The enhancements and changes that Java version 1.1 introduced:

- a new event model
- delegation
- listeners and adapters
- lightweight components
- printing
- data transfer; copy and paste; drag and drop

Java Foundation Classes

- Java 2D
- model-view-controller paradigm
- 'swing' components
- drag & drop

The Stream Zoo

A look at some of the *many* classes for handling input/output:

- standard streams
- "mix & match" capabilities
- files
- random access streams
- tokenizers
- serialization and externalization
- writer classes

The Java Utility Classes

An overview of the classes supplied to remove the need for developers to have to “reinvent the wheel”:

- type wrappers
- vector
- enumeration
- hashtable
- property
- random, stack, date, bitset
- Java Collection Classes

Day Four—Advanced Java Programming

Java Beans

An introduction to the Java-based component software infrastructure:

- why Java beans?
- properties
 - simple
 - indexed
 - bound
 - constrained
- events
- methods
- the BeanInfo class

Security

An examination of why and how Java claims to be a secure programming environment for the World-Wide Web:

- the sandbox
- the bytecode verifier
- the class loader
- the security manager
- hostile attacks
- code signing
- access control lists

Java Database Connectivity

A look at interfacing Java with SQL-based relational databases:

- the DriverManager class
- drivers
- connections
- statements
- SQL Utility classes
- ResultSet handling
- metadata

Native Code

A look at the facilities that exist to allow Java to interact with other programming environments:

- Java Native Interface

- Java invocation API

Day Five—Distributed Systems Using Java

Java features aimed at making the development of distributed systems easier:

- URL
- URLConnection
- sockets:
 - clients
 - servers
- Remote Method Invocation
 - naming
 - clients
 - servers
 - stubs & skeletons
 - security
- Servlets
- Enterprise Java Beans
- Java and CORBA

The Future

An overview of some of the exciting developments currently happening in the Java world, such as JDBC, the “100% Java” initiative and the Network Computer.