Introduction to Project JXTA

Internet 2, P2P Working Group
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Juan Carlos Soto
Director, Advanced Development
Sun Microsystems, SW CTO Office

www.jxta.org
The Time Is Right for P2P and Project JXTA

Peer-to-Peer (P2P) is not new. However, the time is *now* right for broad deployment of P2P applications.

The Project JXTA technology lets developers build and deploy P2P solutions more quickly.
Topics

- Peer-to-Peer computing
- Project JXTA technology
- Project JXTA today
- Future directions
What Is Peer-to-Peer (P2P)?

- P2P covers a wide range of applications...
  - Sharing files, distributed search and indexing
  - Sharing CPU and storage resources
  - Instant messaging & devices communicating together
  - Collaborative work (and games)
  - Web services
  - New forms of content distribution, sharing, and delivery

- P2P is not...
  - New or a specific architecture, technology, business model, or market
  - About eliminating servers or centralized services

P2P is about any device easily connecting “directly” to other devices to enable a more cooperative, or social, style of computing.
P2P Makes Sense Now

- More people connected, more data generated
- More nodes on the Internet and wireless Web
- More bandwidth available
- More computing power available (disk, memory, CPU)
- More interesting applications, content, and services
- **Edge devices are increasingly providers of resources**
Characteristics of Ideal P2P Applications

- Applications best suited for P2P implementation are those where:
  - Centralization is not possible or desired
  - Massive scalability is desired
  - Relationships are transient or ad-hoc
  - Resources are highly distributed
  - Resilience is desired

Their value or performance increases as more nodes participate in the network.
What is Project JXTA?

- An open set of XML-based protocols for creating peer-to-peer style network computing applications and services
  - A virtual network overlay
  - Protocol based --> language, OS, network, and service agnostic technology
  - Defines mechanisms, not policies
  - Open Source project: www.jxta.org
JXTA Technology Objectives

- **Interoperability**
  - Across different P2P systems and communities

- **Platform independence**
  - Programming languages, system platforms, and networking platforms

- **Open and Ubiquitous**
  - No barriers to use
  - Connect every device with a digital heartbeat

- **Security and Monitoring**
  - For commercial and enterprise deployment
JXTA Enables Classic P2P Applications

- Communications, collaboration, gaming
- Content delivery and sharing networks
- Transactional Web services
- Resource sharing
JXTA Application – iFreestyle by Digital Dream
JXTA Applications – Momentum by InView Software
JXTA Applications - Java IDE by Internet Access Methods
JXTA Application – Zudha Instant Messenger
JXTA Application – Brevient Connect Web Conferencing
JXTA Applications – VistaPortal, Adaptive Distributed Data
JXTA Applications – Convenience Stores / Retail
National Association of Convenience Stores (NACS)
JXTA Virtual Network

Physical Network

TCP/IP

Firewall

HTTP

Virtual Mapping

Project JXTA Virtual Network

Peer

Peer

Peer

Peer

Peer

Peer
JXTA Virtual Network Building Blocks

- Uniform peer addressing
  - Peer IDs
- Dynamically configurable peer domains
  - Peer groups
- Uniform resource representation
  - Advertisements
- Virtual communication channels
  - Pipes
- Security and Monitoring
JXTA Peer Types

- Micro peers
- Standard peers
- Super peers:
  - Rendezvous peer
  - Relay peer
  - Proxy peer
Peer Groups

JXTA Virtual Network

Physical Network

Virtual Mapping
Any Platform, Any Network

- JXTA Chat (J2ME™)
- MyJXTA (J2SE™ on Windows)
- JXTA Virtual Network
- JXTA-C Shell (C on Solaris™)
JXTA Is Based on Protocols

- JXTA defines XML message formats, or protocols, for communication between peers
- Protocols used to discover peers, advertise and discover resources, communicate and route messages, and provide monitoring
- Can be implemented in any language
JXTA Implementation Platforms

- **J2SE™ Implementation**
  - Full implementation of JXTA protocols
  - Standard and Super Peer functionality
  - APIs and functionality frozen

- **JXTA-C**
  - Standard Peer functionality only
  - Runs on Linux, Solaris OE, and Windows

- **JXTA for J2ME™**
  - Micro Peer functionality only
  - MIDP-1.0 compliant
  - iAppli compliant
jxta.org Based on a Proven Open Source Model

- www.jxta.org
  - All source, projects, docs, examples on-line
- Apache-style (BSD-based) software license
  - No barriers to getting started
  - No royalties, no fees, no registration
- Meritocracy
  - The more you've done, the more you can do
JXTA Community Momentum


- 1,650,000+ downloads
- 80+ projects
- 14,600+ members
- Active discussion groups
- Community actively contributing and integrating technology

Please join our efforts!
JXTA Standardization Efforts

Participating (and co-founded) IRTF on P2P Computing

- Co-chair: Bill Yeager, Sun Labs, former JXTA CTO
- Working Group Meeting: 12 October 2003
Research and University Activities

- **Grid Research**
  - University of Indiana (US)
    - The NaradaBrokering Project
    - Universidade Federal de Campina Grande, Brazil
      - OurGrid
  - University of Melbourne (AUS), University of Malaysia
    - Compute Power Market Project
  - Cardiff University (UK)
    - GridOneD Project
  - IRISA (FR)
    - Large-scale Distributed memory
Research and University Activities

• **Semantic Web**
  – Stanford (US), University of Hannover (DE), Karlsruhe (DE)
    • Edutella
  – University of Bremen (DE)
    • The iKnow project

• **Collaboration**
  – University of Athens (GR), University of Lancaster (UK), ETH Zurich (CH)
    • MMAPPS (EC Project)
  – Trinity College (IR)
  – University of Malta
    • Educational Collaboration tool
  – University of Southampton (UK)
    • Location awareness
Research and University Activities

• Agents
  – Ecole Polytechnique Federale de Lausanne (CH)
  – University of Bologna (IT)
    • Anthill
  – NTT Labs (JP)

• DHT
  – Stanford (US)
  – Toshiba Research (JP)

• Multi-Media Content Delivery
  – Linkoping University (S), Philips Research (UK), University of Ljubljana
    • Share It TV (EC Project)
  – Paderborn University (DE)
    • Middleware for Virtual Home
Research and University Activities

- Small Devices / Ad hoc, Defense, Robotics
  - San Jose State University
  - US Army (Boeing)
    - Future Combat Systems
  - BBN
    - Distributed sensors

- Distributed Security
  - Linkoping (EU)
  - Sun Labs
Why Project JXTA in Research?

- True Open Source
  - No licensing problems, BSD-based license
  - Global project with large, active community
- Plugable architecture
  - Walker / Greeter mechanism
  - Multi transports
  - XML protocols
  - Security models
  - Service Architecture
- Works Today
  - IPv4 friendly
  - Multiple implementations, small to large devices
  - Sun commitment to technology
Looking Ahead

- Enhanced Performance, Scalability, and Security
- New services and opportunities
  - E.g. identity, further integration with Web services, content management, digital rights, presence
- Participation in Relevant Research and Standards Activities
- Abstractions
  - Simplified programming model (JXTASocket, JXTA as a system service, discovery agent)
Project JXTA is an open source platform for P2P applications and research – it is free!
Project JXTA technology is language, operating system, network, and service agnostic.
Project JXTA works on any network device -- from cell phones to super servers
Project JXTA has a large and active community at http://www.jxta.org

We invite you to join our efforts.