

Intel Server Update

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Today's Highlights

Strong momentum for Intel® Xeon® 5500 processor

- Projected @>50% of DP shipments by Aug '09

Nehalem microarchitecture coming to MP servers

- 9X the Memory Bandwidth
- Doubling memory capacity with 16DIMMs per Socket
- >15 8-Socket+ designs from 8 OEMs - 128 thread demo
- New advanced reliability w/ MCA Recovery on Xeon



Intel® Xeon® Processor 5500 Series *Momentum*

Launch Highlights

- 30 world record results
- 100+ optimized software products
- 73 OEMs shipping 230 solutions
- Hardware enabled FCoE
- Rapid payback from refresh
- Enabling intelligent datacenters

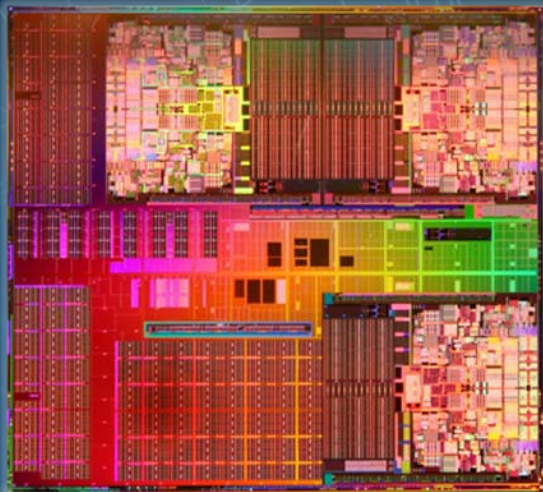
Post Launch

- Systems from Cisco, IBM, Fujitsu, Sun
- Performance Records
 - 10 New VMware VMmark* results
 - Top 7 SPECpower results
- 20 joint ISV solutions briefs
- Xeon ROI Estimator usage up 10X
- 6K+ press articles, 97K+ blog posts, and 60K+ Intel social media views

