



# OpenSolaris: Greybeards No More

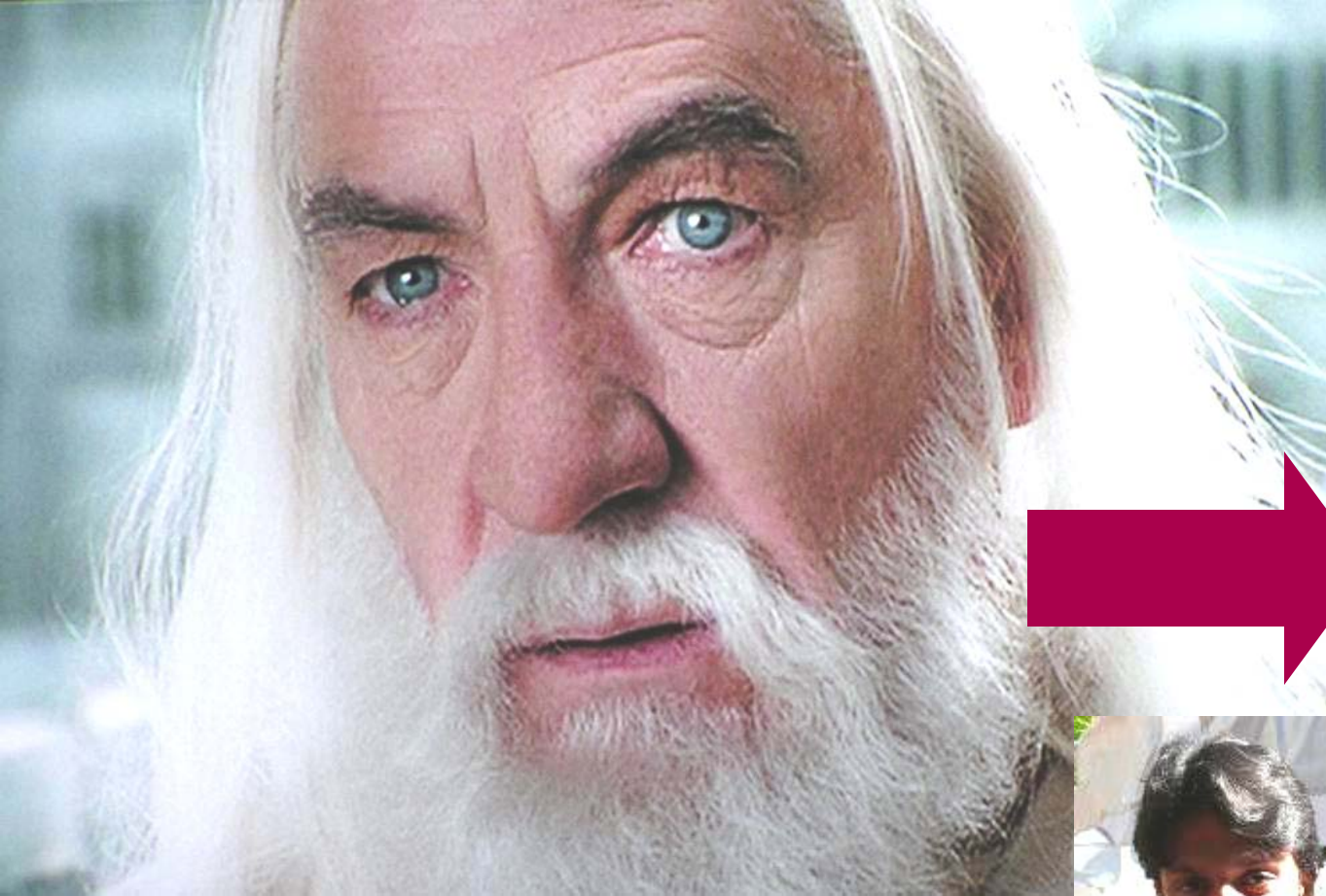
OSCON  
July 24, 2008

David C. Stewart



Software and Solutions Group





Typical UNIX Wizard

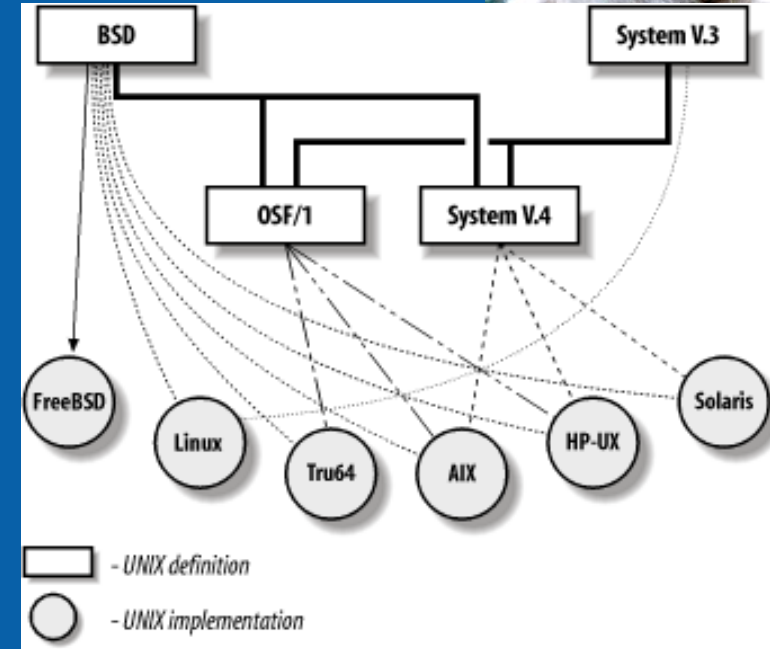
