

Java Overview

■ History

◆ search for holy grail—Universal Prog. Lang.

☞ Ho Ho! They never stop trying!

◆ brute force approach

☞ L * M problem

◆ UNCOL

☞ L + M 'solution'

◆ ANDF

◆ Virtual Machines

☞ PERL

☞ TCL/TK

☞ UCSD Pascal

☞ **Java**

Java Overview

- In the beginning was Java...
- Now...explosive growth!
 - ◆ JDK
 - ◆ JRE
 - ◆ JFC
 - ◆ JavaBeans
 - ◆ Java Server
 - ◆ HotJava
 - ◆ JavaOS
 - ◆ Java Management
 - ◆ Security
 - ◆ HotJava Views
 - ◆ E-Commerce Framework
 - ◆ Java IDL
 - ◆ JavaSpaces
 - ◆ Java Naming and Directory Interface
 - ◆ Personal Java
 - ◆ Java Telephony
 - ◆ JDBC

“Java has a unique legacy problem already: the need to remain compatible with the future...”

Java Overview



■ Packages

◆ java.applet

◆ java.awt

📄 java.awt.datatransfer

◆ java.awt.event

◆ java.awt.image

◆ java.awt.peer

📄 java.beans

◆ java.io

◆ java.lang

📄 java.lang.reflect

📄 java.math

◆ java.net

📄 java.rmi

📄 java.rmi.dgc

📄 java.rmi.registry

📄 java.rmi.server

📄 java.security

📄 java.security.acl

📄 java.security.interfaces

📄 java.sql

📄 java.text

◆ java.util

📄 java.util.zip

Java Overview

■ What's new in JDK 1.2

◆ Security

☞ Protection Domains

◆ Swing

☞ Application Services

◆ Various Enhancements

☞ JavaBeans

☞ Serialization

☞ RMI

☞ Audio

☞ Jar Files

◆ Collections

◆ Input Methods API

◆ Runtime Version Identification

◆ Servlet API

◆ Template-Driven JavaDoc Tool

◆ Drag&Drop API

◆ Java 2D API

◆ Java IDL

◆ VM Debugger Interface

◆ Weak References

◆ Extensions Framework

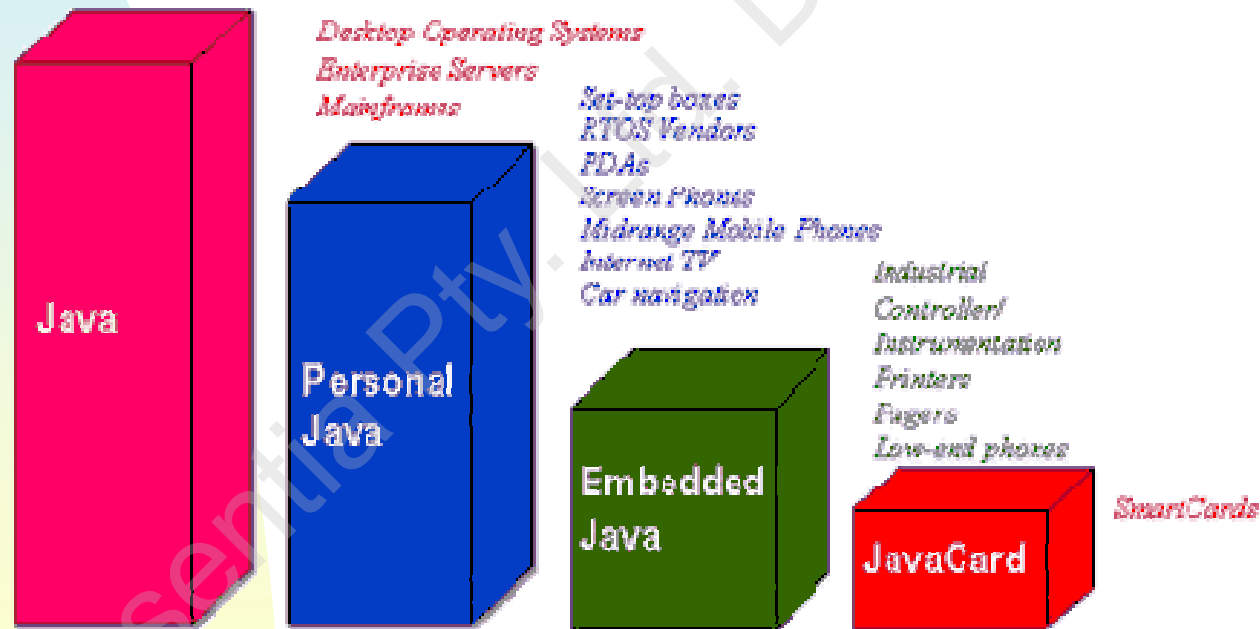
◆ Performance Enhancements

Sunday, July 05, 2009

Good luck keeping up with the changes!