Expected to be 50%+ of DP Shipments by Aug'09

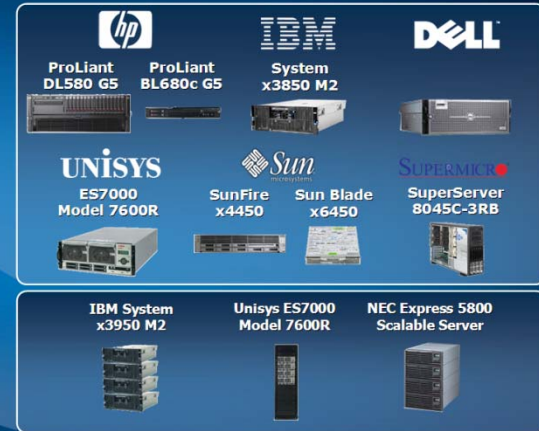


Intel Leadership in MP Segment



4 Socket

Up to 16
Socket



1st MP quad-core – Xeon® 7300

1st 6-core/16MB cache – Xeon® 7400

Gained >9% 4S MSS in 2008*

7 World Record Results - IBM 1.2M TPM-C !!

RISC migrations to Xeon – Aviza, BMW, Lockheed Martin, & VeriSign



MP Solutions Designed for the High-End

Business Driver

Feature

Xeon® 7400 vs.
Xeon® 5500

Consolidation

Memory

~2X

High Data
Demands

RAS

System

Virtualization

Threads / Cache

3X / 2X

Scalability

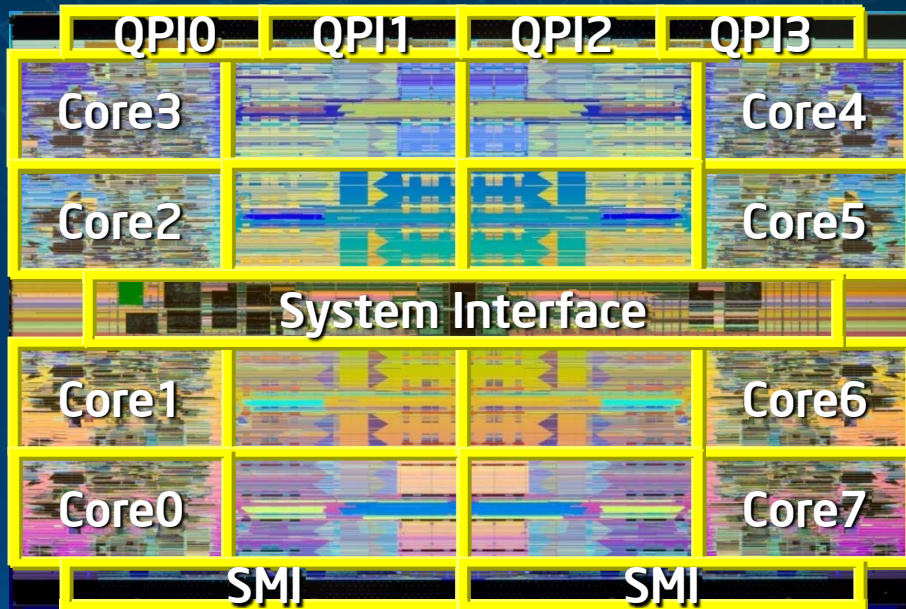
Sockets

8X

Delivering Lower TCO



Nehalem-EX Overview

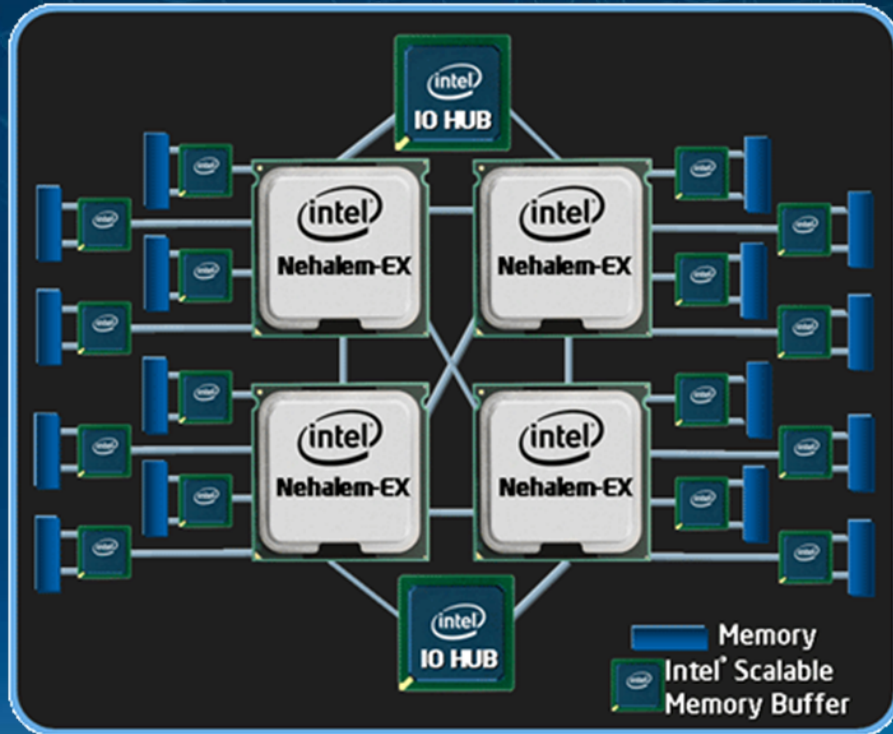


- Up to 8 Cores/16 Threads
- 24MB of Shared Cache
- Integrated Memory Controllers
- 4 High-bandwidth QPI Links
- Intel® Hyper-Threading
- Intel® Turbo Boost
- 2.3B Transistors

The Next Generation Intelligent Expandable Platform



Nehalem-EX: Leadership 4-socket Platform



4 Sockets / 64 Threads
Intel® Scalable Memory Interconnect with Buffers
2X Memory Capacity
16 DIMMs per Socket
64 DIMMs per platform
Advanced Virtualization & I/O Technologies

Unmatched Enterprise, Virtualization, and HPC Solutions



Next Generation MP Advances

Business Driver

Feature

Nehalem-EX vs.
Xeon® 7400

Consolidation

Memory

~2X

High Data
Demands

RAS

CPU & System

Virtualization

Threads / Cache

2.7X / 1.5X

Scalability

Sockets

2X

Extending Leadership Solutions



Nehalem-based Server Performance

The Greatest Intel® Xeon® Performance Leap In History!