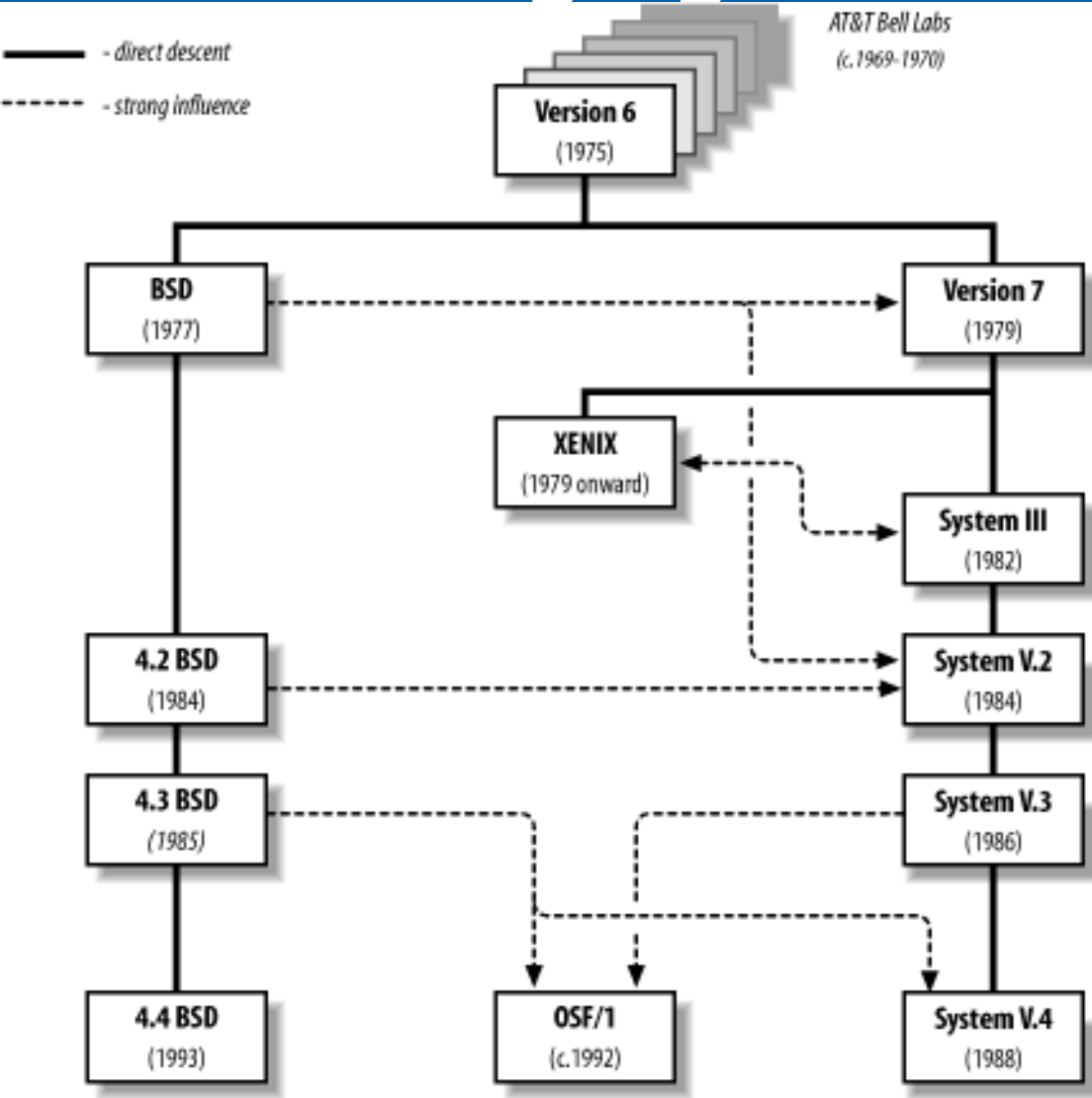
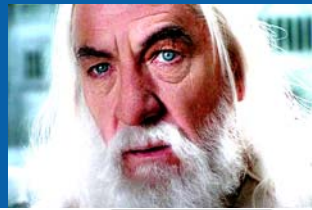
***“Unix beardies get legal over OOXML”***  
– typical headline on [theinquirer.net](http://theinquirer.net)

