A Complete Open Source Stack: Hardware to Web 2.0

Matt Ingenthron
Josh Berkus

Sun Microsystems, Inc.
Agenda

- Introduction
  - Sun in Open Source
  - Special guest: Josh Berkus
- OpenSPARC™
- OpenSolaris™
- CoolStack™
- OpenJDK™, project Glassfish
- Other items, futures
- Questions
Sun’s History of Community

- NFS
- X Window System
- BSD
- UNIX SVR4
- Sun 1 with TCP/IP
- SPARC
- Apache Software Foundation
- Java
- open source
- Liberty Alliance
- Java Community Process
- Java.net
- OpenSolaris
- Project Looking Glass
- GNOME
- netBeans
- Jini
- Mozilla
- Project JXTA
- Grid Engine
- OpenOffice.org
- XML

Timeline:
- 1980
- 1990
- 2000
- 2006
Sun's Open Source Strategies

Drive volume

- Developers
- Partners
- Applications
- Users

Share

- PostgreSQL
- X
- GNOME
- Mozilla
- Sun Microsystems

Address growth markets

Disrupt locked markets

2003

Windows

Office

2006

Windows

OpenOffice.org

Copyright 2007, Sun Microsystems
# Sun contributes to GNU/Linux

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<th>Person/months</th>
<th>Estimated $ value</th>
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**European Commission**

Economic impact of FLOSS on innovation and competitiveness of the EU ICT sector

January 2007
OpenSPARC

• Jonathan Schwartz with the BU's, meets with David Yen
  > David decides to release the CoolThreads (a.k.a. Niagara Processor)
    – Yes, the whole thing: Verilog, testing tools
    – GPLv2 license
  > Not Sun's first Open Source SPARC release

• Subsequent adoption by Simply RISC
Four Converging Trends:

- Network Computing Is Thread Rich
- Moore’s Law Provides an Ever-Increasing Transistor Budget
- Worsening Memory Latency
- Growing Complexity of Processor Design
Comparing Modern CPU Design Techniques

- ILP Offers Limited Headroom
- TLP Provides Greater Performance Efficiency
Chip Multi-Threaded Design (CMT)

CMP (chip multiprocessor) + HMT (hardware multithreading) = CMT (chip multithreading)

- CMP: n cores per processor
- HMT: m strands per core
- CMT: n x m threads per processor
UltraSPARC T1 Capabilities

• Aggressive CMT and multi-core design
  > 8 CPU cores, 4 threads per core

• Hardware Virtualization
  > LDOMs allow adding multiple OSs

• Designed to solve the 21st century problems
  > SWaP metric demonstrates the problem
  \[
  \text{SWaP} = \frac{\text{Performance}}{\text{Space} \times \text{Power Consumption}}
  \]
OpenSolaris

- Launched nearly 2 years ago, full buildable environment 1 year ago
- Goals/Challenges
  > Acknowledge and build the community around Solaris
  > Open Source is not just about the source, it's about the community
- Who has adopted OpenSolaris
  > SchilliX
  > Nexenta
  > Solaris Express
- Open Governance Board
OpenSolaris Capabilities

- DTrace: dynamic, production quality tracing to allow administrators to answer tough questions
- ZFS: the Zettabyte filesystem, ease of use, unmatched reliability
- Zones: resource controlled, separate containers for virtualized Solaris environments
- SMF: service management integrated with Role Based Access Control
- Cryptographic Framework: unified access/implementation of algorithms, transparent access to crypto accelerators
- Process Rights Management: taking the root out of root
- Fault Management: enhancing reliability by responding to system faults
OpenSolaris Futures

- Network Automagic: setup and resolve networking in system environment without intervention
- Enhanced Intel Platform Support: graphics, wifi, performance improvement, power management, virtualization, fault management
- PRESTO: automatic printing configuration
- Xen: Dom0 and DomU support
- libc_i18n rewrite: move to Open Source i18n (part of project emancipation)
- Availability Suite: software, block-based snapshot and WAN replication
- SATA AHCI enhancements: more AHCI compliant chipsets, port multiplier, MSI interrupt, power management
- PowerPC port: port of the core Solaris kernel to the Power architecture
CoolStack & CoolTools