Xeon® 5500 vs. Xeon® 5400

Up to **3.5x** Memory Bandwidth
Up to **2.5x** Database Performance
Up to **1.7x** Integer Throughput
Up to **2.2x** Floating Point Throughput

Nehalem-EX vs. Xeon® 7400

Up to **9x** Memory Bandwidth²
> **2.5x** Database Performance¹
> **1.7x** Integer Throughput
> **2.2x** Floating Point Throughput

Expecting larger gains from Nehalem Architecture in MP

¹Based on May'09 internal measurement using OLTP workload.

²Based on May'09 internal measurement using Intel internal workload

Source: Intel. December 8, 2008. Based on Internal testing on pre-production Intel Xeon Processor 5500 based servers. Performance Gains Represent A Blend (GEO Mean) Of Five Common 2-socket Workload Types Across A Range Of Typical Usages



Flexibility and Investment Protection

Intel® VT FlexMigration Assist & VMware Enhanced VMotion*

Intel® VT FlexMigration Assist

2006-2007

2007-2008

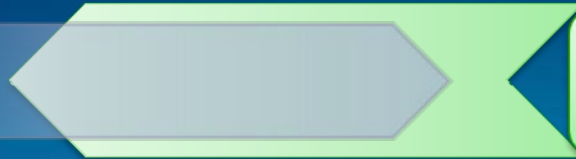
2008-2010

Intel® Core™
Microarchitecture

Enhanced
Intel® Core™
Microarchitecture

Intel® Nehalem
Microarchitecture

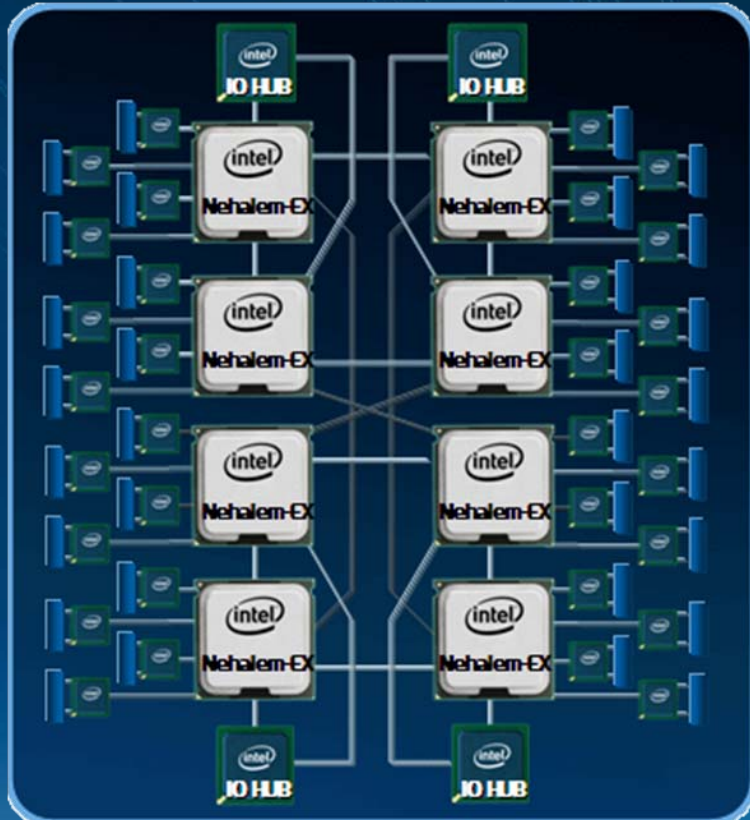
Live VM Migration w/
ESX 3.x* Today



Investment Protection
w/future
VMware vSphere*



Nehalem-EX: 8-Sockets and Above



Memory
Intel® Scalable Memory Buffer

Intel Architecture capable of QPI connected 8-Sockets / 128 threads

Scalable systems and >8-socket capability with OEM node controllers

Scalable performance through modularity

Leadership RAS with MCA recovery

Targeting High-End Enterprise Apps and Large Scale Consolidation

> *15 designs from 8 OEMs*



Delivering Solutions through our Partners



Alex Yost,
VP and Business Line Executive
IBM System X and BladeCenter



High End Workloads Drive Increasing Demands

Workload Demands



System Requirements

High End Workloads

- ✓ Virtualization and Consolidation
- ✓ Database Applications
- ✓ Enterprise Applications

