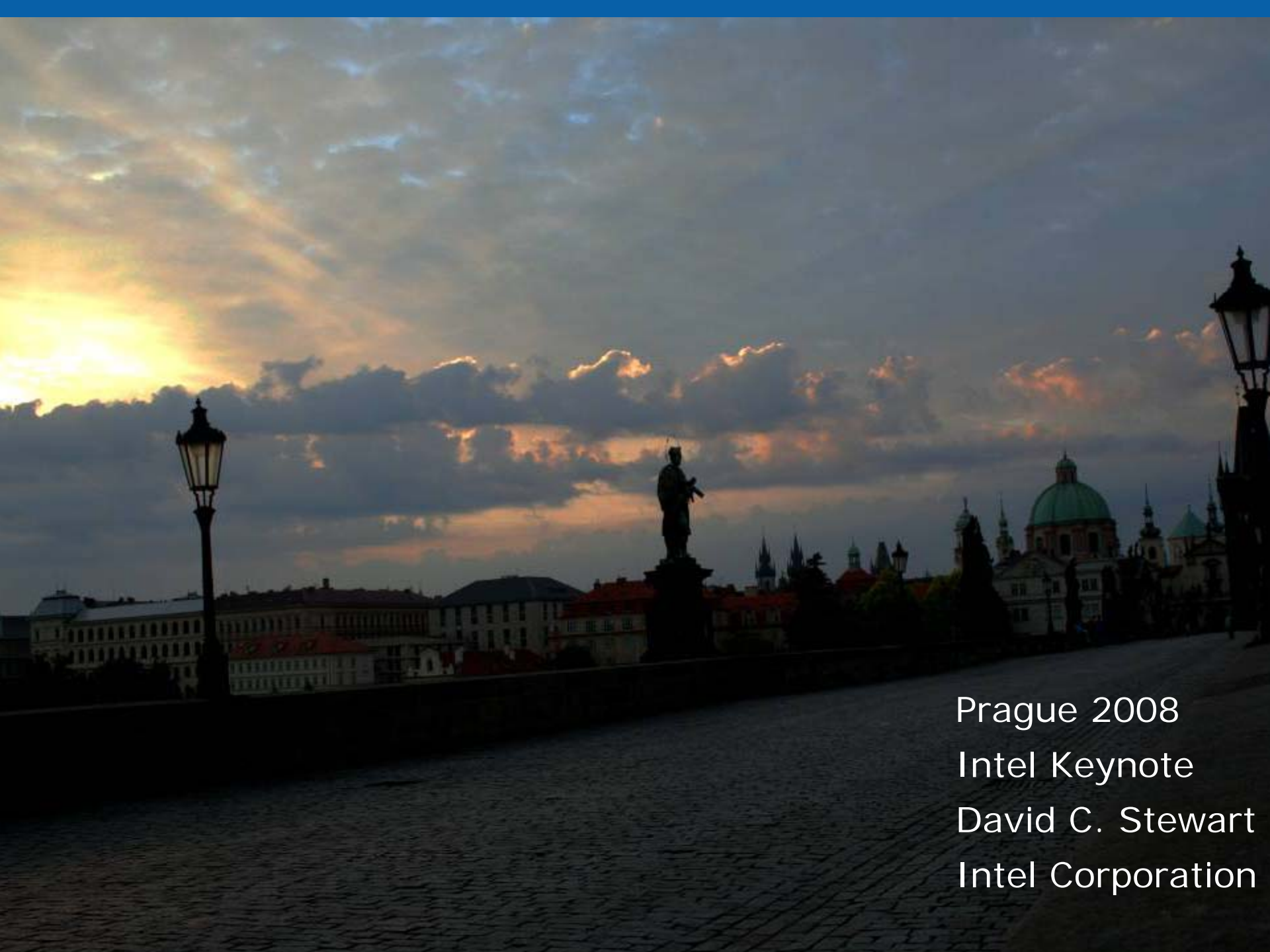


Prague 2008
Intel Keynote
David C. Stewart
Intel Corporation



Prague 2008
Intel Keynote
David C. Stewart
Intel Corporation



Empowering OpenSolaris Developers on Intel Hardware

OpenSolaris Developer Conference
June 27, 2008

David C. Stewart