Java Overview

- Where to find Java?
 - ◆ now: Netscape, Internet Explorer, Oracle PowerBrowser, Hotjava, OS/2...
 - ◆ soon: everywhere!



Java Application Environments

Java Overview

Comparing Java To Other Programming Languages

	Java	Smalltalk	TCL	PERL	Shell	C	C++
Simple	●	●	●	◆	◆	◆	
Object-Oriented	●	●		●			◆
Robust	●	●	●	●	●		
Secure	●	◆	◆	●	◆		
Interpreted	●	●	●	●	●		
Dynamic	●	●	●	●	◆		
Portable	●	◆	●	●	◆	◆	◆
Architecture-Neutral	●	◆	◆	●	◆		
Threaded	●			●			
Garbage-Collected	●	●					
Exceptions	●	●		●			◆
Performance	High	Medium	Low	Medium	Low	High	High

Java Overview

- Alternatives?

- ◆ Shockwave/Flash

- ☞ best if all you want is “eye-candy”

- ◆ Active X components

- ◆ PerlScript

- ◆ *etc*

Java Overview

◆ IBM's NetRexx

```
/* The 'Scribble' applet, using an Adapter class */
class Scribble adapter binary-
    extends Applet-
    implements MouseListener, MouseMotionListener, ActionListener
    last_x=int; last_y=int                -- these record mouse coordinates

    method init
        addMouseListener(this)           -- we want mouse events ..
        addMouseMotionListener(this)     -- .. and mouse movements

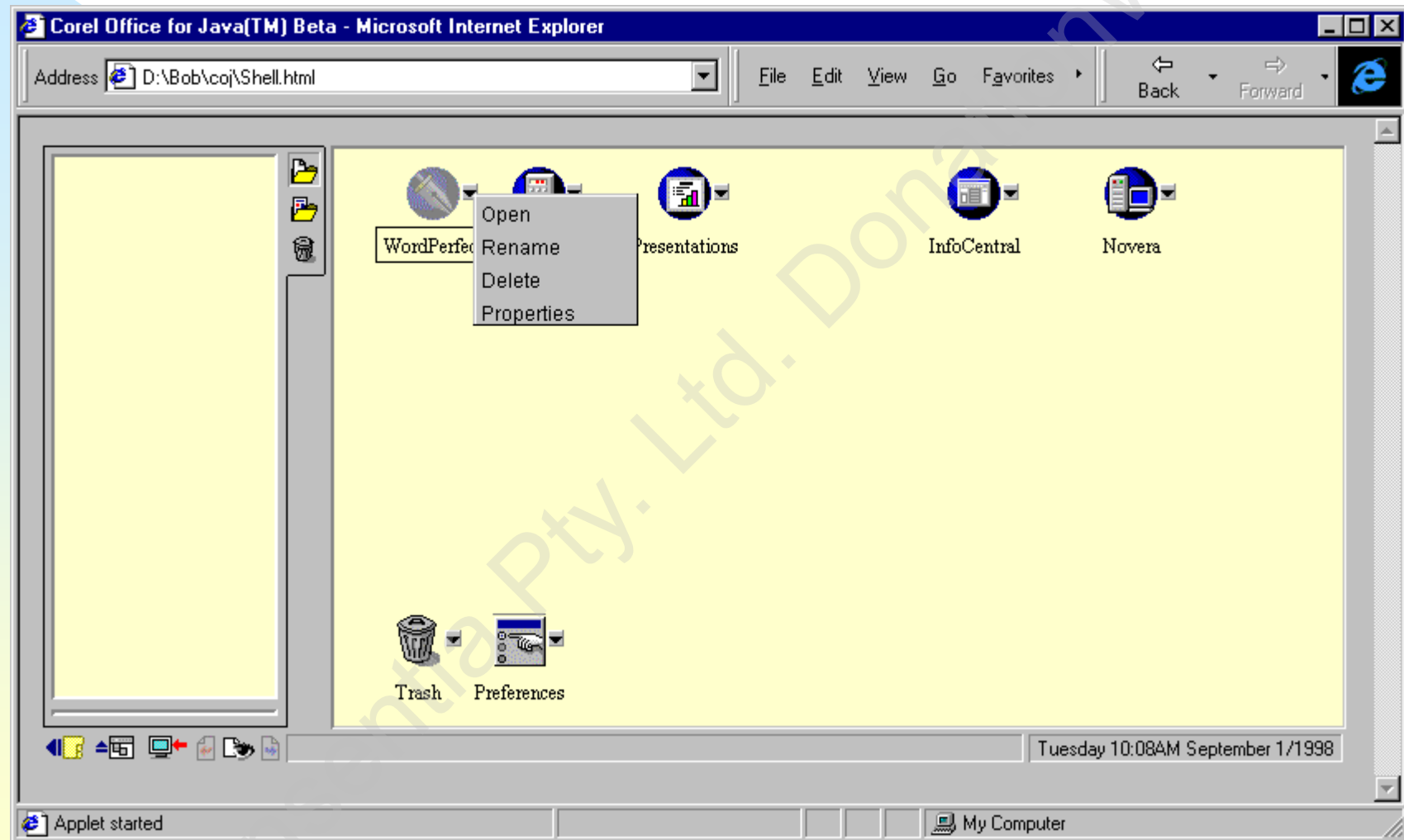
        b=Button("Clear")                -- make a button
        b.addActionListener(this)        -- we want to see the button's events
        add(b)                           -- add the button to the applet

    method mousePressed(m=MouseEvent)
        last_x=m.getX; last_y=m.getY     -- initialize mouse coordinates

    method mouseDragged(m=MouseEvent)
        g=this.getGraphics                -- get applet's Graphics context
        x=m.getX; y=m.getY                -- get mouse coordinates
        g.setColor(Color.black)
        g.drawLine(last_x, last_y, x, y)  -- draw new line segment
        last_x=x; last_y=y                -- save coordinates

    method actionPerformed(a=ActionEvent) -- Button pressed
        g=this.getGraphics
        g.setColor(this.getBackground)
        g.fillRect(0, 0, getSize.width, getSize.height) -- clear the window
```