# Agenda

- The changing face of Unix
- What makes OpenSolaris cool?
- Intel's involvement in OpenSolaris

**Key thought: UNIX could be cool again**

# The changing face of UNIX



Unix Genealogy (simplified) © O'Reilly

- My involvement: since the early '80s

Source: Essential System Administration, 3rd Edition by Æleen Frisch, publisher: O'Reilly  
 For a family tree at the other end of the detail spectrum:

<http://www.levsnez.com/unix/history.html>

# Intel innovates throughout the stack

Middleware & Applications



Development Tools



Operating Systems



Virtualization Software



Platform Firmware



Platform Hardware



Milliwatts

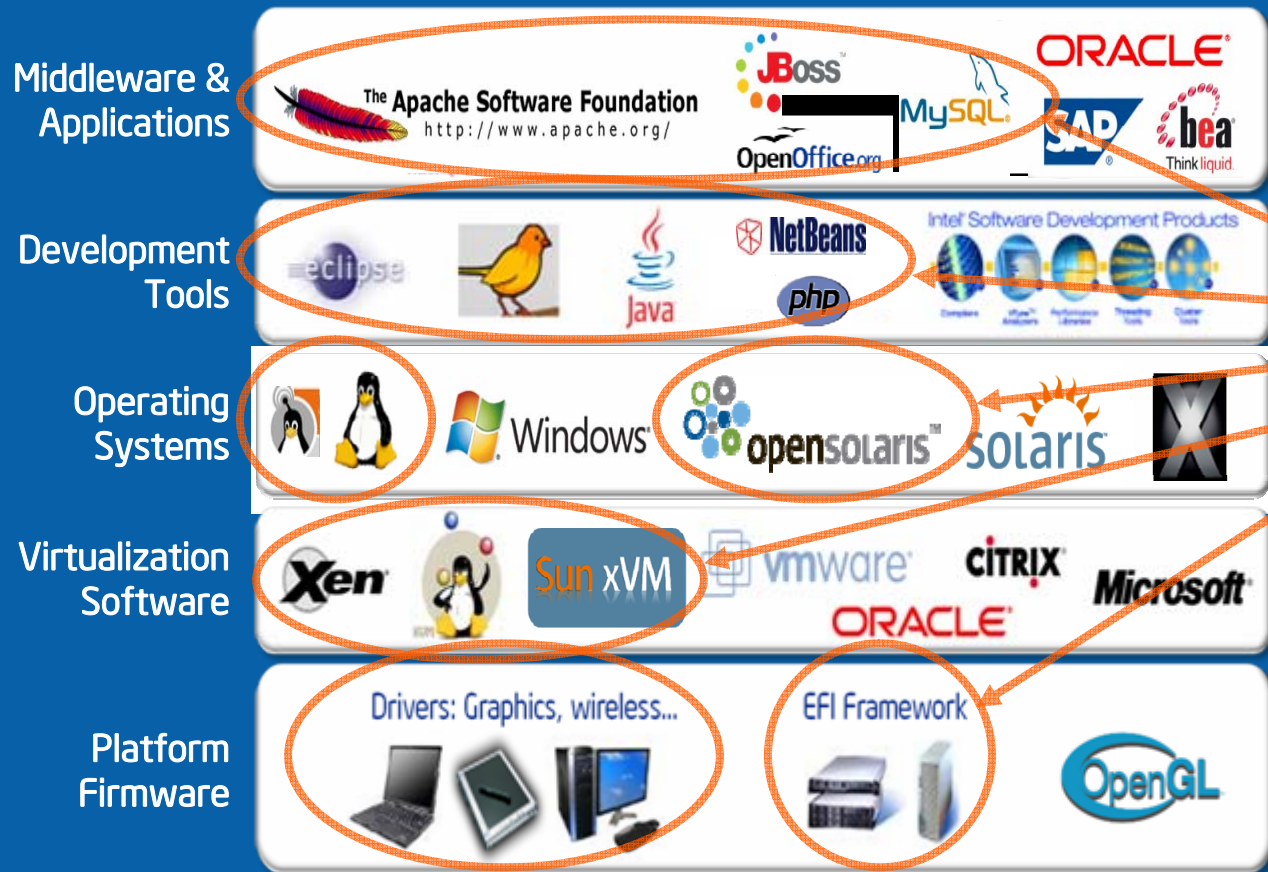
Intel Architecture

Peta FLOPs



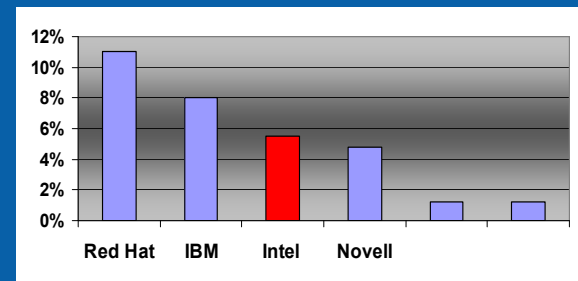
\*Other names and brands may be claimed as the property of others.

# Intel is an open source leader



Open source projects

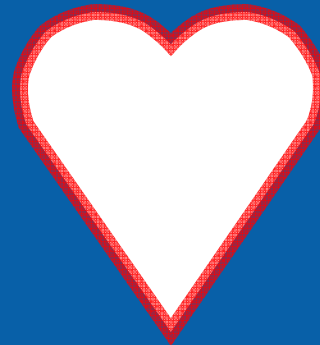
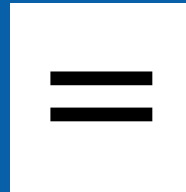
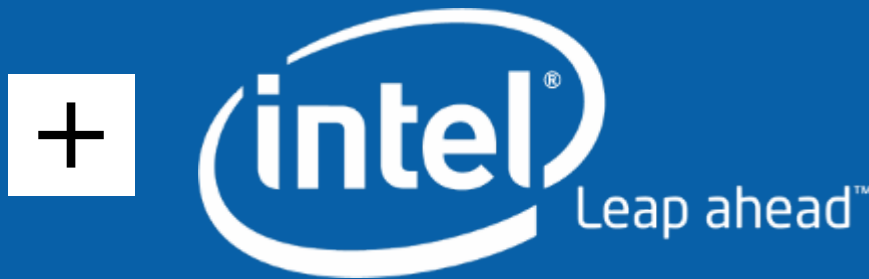
Example:



Third largest developer of Linux contributing over 5% of Linux over the past year



- TTM
- Open Source
- Intel "gets it"
- Sun "gets it"
- Developers can now get it too!



