

## Java: Introduction and Overview

Originals of Slides and Source Code for Examples: http://courses.coreservlets.com/Course-Materials/java.html

**Customized Java EE Training: http://courses.coreservlets.com/** Java, JSF 2, PrimeFaces, Servlets, JSP, Ajax, jQuery, Spring, Hibernate, RESTful Web Services, Hadoop, Android. Developed and taught by well-known author and developer. At public venues or onsite at *your* location.



## **Topics in This Section**

## Truths / Myths About Java

- Java is Web-enabled?
- Java is safe?
- Java is cross-platform?
- Java is simple?
- Java is powerful?
- Java is popular?

### Java versions and application areas

- Standard edition
- Enterprise edition
- Micro edition (and Android Edition)



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## Overview of the Java Language

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## Java is Web-Enabled?

#### Truth: Web browsers can run Java "applets"

- The Web can be used for *software* delivery and *execution*, not just *document* delivery and *display*
- No more installation or updates; just a bookmark
- Large, complex applets best suited for intranets. Fits the APL model better than the WWW at large.

#### Truth: Java's network library is easy to use

- Ordinary mortals can do socket programming
- Standard distributed object protocol and DBMS API

#### Hubble Space Telescope Monitoring: "NASA Goddard's Most Successful SW Project Ever."

HubblePowerSystems   File Edk (rid) Composer   Telemetry Status   Distance (Rid)   Distance (Rid)   Distance (Rid)	UTC 97/181/14:03:24	VehicleOrbit File Edit Grid Component Help	)		
Current Temperature Voltage PRI/RED LD Bus Diode Bus				SCT 97/181/14:05:04 FMT HN UTC 97/181/14:05:03 MFC Invalid	
CBAT1CUR -9.4 amps CBAT2CUR -9.8 amps CBAT2CUR -9.8 amps	Time update = 5 min	Vehicle Position & Velocity	HST NET Velocity	Vehicle Aberration Parallax	
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SADE-1 SADE-2 Battery Voltage Recharge	Ratio Main Bus Configuration	Earth Pointing Cosine>>	QDSCOSE 0.728147		
	CMNBUSA Closed	TDRS A&B Positions	Sun Position &Velocity	Moon Position & Velocity	
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# Java is Web-Enabled? • Myth: Java is only for the Web – Java "applets" run in Web pages

- Java "applications" run stand-alone
- Current usage (roughly)
  - Client (applet): 5%
  - Desktop (application): 25%
  - Server (servlets/JSP/EJB): 70%

## Tomahawk Strike Coordination Planner (APL/PPSD)

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Missile	M-0	M-1	M-2	M-3	M-4	M-5	M-6	M-7							
Mission	00000	00001	00000	00003	00000	00003	00004	00004	-	Avail	Req	Alloc	Play	Pause Stop	
20AA										3	2	3			□x10
20AB							1	1	Preview Speed	: 1x Real Time Ap.					
21AA										4	3	0	Start Time:	290325Z SEP 98	Rev
22AC										2	1	2	Random	Missile St	atus
23AB		No Name								ame		Launch Platfor	m Status		
	•		System Paused										-	Communication	
Execute Orders		Aim	npt Tar	get Nam	e		м	sl	Platfor	m M	lsn Tag	Туре	L.,	Threat Sta	atus
		204	AA Ama	al Abo F	acility		м	-0	CG 54		00000	BLK3			<u> </u>
		204	AA Ama	al Abo F	acility		м	-2	CG 54		00000	BLK4			
		204	AA Ama	al Abo F	acility		м	-4	DD 965	;	00000	BLK4			<u> </u>
		204	AB Ama	al Abo F	acility		м	-1	CG 54		00001	BLK3			
		224	AC Mir	nistry o	f Defen	se	м	-3	CG 54		00003	BLK4			
		224	AC Mir	nistry o	f Defen	se	м	-5	DD 965	;	00003	BLK4			
		234	AB Lat	:ka Hydr	oElectr	ic Plan	t M	-6	SSN 75	52	00004	BLK4			
		234	AB Lat	:ka Hydr	oElectr	ic Plan	t M	-7	SSN 75	52	00004	BLK4			



#### Truth: Restrictions on permissible operations can be enforced

- No "raw" memory manipulation (directly or indirectly).
  - Thus, it is easy to identify prohibited operations.
- Applets, by default, prohibited from:
  - · Reading from the local disk
  - Writing to the local disk
  - Executing local programs
  - Opening network connections other than to the HTTP server that the applet came from
  - Discovering private info about user (username, directories, OS patch level, applications installed, etc.).