Software and Solutions Group

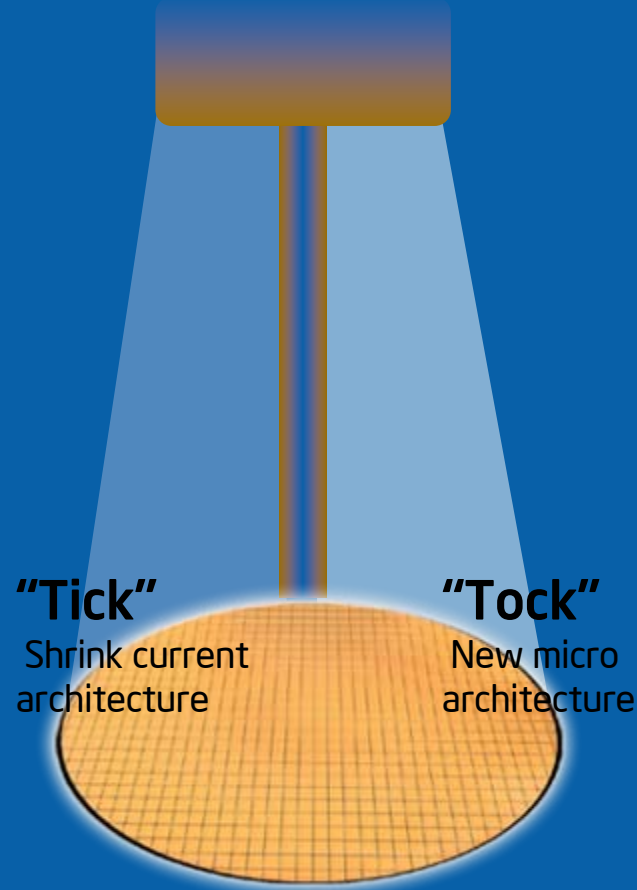


Agenda

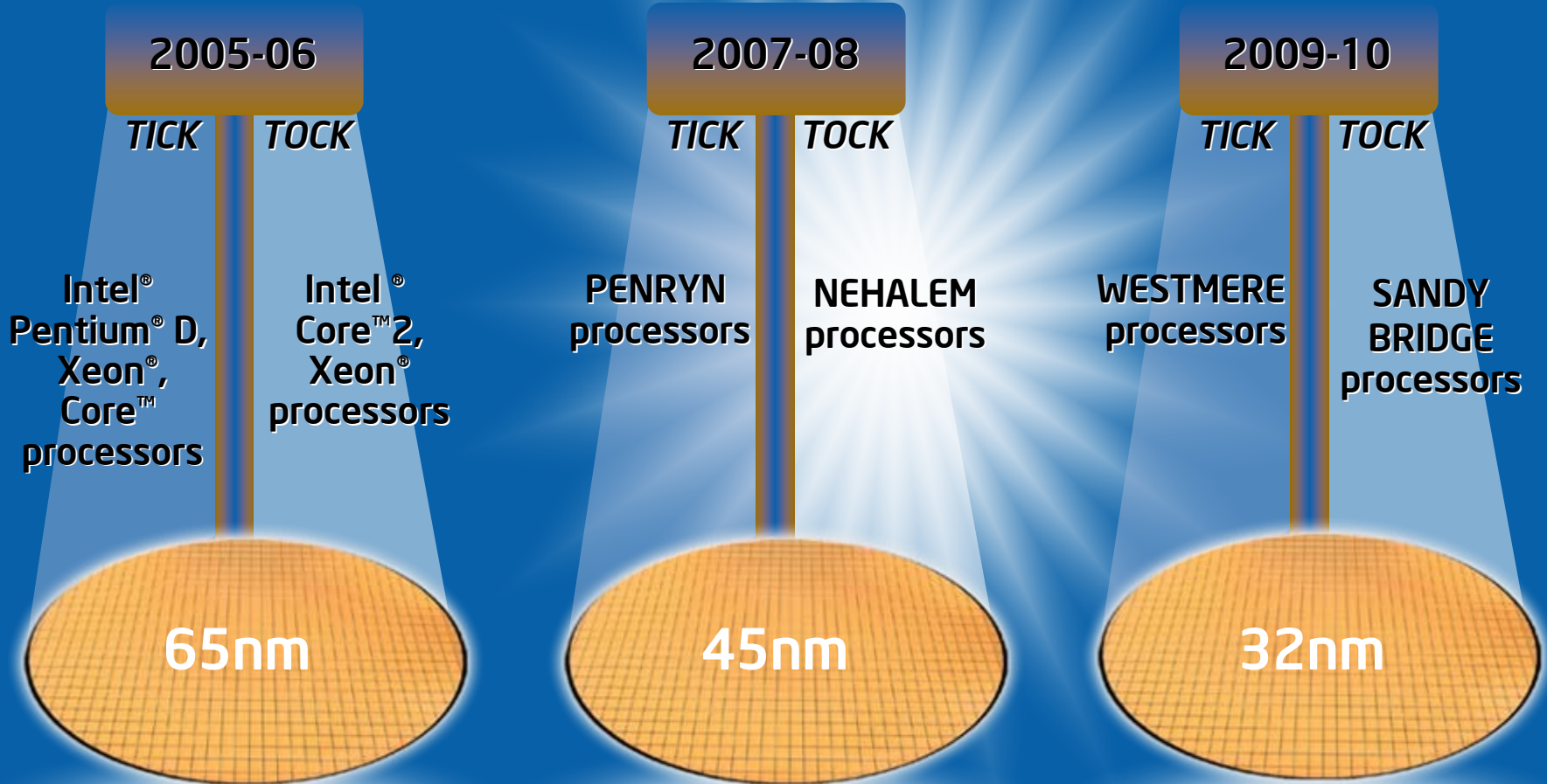
- How Intel empowers through hardware and software innovation
- Empowering through enabling OpenSolaris on Intel hardware
- How the community enables you the developer