Reliability

- ✓ Mainframe inspired system availability for maximum uptime

High Memory Performance

More memory DIMMs for:

- ✓ Low cost large memory capacities
- ✓ Greater memory bandwidth
- ✓ More VMs and more GBs per VM

Cost Savings Consolidation

- ✓ More VMs per software license
- ✓ Power optimized systems
- ✓ Invest protection through scalability

Customer Pain Points

- ✓ Managing space, power, and server utilization resources
- ✓ Maximizing system uptime, and minimizing administrative costs
- ✓ Keeping performance high and energy consumption low
- ✓ Adding new function with affordable scaling infrastructure

IBM x3850 M2 / x3950 M2



Best solution for reliability

Mainframe-inspired RAS with IBM eX4 technology

Best solution for large memory capacity

High-memory capacity x3850 M2 cost up to 17% less to purchase than equal capacity DP systems

Best solution for server consolidation

46% lower cost/VM makes server consolidation for large numbers of users most cost-effective

Best solution for virtualization

38% lower cost/VM for virtualized ERP instances and other mission-critical apps

Best solution for growing businesses

Savings up to \$12,000 at time of purchase and still have the ability to scale to eight+ sockets

Leadership Performance

#1 x86-64 TPC-C Benchmark

First to break the 1 million transactions per minute barrier

#1 VMware 24-Core benchmark

#1 SAP SD Standard Application two-tier 8-processor result

#1 SAP SD Standard Applications two-tier Win 4-processor result

#1 Oracle E-Business R12 Large Payroll Batch Benchmark

#1 TPC-C 4-processor benchmark

#1 TPC-E 4-processor benchmark

#1 Spec CPU2006 benchmarks



IBM's X-Architecture

Continued Investment, Continued Differentiation

5th Generation of IBM X-Architecture
Maximum Productivity, Reliability, and Scalability



4th Generation - Today

*Introduced First x86 Platform
to Break 1 Million tpmC*



3rd Generation - 2005

*Introduced Hot-Swappable
Memory for Maximum
Reliability*

2nd Generation - 2003

*Introduced Snoop Filter to
Achieve 100 #1 Benchmarks*

1st Generation - 2001

*Introduced First Scalable 16
Socket x86 Platform*

x3850M2/x3950M2

The Evolution of IBM's 4 socket X-series servers

IBM x440
1st Generation X-chipset

IBM x445
2nd Generation X-chipset

IBM x460/x3950
3rd Generation X-chipset

IBM x3850M2/x3950M2 - 4th Generation X-chipset



Leading the MP Market Today and Tomorrow

A Dynamic Infrastructure to address today's challenges and tomorrow's opportunities

Solving Customer Problems

- Space Constrained Data Centers
- Maxed-out Data Center Power
- Rising Management Costs
- Underutilized Servers with Expensive Software Licenses



...with the Data Center

- *Reduce Costs*
 - Greater Business Productivity
 - Large Scale Consolidation
 - Equal Performance at Less Cost
- *Manage Risks*
 - Mainframe Inspired Reliability
 - Investment Protection
- *Improved Service*
 - Easier Administration
 - Greater Productivity per System and Software License