• Pre-tuned, optimized binaries for both UltraSPARC and x64
  > Simplifying how you obtain the AMP stack
  > Pre-optimizing a number of the binaries
    – Sun Performance Engineering carried out specific testing with a variety of configuration/compilation options to determine a good set of optimizations
    – Installable packages, source plus documentation and community support through the forums
  > CoolTools
    – GCC for SPARC Systems
    – ATS: Automatic Tuning and Troubleshooting System
    – Faban: Benchmark development and deployment kit
OpenJDK

- GPLv2 announcement of the full Java Developers Kit that is Sun's to give
  > Releases of redistributable binaries for encumbered portions of the JDK

- Available today:
  > The HotSpot virtual machine
  > The Java language compiler (javac)
  > Eventually, everything to be released
    - And hopefully Open Source replacements written for encumbered code

- Available under other licenses today:
  > The full Java source
Mustang Component JSRs

202: Class File Update
199: Compiler API
269: Annotation Processors
221: JDBC 4.0 software
223: Scripting
105: XML Digital Signature
173: Streaming API for XML
222: JAXB 2.0
250: Common Annotations
181: WS Metadata
224: JAX-WS 2.0

Ease of Development

XML

Web Services
OpenJDK Technology

Interesting Stuff That You Might've Missed…

10. Attach-on-demand monitoring
9. JConsole plugin API
8. jhat OQL
7. Solaris™ Dynamic Tracing (DTrace) support
6. Annotation processing done by javac
5. Class-path wildcards
4. Free disk-space API
3. Password prompting
2. `javax.swing.GroupLayout`
1. JAX-WS can do RESTful web services
GlassFish

Over 1400 members and 350,000 downloads*

Includes Java EE 5, JWSDP and other Web services technologies

Builds best with NetBeans, available Eclipse plug-in

Basis for the Sun Java System Application Server PE 9

java.sun.com/javaee/GlassFish

*Source: Sun 2/06 – See website for latest stats
Project GlassFish

• Open Source Java application server
  > The complete Java EE™ RI
  > Initially under a CDDL license, but later added GPLv2

• Adoption by a number of projects and companies
  > BEA using components in Weblogic
  > Apache Geronimo considering adopting components

• Many Glassfish extras:
  > jMaki, Hibernate, Spring, Spring 2.0
  > MySQL, PostgreSQL, JavaDB (a.k.a. Apache Derby)
  > NetBeans, Eclipse, JProfiler, IntelliJ IDEA
PostgreSQL

- Enterprise-class open source database
  - advanced SQL features
  - vertical scalability to 32 cores
  - supports terabytes of data
  - top ratings for security & reliability
  - alternative to Oracle, DB2, SQLServer

- Large, established open source community
  - community-owned project
  - twenty years of development
  - more than 20 corporate sponsors
  - millions of installations in dozens of countries
Sun and PostgreSQL

• History
  > Hired core team member: April 06
  > Integrated PostgreSQL into Solaris: June 06
  > Enterprise support for PostgreSQL: June 06

• Contributions
  > JDBC driver improvements
  > Improved Solaris support, performance
  > Benchmarking expertise & help on scalability
  > Niagara testing server
  > DTrace probes for PostgreSQL 8.2
Demonstration
Projects Sun Contributes to....

Apache Derby
Apache Tomcat
JRuby
JRoller
Gnome
OpenPrinting
gcc and other gnu utilities
PHP
Debian Linux
Ubuntu Linux

OpenMPI
DTrace on FreeBSD
X.org
MySQL
JXTA.org
Gentoo Linux
Mozilla.org
Fortress
OpenSSL
FreeBSD
Apache Webserver
Apache Ant
Ubuntu Linux
Resources

- OpenSparc: opensparc.net
- OpenSolaris: opensolaris.org
- CoolStack: cooltools.sunsunsource.net/coolstack/
- OpenJDK: openjdk.dev.java.net
- PostgreSQL: postgresql.org
  sun.com/software/solaris/postgresql.jsp
- Project Glassfish: glassfish.dev.java.net
- Blogs: planetpostgresql.org
  blogs.sun.com/mingenthron
Thank you!

matt.ingenthron@sun.com
josh.berkus@sun.com