Key thought: Only by working together can we keep OpenSolaris innovative and cool

How Intel empowers through hardware and software innovation



Intel's Tick Tock; Roadmap for Predictable Innovations



Software Innovation Matching the Pace..

Middleware & Applications



The Apache Software Foundation
<http://www.apache.org/>



ORACLE



Development Tools



Operating Systems



Virtualization Software



ORACLE



Platform Firmware

Drivers: Graphics, wireless...



EFI Framework



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

Middleware & Applications

Development Tools

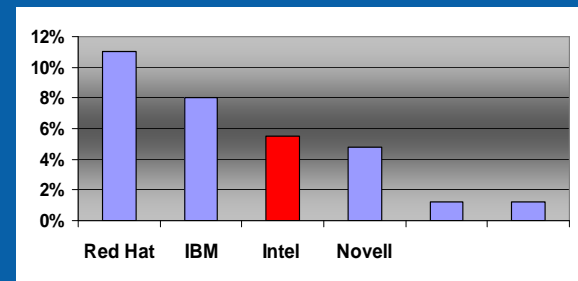
Operating Systems

Virtualization Software

Platform Firmware

Open source projects

Example:



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

Intel empowers developers through relentless innovation



Empowering through enabling OpenSolaris on Intel hardware

Areas of Development

- 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

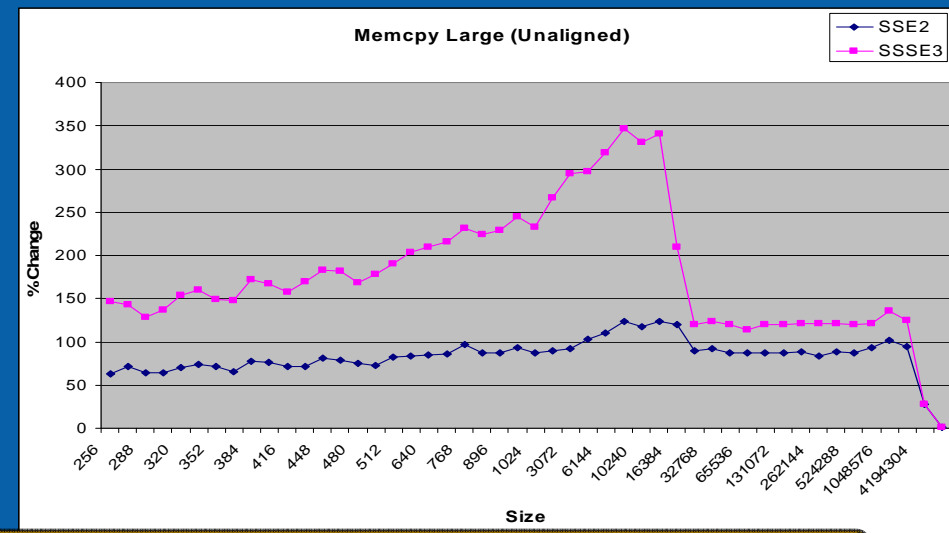
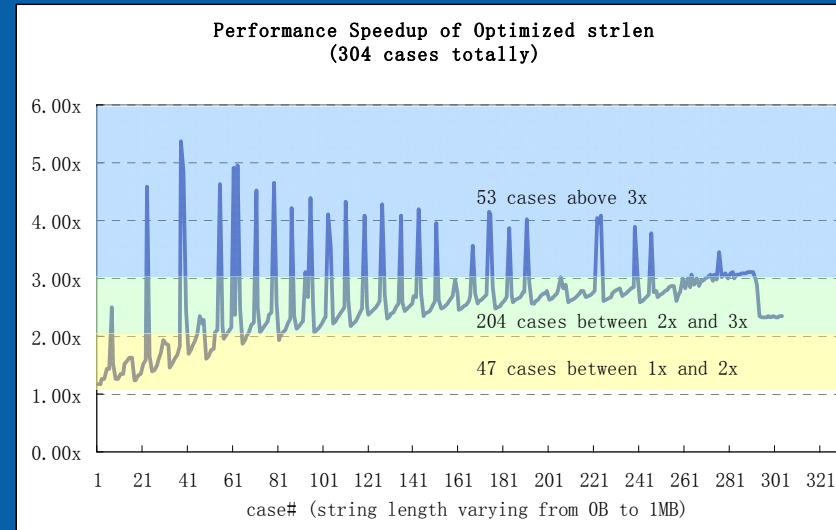
Contributions/consulting:

Microcode update
CPUID for Core2 and Nehalem
Libc optimizations for Core2 and Nehalem
NUMA support for Nehalem
Performance counter support for Core2
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

How to get great performance with no app changes

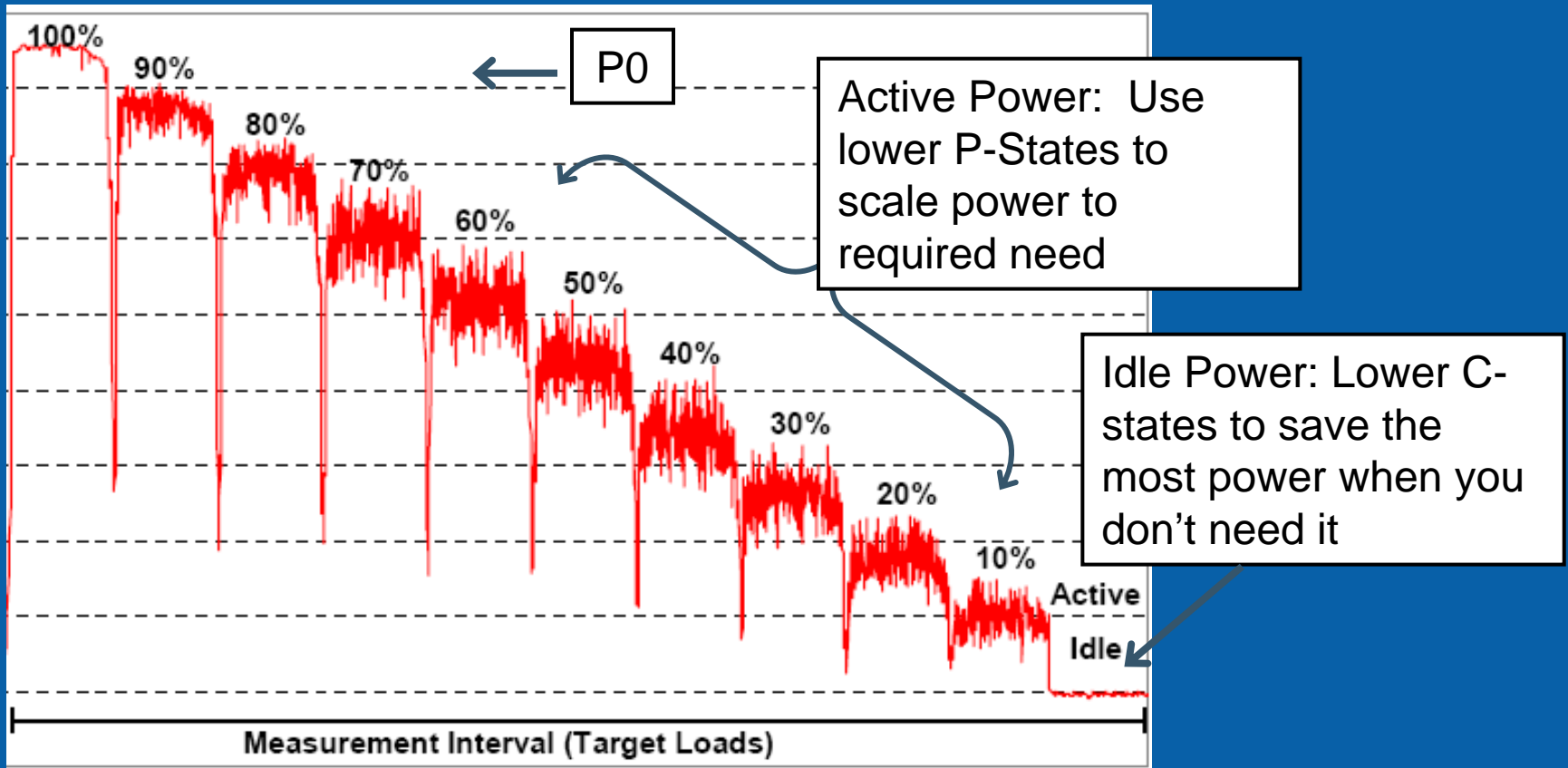
all work is WIP pending integration
Kernel work WIP on bcopy/bzero