Advanced RAS - MCA Recovery

Application / VM

Native & Virtually

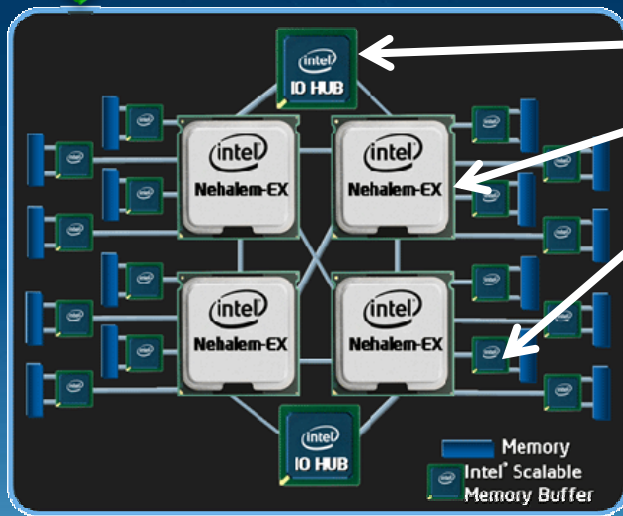
OS / VMM

Contain, Correct, Predict Errors

Detects CPU, memory, & I/O errors

Works with OS to correct

Recovers from otherwise fatal system errors



First Machine Check Recovery in Xeon-based Systems



Strong OS Support for MCA Recovery

"Novell SUSE Linux Enterprise 11 is optimized for Xeon, and will continue as we use MCA recovery in the Nehalem-EX processor. This is a major step forward in moving Novell on Xeon into the Mission Critical space previously occupied by RISC..."*
-Carlos Montero-Luque, VP Business & Product Mgmt

Novell.

"RHEL will make excellent use of Intel's Nehalem-EX MCA recovery...This will be the first time this level of RAS capability is seen outside RISC and mainframe systems." - Scott Crenshaw, VP of Platform Business Unit



"Microsoft is excited about...our technology collaboration. Windows Server 2008 R2 will support Intel's upcoming Nehalem-EX MCA recovery features, giving IT professionals confidence to move to higher levels of consolidation." - Bill Laing, Corporate VP

Microsoft®

VMware will be supporting Intel's implementation of MCA recovery in future versions of VMware vSphere to enhance consolidation of business critical workloads. When combined with VMware vSphere, Intel's MCA will deliver new error recovering capabilities for improved reliability in large memory systems, helping customers accelerate their journey towards 100 percent virtualization to achieve better efficiency, control and choice for their datacenters."

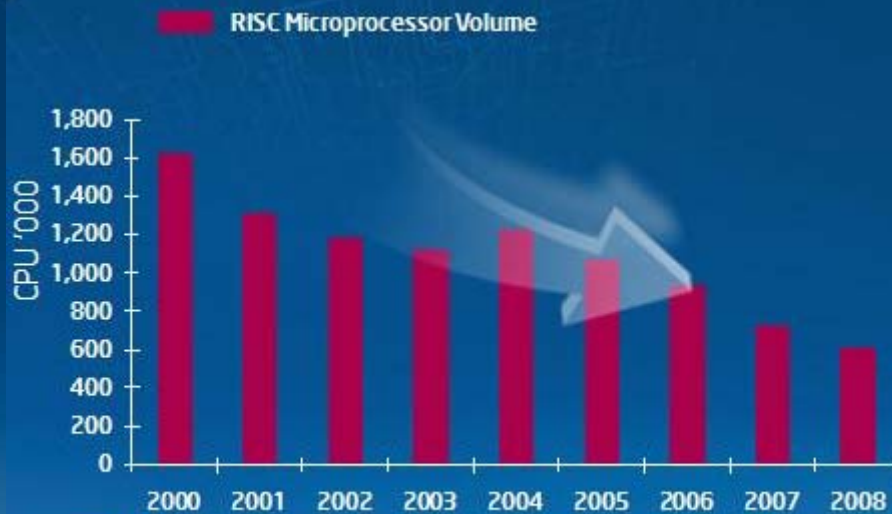
-- Dr. Stephen Herrod, CTO and SVP of R&D



Industry Standard Architectures *Growth vs. RISC*

“Nehalem EX’s core platform attributes make it very capable to *further* disrupt parts of a declining RISC market”

Vernon Turner, IDC



RISC microprocessor volumes decline

Lower TCO
Higher Performance
Flexibility

Nehalem-EX expected to accelerate conversion



Source: IDC Worldwide Quarterly Server Tracker, Q4'08



The Most Complete Server Product Portfolio

2009

2010



5000
Sequence

Top Performance / \$, Energy Efficiency, & Flexibility for Infrastructure Apps

Xeon® 5500

Westmere-EP



7000
Sequence

Scalable Performance, Flexibility, & Advanced RAS for Demanding Apps / Consolidation

Xeon® 7400

Nehalem-EX



9000
Sequence

Highest Scalability and Most Advanced RAS for Most Demanding Environments

Itanium® 9100

Tukwila



Summary

Strong Intel® Xeon® processor 5500 momentum

Intel high-end enterprise leadership today

Nehalem-EX on track for 2H'09 production



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Thank You