Java Overview



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Java Overview

- Buzzwords: Simple
 - ◆ simpler, in any case!
 - ◆ cleans up several features of C/C++
 - ☞ no structs, unions, header files, multiple inheritance, operator overloading, type ambiguities/loopholes, etc.
 - ☞ bye bye pointers (hooray!)
 - ◆ small
 - ☞ a few Ks vs a few Megs
 - ◆ features farmed off to class libraries
 - ◆ easy for tool designers to build on

Java Overview

- Buzzwords: Object-Oriented
 - ◆ has to be!
 - ◆ single inheritance
 - ☞ easy to understand
 - ☞ *interfaces* to compensate for drawbacks
 - ◆ strong typing
 - ☞ almost everything is an object
 - ☞ what isn't can be 'wrapped'
 - ☞ no loopholes; Java is OO "from the ground up"

Java Overview

- Buzzwords: Distributed
 - ◆ via class libraries and tools
 - ◆ added wider internet support when recast:
 - ☞ URLs
 - ☞ HTML
 - ☞ FTP
 - ◆ Remote Method Invocation up & coming
 - ◆ CORBA/Java ORBs/Directory Services, etc.
 - ☞ tackling the enterprise
 - ◆ without the internet, Java would be J.A.P.L.

Java Overview

- Buzzwords: Robust

- ◆ from original intended use: embedded systems

- ☞ no pointers

- ☞ exceptions

- ☞ array bounds checking


- ☞ simplicity

- ☞ etc.

- ◆ yet again proves:

- “Keep It Simple, Stupid!”*

Java Overview

- Buzzwords: Secure
 - ◆ function of language and run-time environment
 - ◆ security important when downloading code
 - ☞ ideally, viruses, trojan horses, bombs would be impossible to construct in Java
 - ☞ ..yeah right !
 - ◆ “zero tolerance” for security problems
 - ☞ intense public scrutiny
 - ☞ fixes appear quickly
 - ◆ digitally signed classes in version 1.1 
 - ☞ allow relaxed security regimes if origin is trusted

Java Overview

- Buzzwords: Architecture Neutral
 - ◆ Java -> intermediate 'bytecodes'
 - ◆ bytecodes shipped
 - ◆ bytecodes -> machine-specific formats
 - ◆ tried *many* times
 - ☞ never succeeded
 - commercial interests
 - market indifference
 - performance issues
 - ☞ Java may finally break the barrier

Java Overview

- Buzzwords: Portable
 - ◆ bytecodes
 - ◆ no implementation dependent features
 - ☞ data type sizes fixed
 - ☞ arithmetic behaviour guaranteed
 - ◆ Unicode for strings
 - ◆ standard infrastructure
 - ☞ tell that to Microsoft or Sun!