- Performance runs deep within Intel's DNA
- Sun's Solaris team has similar focus, complementary methods
- Intel delivering Core2 (and future) optimizations in libc and in kernel
- Improvements in micro benchmarks
- Opportunity: Try SNV 87 and later and give us feedback (64bit mem ops)



Performance is tuned for current and future Intel processors

Goals for power utilization



Example chart from SPECpower_ssj2008 User Guide, 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)      Avg      residency      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>

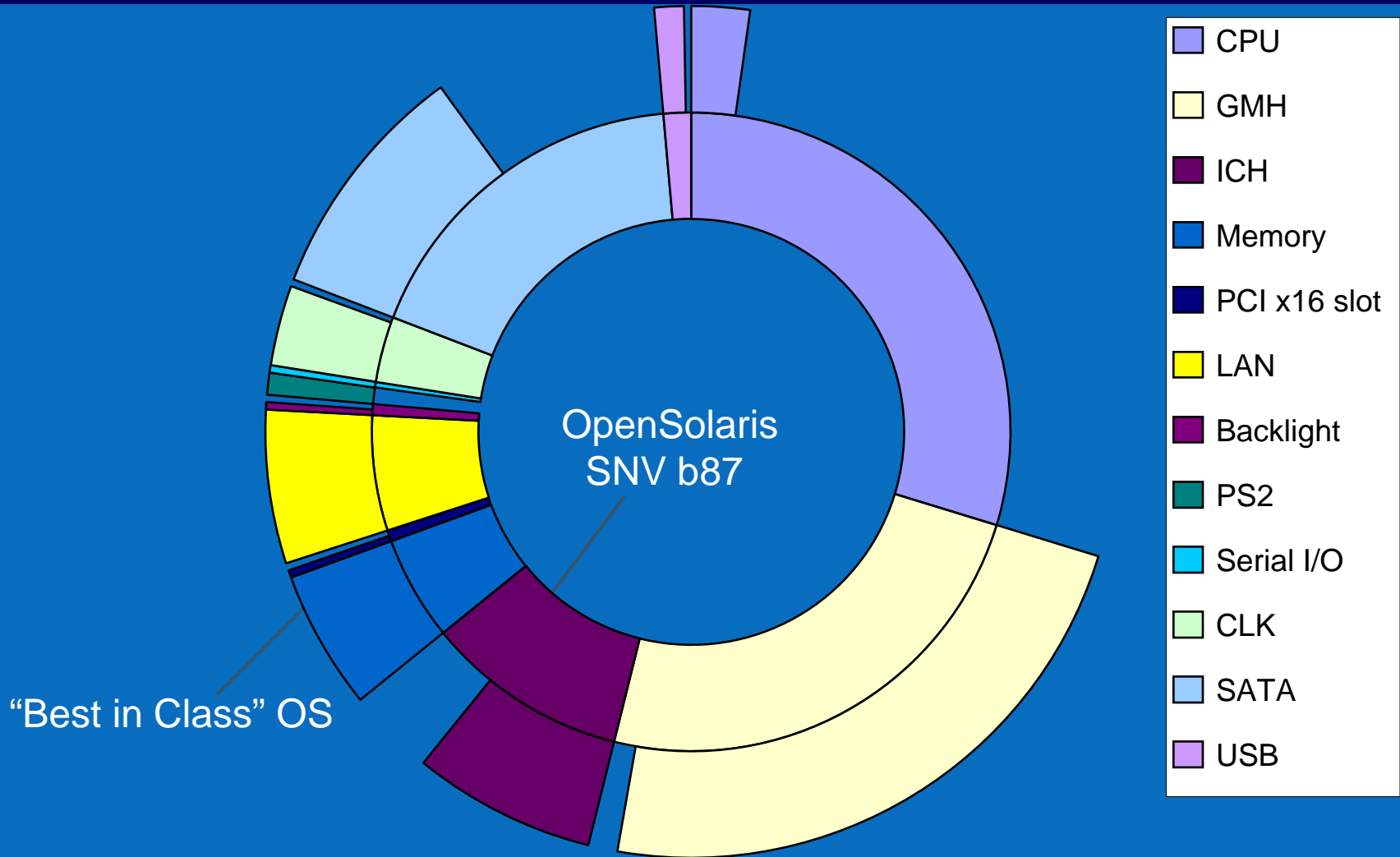
Power Management Development Areas

- Tickless kernel
- Power-friendly scheduling
- P-State improvement
- C-state support
- HPET timer
- Interrupt binding