Intel + Sun + Community = Focus

# What makes OpenSolaris Cool?



- OpenSolaris reference binary distribution
- Sun and community jointly built
- Single CD install
- Role-Based Access Control (RBAC)
- Image Packaging System
- New network package repository
- 100% re-distributable
- Live CD/DVD/USB functionality
- ZFS as default root file-system
- More intuitive update experience with ZFS rollback functionality

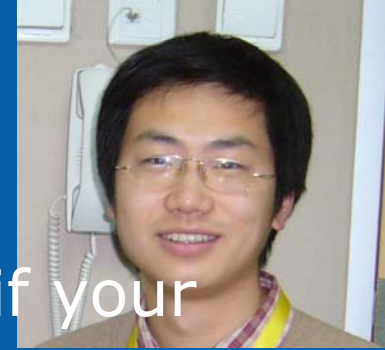


# Image Packaging System (IPS)

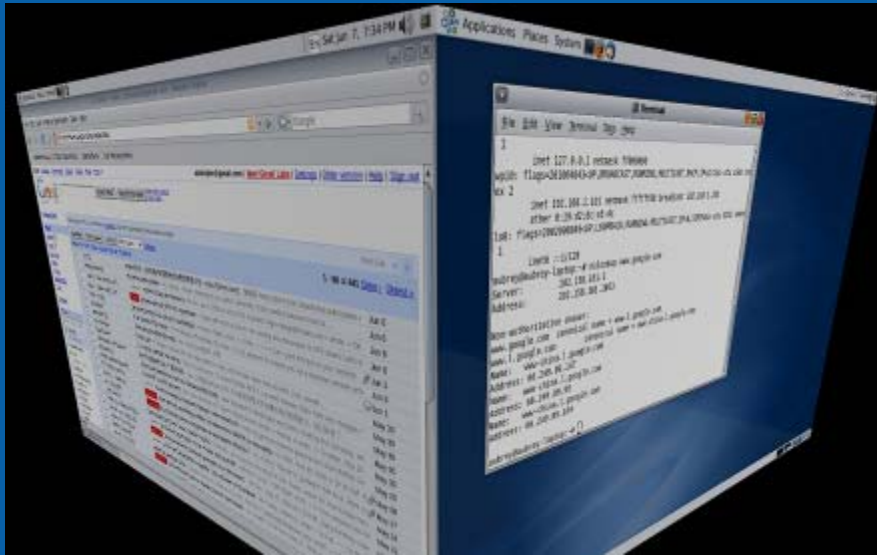


- Network-centric packaging system written in Python
- No scripting in packages – exhaustive metadata
- No build system in packaging – only lays out binary bits
- Dynamic package re-factoring
- Support concept of filesystem images
- Images can be linked and updated in parallel
- Per-user images
- ZFS aware – snapshots and rollback

# 3D Desktop Enabled



- OpenSolaris makes compiz enabling easy, if your video card supports it



OpenSolaris is getting cooler



# What is Intel doing?

- Performance Enhancement
- Power Management
- I/O Acceleration Technology
- Virtualization Technology
- Predictive Self-Healing
- Driver Support