## Java is Safe?

## Myth: Applets cannot harm your computer

- Denial of service
- Browser misconfiguration
- Implementation bugs

#### Myth: Java is too restricted to be useful

- Restrictions apply only to applets, not regular Java programs
- Digital signatures support relaxed restrictions
- Myth: Applets with digital signatures are no more or less safe than ActiveX
  - Relaxed security in applets not "all or nothing" as in ActiveX



#### Java runtime environments

- Most bundle it (Linux, Solaris, MacOS, Windows XP)



## **Java is Cross-Platform?**

- Myth: Safety and machine independence can be achieved with no performance penalty
  - Current systems are about 20% slower than C++
  - Upcoming releases claim to lower or eliminate that gap
  - I expect the gap to stay at 10% or more
- Myth: Java is interpreted
  - Early releases were interpreted
  - Many major "Just in Time" (JIT) compilers



## **Java is Simple?**

 Truth: Java greatly simplifies several language features

- Java has automatic memory management
  - Does Windows and takes out the garbage
  - No dangling pointers. No memory leaks.
- Java simplifies pointer handling
  - No explicit reference/dereference operations
- No makefiles for simple applications
- No header files
- C++ syntax streamlined
- C# is comparable to Java, at least as far as the core language goes.
  - For a comparison of Java and C# syntax/constructs, see http://www.harding.edu/fmccown/java1\_5\_csharp\_comparison.html







## Java is Powerful?

## Truth: Java has a rich set of standard libraries

- Networking
- Threads (lightweight processes)
- Distributed objects
- Database access
- Graphics: GUI controls and drawing
- Data structure library
- Arbitrary precision integral and fixed-point arithmetic
- Digital signatures
- Serialization (transmitting/reassembling data structures)
- File and stream compression
- XML parsing
- Web services

## MEL - Master Environmental Library (DMSO)





## Java and C++



Although Java will certainly not kill off C++, Java and C++ do compete for some of the same territory.

Hmm, does *The* C++ *Report* think that the way to keep your C++ code robust is to port it to Java?

# Java is Popular?









## **Major Java Versions**

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## **Standard Edition**

- Java SE
  - This is often what people mean when they say "Java" or "the Java programming language"

#### Applications

- Desktop programming
- Applets
- Java WebStart
- Java FX
- Base on which to build Web apps that are not full Java EE

#### • Famous examples

- Limewire
- Eclipse, NetBeans, IntelliJ IDEA
- Yahoo games
- Ant and ANTLR
- GWT (Google Web Toolkit) and Laszlo





## **Enterprise Edition**

## Java EE (formerly "J2EE")

 This is Java running on app servers

#### Applications

 Servlets, JSP, JSF, Struts, EJB, Spring, Hibernate

### Famous examples



- Google home page, gmail, Google Maps, Google Docs
- Ebay and PayPal
- walmart.com, kmart.com, target.com, kohls.com, macys.com, homedepot.com, ikea.com, llbean.com
- travelocity.com, orbitz.com, hotwire.com, hotels.com
- Baltimore Orioles, Washington Nationals, Washington Redskins

## Micro Edition (or Java SE for Phones)

#### Java ME

- This is Java running on small devices

### Applications

Cell phone apps, embedded apps, printers, etc.

## Famous examples

- Blackberry
- Android
  - Really optimized Java SE, not Java ME
- Amazon Kindle
- All Blu-Ray DVD players
- Sony Ericson phones
- EA Mobile

Java + Kindle: Amazon's new wireless reading device





## Wrap-Up

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## Summary

- Java is a general purpose language
  - Supports standalone apps, browser-based applets, serverside programs, cell phones, and more
  - It is the most widely used language in the world

#### Java has a number of good features

- But not better in every way than all other languages
- Few of the technical features were new to Java

#### Reasons for using Java

- Combination of technical features, widespread use, available developers, tools, and libraries
- But in many application areas, other languages are also viable alternatives



# **Questions?**

JSF 2, PrimeFaces, Java 7, Ajax, jQuery, Hadoop, RESTful Web Services, Android, Spring, Hibernate, Servlets, JSP, GWT, and other Java EE training.

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