Java Overview

- Buzzwords: Interpreted
 - ◆ main reason why the 'cool' features of Java are possible
 - ☞ virtual machine
 - ◆ simplifies porting
 - ☞ speeds dissemination
 - ◆ Just-In-Time compilation
 - ☞ originally developed for Smalltalk
 - ☞ (partially) overcomes speed problems

Java Overview

- Buzzwords: High-Performance
 - ◆ no!
 - ☞ possibly not a problem, depending on application and usage
 - ◆ JIT compilers
 - ◆ native code compilers coming
 - ☞ frowned up by Sun
 - ◆ “3rd generation” VMs coming
 - ☞ Hotspot
 - also speed up GC, threads, etc.
 - ◆ Sun hopes that the (*its!*) “Java chip(s)” will become ubiquitous and hence the problem will vanish...

Java Overview

```
public class JITTest
{
    public static void main (String [] args)
    {
        final int LIMIT = 10000000;

        System.out.println ("Doing " + LIMIT + " iterations.");

        long start = System.currentTimeMillis ();

        for (int i = 0; i < LIMIT; i ++)
            { double d = Math.sin ((double) i); }

        long finish = System.currentTimeMillis ();

        System.out.println ("Elapsed time: " + (finish - start) + " ms.");
    }
}
```

```
C:\>java JITTest
Doing 10000000 iterations.
Elapsed time: 11546 ms.
C:\>set JAVA_COMPILER=symcjit
C:\>java JITTest
Doing 10000000 iterations.
Elapsed time: 100 ms.
C:\>
```

Java Overview

- Buzzwords: Multithreaded
 - ◆ improves interactive responsiveness
 - ☞ compensates for slow internet
 - ☞ compensates for sluggish language implementation
- Buzzwords: Dynamic
 - ◆ (down)load as you need technology
 - ◆ fits in with other technologies
 - ☞ Active X
 - ☞ OpenDoc (R.I.P.)
 - ☞ etc.

Java Overview

- Cynicism

- ◆ could probably say *all* this about two-dozen other languages...
- ◆ so what's the difference?

Marketing!

(and perhaps being in the right place at the right time)

Java Overview

■ Java Wish List

"It's not much of an exaggeration to say Java is still a ton of hype and promise held together by a pinch of results. For all the changes it's undergone in the past two years, the programming language still has weaknesses that prevent it from being a powerhouse in the mainstream business environment. Here's a list of Java's worst shortcomings:

- Incompatibilities in how different browsers and operating systems implement Java*
- Awkward integration into the Windows environment*
- Lack of support for Windows-specific controls and user interface conventions*
- A dearth of commercial, industrial-strength applications*
- Poor depth, breadth and stability of programmer tools*
- Lack of base of experience for advanced use of the language*
- Unpredictable performance on equivalent hardware, thanks to the large number of older and less-sophisticated Java Virtual Machines in use."*

Windows Magazine, November 1997

Java Overview

- Disenchantment?

“Sun’s proposition

Sun dreamed of a world without Microsoft. We took a look. But...

Port all your code to Java, they said, if you want to be able to connect Frontier scripts to software that's written in Java. What a ridiculous proposition.

Java isn't that important. There's PERL, Tcl, Rexx, JavaScript, VB Script and SQL, none of which require us to port our software to connect to their software.

Java truly is a captive world unto itself. The only way to talk to it is to become part of it. Yuck!”

Dave Winer

URL: <http://www.scripting.com/davenet/97/12/navigators.html>

Java Overview

- More Disenchantment?

“JAVA truly is the great equalizing software. It has reduced all computers to mediocrity and buggyness.”

From the comp.lang.java newsgroup, attributing the quote to a NASA web page

- A good discussion/status overview:

“Mr. Bean’s Hype machine”

<http://www.marketingcomputers.com/january/bean.asp>

Java Overview

Testifying earlier that day, Sun Vice President and Fellow James Gosling, who is credited with creating Java, told the court that Microsoft has added extensions to the Java language that compromise the ability of its tools to write cross-platform applications.

Java software applications built using the company's Visual J++ development tool will only run properly on Microsoft's Java virtual machine, and not on virtual machines available from Netscape Communications Corp., Symantec Corp., and others, Gosling said.