Join us at <http://opensolaris.org/os/project/tesla/>

OpenSolaris vs "best in class" power use



We have more work to do for Solaris to be best-in-class



Unlocking Virtualization on Xeon

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



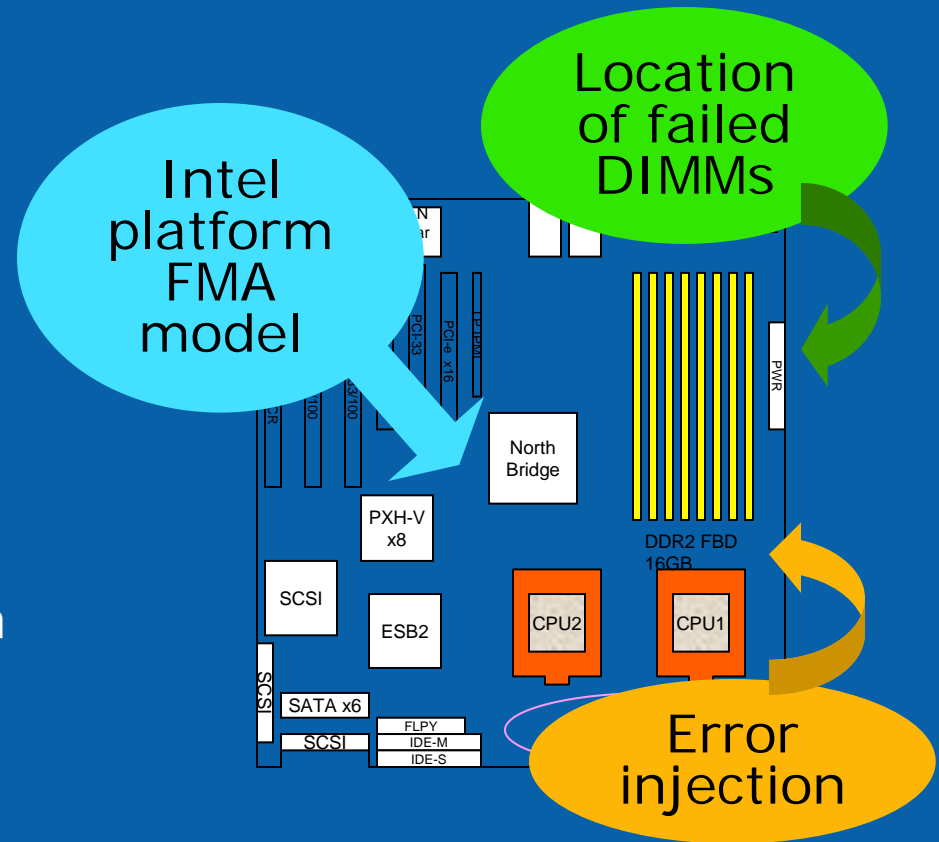
xVM Enabling for Intel processors

	Today	Tomorrow
xVM Server	V1.0 will support VT-x, extended page tables, VTPR, WBINVD for better performance, reliability	Future version supports VT-d and VT-d2 device assignment for higher performance
xVM VirtualBox	VT-x, good performance	Blazing fast on Intel Architecture
xVM Ops Center	Intel Architecture support	Device assignment

Join us at <http://opensolaris.org/os/community/xen/>

FMA and Intel® Xeon® processors

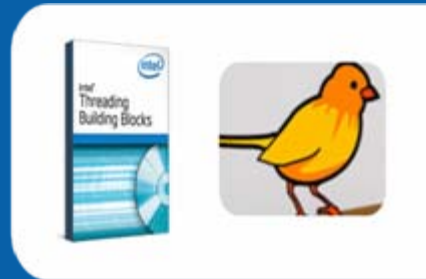
- Fault Management Architecture in Solaris saves millions in service costs
- Intel platform support – Bensley and Caneland platforms
- Error injection: ensures that FMA code paths work correctly
- Reporting of physical location of failed DIMMs
- Future processors – new RAS features in Nehalem



RAS support is great for 2 and 4 socket servers

Developer Tools

- Sun Studio 12 Compiler (released June 2007) with Xeon-specific optimizations
- 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/>



Tools are ready for you to optimize for Xeon

Desktop/Mobile Driver Support - Wireless Driver

- www.opensourcewireless.org
- Focus on 4965 and future Wifi planned
- Downloadable uCode and dual licensed header files
- Phase 1 – completed
 - 802.11 A/B/G
 - Infrastructure mode
 - power/temperature calibration (FCC regulatory)
 - Rx sensitivity calibration
 - WEP
- Phase 2 -- expected completion late summer
 - 802.11 A/N
 - WPA

Solaris: Not just for servers



Open Source

How the community enables you the developer

- OpenSolaris community has embraced Intel