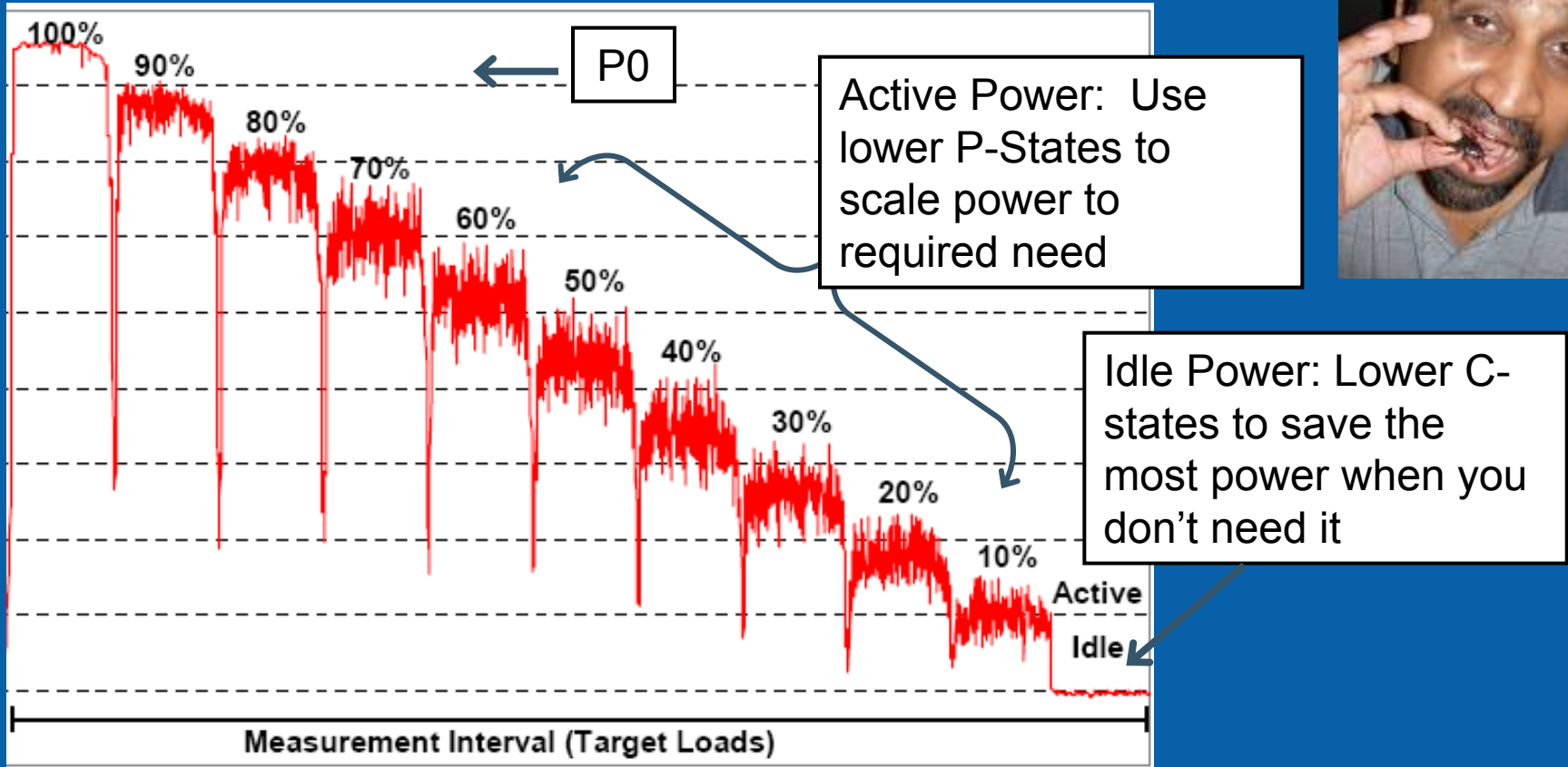
# Results of Intel / Sun collaboration

- Intel and Sun engineers collaborating since January 2007
- Intel focusing on OpenSolaris for development
- Sun back-ports select OpenSolaris enhancements to Solaris 10 updates
- Numerous code contributions and collaboration on future platform advances

## Contributions/consulting:

Microcode update  
CPUID for Core2 and Nehalem  
Libc optimizations for Core2 and Nehalem  
NUMA support for Nehalem  
Performance counter support for Core2  
FMA/RAS support for 2S, 4S  
SSE 2, 3, Supplemental SSE3, SSE 4.1, 4.2  
C-state framework  
PowerTOP DTrace infrastructure  
4965 Wireless LAN support  
Zoar and Oplin NIC support  
Graphics drivers for Centrino Pro, vPro, AMT  
IO Acceleration Technology  
Virtualization Technology in xVM

# Goals for power utilization



Example chart from SPECpower\_ssj2008 User Guide, [www.spec.org/power\\_ssj2008/](http://www.spec.org/power_ssj2008/)

Quickly increase power when you need it, lower when you don't

# PowerTOP



- PowerTOP available for Solaris
  - To show what wakes up your system from saving power
  - Uses DTrace