Under cross-examination, Gosling acknowledged that Microsoft's development tools include a “mode switch,” which allows developers to make a choice between writing applications using only Java and writing Windows-specific applications that use both Java and C code.

Microsoft attorney Karl Quackenbush asked Gosling if he didn't think software developers are smart enough to make up their own minds about what types of applications they want to write using Microsoft's tool.

“Developers are a pretty savvy bunch, wouldn't you agree with me?” Quackenbush asked.

“Hmm, well,” Gosling said, drawing laughter from the court. “I think 'savvy' is saying a little much.”

—<http://www.javaworld.com/javaworld/jw-10-1998/jw-10-idgns-baratz.html>

Java Overview

Bill Gates meets Satan

"Wiiiiilliam Gaaaates..."

"Oh, hi, Satan. What's up downstairs?"

"It's tiiiiime..."

"Yeah, but we're still debugging Memphis, and Ballmer swears he'll wipe out Adobe before lunch, and Melinda wants to change the tile in the third-floor kitchen again, and..."

"Sorry, Bill. I've given you too many extensions already, not to mention the Oracle8 launch event disaster, not to mention Steve Jobs' head on a platter."

"Yeah, that was a good one. I think you enjoy this as much as I..."

"Regardless, a deal's a deal. Your soul is mine, Bill Gates. And today is the day you pay your eternal debt to me."

"Now, let's be reasonable here, Satan..."

"Reasonable?!? You want reasonable?!? You're the richest man in the world! You've got a beautiful wife and daughter! Microsoft is the most powerful company on the planet! We're even using NT to run hell's WAN server! And frankly, it sucks. That's one of the reasons I've come to collect. If you can't get my network to run right, you'll spend the afterlife writing Windows applications that run on doorbells..."

"What's your alternative, Satan? Netware? AppleTalk? OS/2? You're a funny guy for someone who breathes fire."

"Well, God is porting all his heaven-critical applications to Java..."

"Java?!? Stop it, Satan. You're going to make me wet my pants again like that time you told me to buy Novell for \$50 a share."

"Yes, Java, running on Sun servers, IBM plumbing and Oracle databases with thin clients accessing the apps via the web through Netscape Navigator."

"That's not a solution, that's one of those Grimm's fairy tales that scare children to death. I have yet to see an NC actually being used to do anything except crash during demonstrations. Look, Java is a nice little language for animating web sites, but Shockwave after too many espressos isn't going to displace Windows as an applications platform on hundreds of millions of PCs."

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"Nevertheless, Java is the future of computing, and I'll be damned if I'm going to give God a strategic technology advantage!"

"Satan, what if I told you I could kill off Java with a single word?"

"Interesting. Tell me more."

"Wait a minute. What's in it for me?"

"I promise I won't turn you into Larry Ellison's bidet right this second."

"Okay, that works for me. Here's the word...disable."

"Disable what?"

"Disable Java support in Internet Explorer."

"You mean Microsoft's web browser won't run Java anymore?"

"That's right, brimstone breath. You want to run Java, give Netscape 50 bucks per seat and pray that IBM doesn't buy the company to merge Communicator with Lotus Notes."

"The Department of Justice will..."

"Will what? Punish me because I won't support a product my enemies want to use to destroy my company? Chevrolet dealers don't have to sell Fords. Pepsi's restaurants don't have to offer Coke. Why does Microsoft have to support Java?"

"It's an industry standard..."

"It's an industry hallucination."

"There will be a public outcry..."

"From who? Network managers? MIS? The CIO? They're up to their nosehairs in Cobol getting ready for January 1, 2000. To them, Java is still a cute word for coffee."

"What about all those spiffy applets on thousands of web sites?"

Java Overview

"Microsoft owns 100 percent of the Apple and Windows preload market for browsers, and our overall share has gone from zero to half in two years. It's a safe bet most people will soon use IE for web access. If they come to a site that doesn't work because of Java, they'll simply jump to the next one. Trust me, developers will switch to ActiveX faster than you can say 'Playstation.'"

"What about other platforms..."

"Like Intel has competition?"

"Interactive TV..."

"We call it WebTV in Redmond."

"Venture capitalists have invested billions..."

"To get a date with Kim Polese."

"Sun will write a plug-in..."

"Not without the hidden APIs."

"Of all my minions, you are my very favourite, Bill. You may stay."

"Thanks, Satan. Now, about that Exchange license agreement..."

—From the Internet

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