 - Intel has brought great players to OpenSolaris (20+ year veterans in kernel architecture)
 - Sun has really top-notch Solaris engineers that have worked really well together
 - Community has great passion and desire to advocate
- Compatibility ethic + ARC = Frustration (sometimes)
- We need to grow and attract more experienced community developers who can advance OpenSolaris

Contrasting Development Styles



- First thing delivered: Product requirements, architecture spec, design document
- Code is developed after debugged, unit tested
- ARC case
- Mail sent out giving notification of put back
- *Big bang release*
- First thing delivered: code, as a collection of self-consistent patches
- Designs in comments, typically ignored
- Email feedback, discussion, argument
- Maintainer either approves or not
- *Incremental release*

OpenSolaris can get features to market faster
Model mismatch makes it hard to attract Linux kernel devs

Other barriers to entry

- Open source developers show concern about signing contributor agreement
- Hard to know who to talk to, no place to send patches like Linux
- Recognition / kudos to developers not obvious
- If “code is king” with Open Source, identify contributors and make them happy

Make it a joy to be an OpenSolaris developer

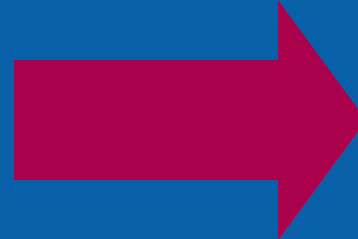
Where to go from here

- Establish a clear vision for growing open source cred
 - Lower barriers of entry
 - Make it easier for developers to contribute, document the process well
 - Identify the maintainers / contributors

This is a great community – we can make it better

Greybeards no more

"Unix beardies get legal over OOXML" – typical headline on <http://www.theinquirer.net>



Summary

- Intel empowers developers through relentless innovation
- Intel is fully engaged in enabling OpenSolaris
- This is a great community – we can make it better

Thanks!