C-State residency

P-State residency

```
File Edit View Terminal Tabs Help
Solaris PowerTOP version 1.0 (C) 2007 Intel Corporation

Cn      Avg      residency      P-states (frequencies)
C0 (cpu running)      (12.2%)      1000 Mhz      100.0%
C1      2.0ms    (87.8%)      1333 Mhz      0.0%
                               1667 Mhz      0.0%
                               2000 Mhz      0.0%

Wakeups-from-idle per second: 450.0      interval: 8.0s
Power usage (ACPI estimate): 0.087W (running on AC power, fully charged)

Top causes for wakeups:
28.2% (127.1)      firefox-bin : <scheduled timeout expiration>
22.2% (100.0)      <kernel> : uhci`uhci_handle_root_hub_status_change
22.2% (100.0)      <kernel> : genunix`clock
13.8% ( 62.0)      <interrupt> : nvidia#0
 8.0% ( 35.9)      gam_server : <scheduled timeout expiration>
 7.4% ( 33.3)      <kernel> : ehci`ehci_handle_root_hub_status_change
 4.7% ( 20.9)      <interrupt> : wpi#0

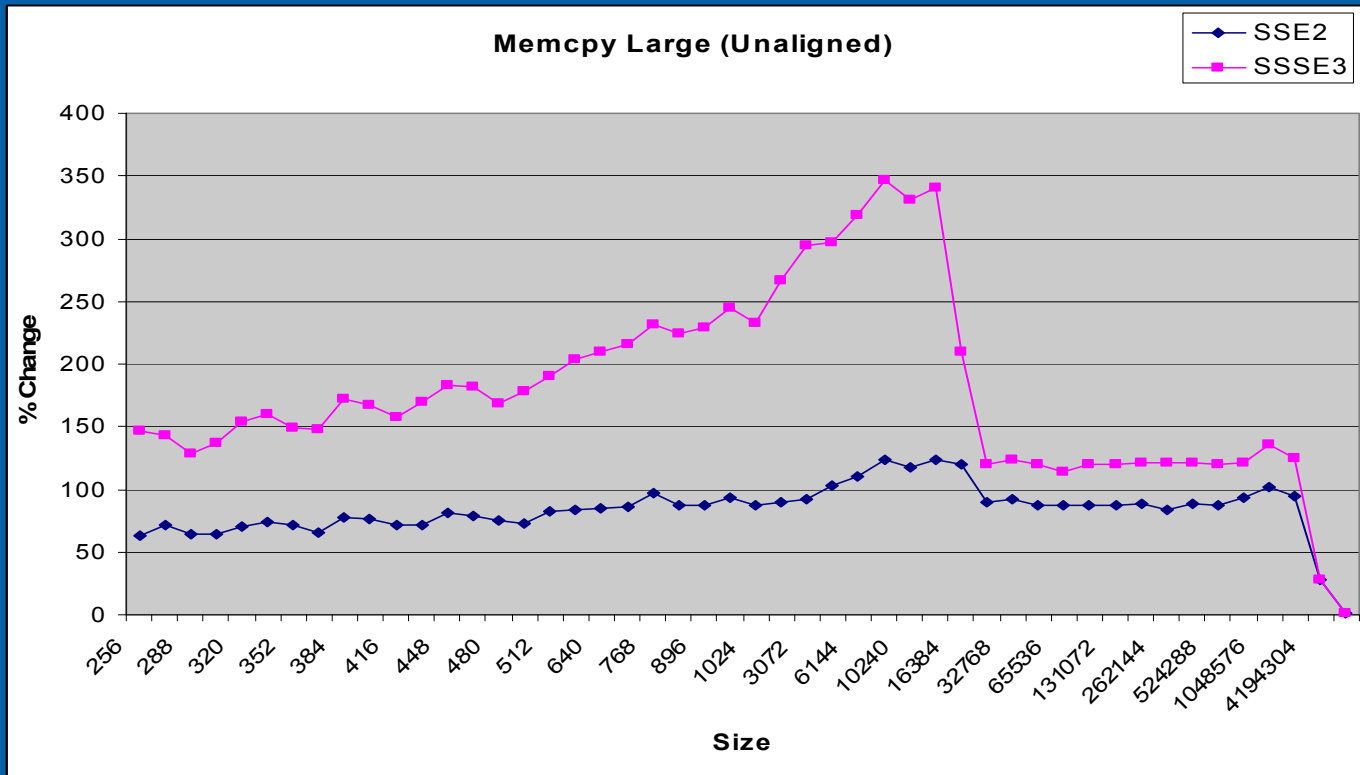
Q - Quit R - Refresh
```

