Java Everywhere

Simon Ritter
Technology Evangelist
Sun Microsystems, Inc.
Agenda

- Data & Web Services
- The Sun Java Enterprise System
- Future Directions For Java
  - Ease of Development
- Summary
Auto-ID/RFID: The New Barcode

- Radio Frequency Identity Tags
- Data can be changed
- No line of site required
- 96-bits is plenty of storage
Lots Of Possibilities...

- Supply chain management
- Parcel tracking
- Refrigerator/oven
- Washing machine
- Personalised advertising
- Use your imagination...
Three “Laws” of Computing

• Moore's Law
  – Computing power doubles every 18 months

• Gilder's Law
  – Network bandwidth capacity doubles every 12 months

• Metcalfe's Law (Net Effect)
  – Value of network increases exponentially as number of participants increases
# Platform Evolution

<table>
<thead>
<tr>
<th>Catch Phrase</th>
<th>The Network Is the Computer</th>
<th>Objects</th>
<th>Legacy to the Web</th>
<th>The Computer Is the Network</th>
<th>Network of Embedded Things</th>
<th>Network of Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>100s</td>
<td>1,000s</td>
<td>1,000,000s</td>
<td>10,000,000s</td>
<td>100,000,000s</td>
<td>100,000,000s</td>
</tr>
<tr>
<td>Leaf Protocol(s)</td>
<td>X</td>
<td>X</td>
<td>+HTTP (+JVM)</td>
<td>+XML Portal</td>
<td>+RM</td>
<td>Unknown</td>
</tr>
<tr>
<td>Directory(s)</td>
<td>NS, NS+</td>
<td>+CDS</td>
<td>+LDAP(*)</td>
<td>+UDDI</td>
<td>+Jini</td>
<td>+?</td>
</tr>
<tr>
<td>Session</td>
<td>RPC, XDR</td>
<td>+CORBA</td>
<td>+CORBA, RM</td>
<td>+SOAP, XML</td>
<td>+RM/Jini</td>
<td>+?</td>
</tr>
<tr>
<td>Schematic</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- **Scale**: Represents the growth in scale, with time frames indicating when each phase was prominent.
- **When/Peak**: The peak years for each phase, showing when the network was at its most expansive.
- **Leaf Protocol(s)**: The protocols used during each phase, with additional notes on JVM and RM.
- **Directory(s)**: The directory protocols used, with LDAP(*) indicating an enhanced protocol.
- **Session**: The session protocols, with CORBA and RM indicating key standards.
- **Schematic**: Visual representations of each phase, showing the network's evolution from simple to complex.
Design Patterns: Web Service

Bus. Sys. DB App Web Browser

Context and Identity (LDAP, Policy, Liberty)

XML (UDDI, SOAP)

J2EE J2SE/J2ME

Web Service
Web Services Adoption

• 1\textsuperscript{st} phase
  – Concerted deployment internally within an organization

• 2\textsuperscript{nd} phase
  – Selective deployment with outside business partners

• 3\textsuperscript{rd} phase
  – Wider deployment with outside business partners
First Generation Web Services

- XML based
- Message-based
- Language independent
- Dynamically located
- Accessed over the internet
- Loosely coupled
- Using standard protocols
Web Services Inhibitors

- Basic web services designed for RPC
  - B2B is different
  - Reliability
  - Choreography
  - Security

- Performance
  - XML massively degrades network performance
  - ASN.1 being considered

- Politics!
  - Too many standards
  - Royalties?
Sun™ Java Enterprise System

- Software for the Enterprise
- $100 per employee per year
- Genuine “Right To Use”
Sun™ Java Enterprise System Architecture

Creation And Assembly
Sun, Borland, WebGain, Rational,...

Clients
- HTML
- XML
- XHTML
- WML
- CHTML
- SOAP
- Heterogeneous Devices
  - Browser, Desktop, J2ME™ Device,...

Services
- Presentation
  - Servlets, JSP, RMI
    Sun, Apache, IBM,...
- Business Logic
  - EJB, JMS
    Sun, BEA, IBM, ATG, Oracle,...
- Integration
  - JDBC, JCA, CORBA
    Sun, BEA, IBM, Iona,...
- Identity & Policy
  - Kerberos, LDAP, PKI
    Sun, Novell, CA,...
- Service Platform
  - Solaris™, Linux, Windows,...
Project Liberty

- Liberty standard allows shared login
- Shipping NOW
- Java Card is a standard for smart cards
- NOW in mass deployments
- Java Card + Liberty = highest security standard for network identity
Java Desktop System

- GNOME
- Mozilla
- Evolution
- StarOffice
- GAIM
- Java
- JavaCard
Java Stats

- Java in 100% of Fortune 500 companies
  - 78% of executives view Java as the choice for web services
- Java installed on 550 million desktops
- 150 Java enabled mobile phone models
- More than 3 million Java developers
- JRE is second most popular download on the internet
- Java is widely recognised consumer brand
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- Java is widely recognised consumer brand
  - Most non-techies associate it with Microsoft!
Java Community Process

- Executive committee
- Java Specification Request
  - Currently 232 Requests
- Expert Group
  - Interested companies/individuals
- Public Review
- Reference Implementation
- Compatibility Test Kit
  - Sun/Apache scholarship fund
The Java Community: Strength in Numbers

- **Java programmers:**
  - 2.5 million, as of 2001 (source: Gartner)
  - Prediction of 4 million by end 2003 (source: IDC)

- **Java in universities:**
  - 78% teach Java, 50% require Java (source: The Middleware Company)

- **Java usage is expected to grow 29.4% in 2003 alone**
  (source: IDC Worldwide Developer Model)
Developers

- Millions
- 100,000s
- 10,000s
- 1,000s

Technology Gurus
Technology Experts
Enterprise Apps
“Corporate developers”
Developers

Millions

100,000s

10,000s

1,000s

Technology Gurus

Technology Experts

Enterprise Apps

"Corporate developers"

Java

.NET

Millions
JDK Themes

- 1.0 – First Release
- 1.1 – New event model
- 1.2 – Performance, New APIs
- 1.3 – Performance, Hot Spot
- 1.4 – Performance, Reliability, Availability
- 1.5 – Performance, Ease of development
JDK 1.5, “Tiger”

- Next major J2SE release
  - Biggest impact on language since JDK1.0
- Themes & features still under design
- Will go through the JCP

ALL FEATURES ARE TENTATIVE
JDK 1.5 Themes

- Compatibility, Compatibility, Compatibility!
- Quality
- Monitoring and Manageability
- Performance and Scalability
- Client for XML and Web Services
- Ease of Development
New Java Language Features
JDK 1.5, “Tiger”

- Generics
- Auto-boxing
- Enumerations
- Meta-data
- Enhanced for loop
- Varargs
- Static import
Sun as a Disruptive Innovator

- NFS
- Java
- Linux
- Jini, JXTA
- NetBeans
- J2EE, J2ME
- OpenOffice.org
- StarOffice
- Sun ONE

TCP/IP in Every System

1980 1990 2000
Java Everywhere

- Freedom of choice
  - Write once, run anywhere
- Open Standard
  - JCP
- Constantly evolving
  - New features to ease development
- Still the best programming language
Simon Ritter
simon.ritter@sun.com
Sun Microsystems, Inc.