ACPI info

Top causes for wakeup

Download at <http://www.opensolaris.org/os/project/tesla/work/powertop>

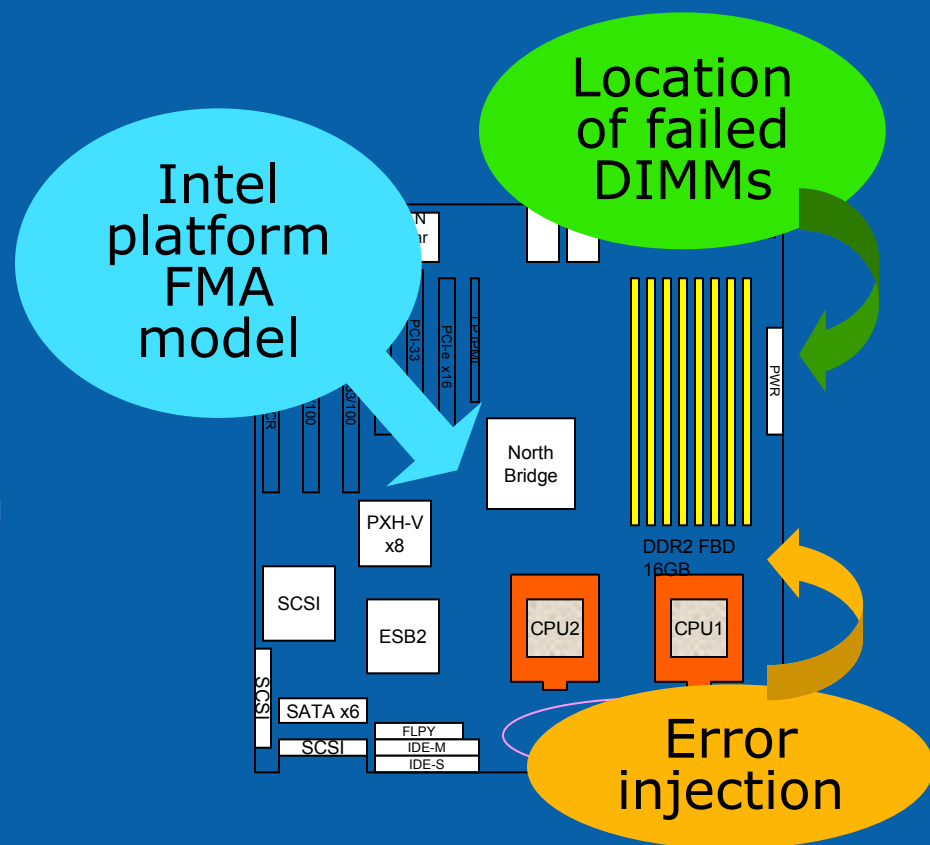
# New Instructions Automagically



# FMA and Intel® Xeon® processors



- Fault Management Architecture in Solaris saves millions in service costs
- Intel platform support – Bensley and Caneland platforms
- Error injection: ensures that FMA code paths work correctly
- Reporting of physical location of failed DIMMs
- Future processors – new RAS features in Nehalem



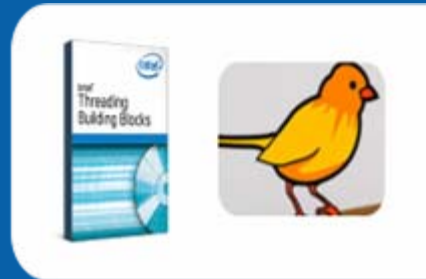
# Unlocking Virtualization on Xeon

- Intel® Virtualization Technology
  - Interoperability
  - Performance optimizations
  - Manageability at scale
  - Availability
  - Security and compliance
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# Developer Tools

- Sun Studio 12 Compiler (released June 2007) with Xeon-specific optimizations
- gcc – easiest port from open source to Solaris
- Sun Studio Performance Analyzer: latest Intel Architecture performance counters
- Threading Building Blocks for Solaris –  
– <http://threadingbuildingblocks.org>
- Transitive® QuickTransit® -  
– Run Solaris/SPARC binaries on Solaris/Xeon  
– <http://www.transitive.com/>



# Desktop/Mobile Driver Support Wireless Driver



**Solaris:  
Not just for servers**



- [www.opensourcewireless.org](http://www.opensourcewireless.org)
- BSD and OpenSolaris (CDDL)
- Current (4965) and future (Shirley Peak)
- 802.11b/g now, 802.11n coming
- Drivers for graphics, chipsets...

**Intel drives coolness in our hardware**

# Summary – OpenSolaris is not for beardies any more

- OpenSolaris is getting cooler
- Intel + Sun + Community = Focus
- Intel drives coolness in our hardware

So: Download, Try, Join!

# Thanks!

