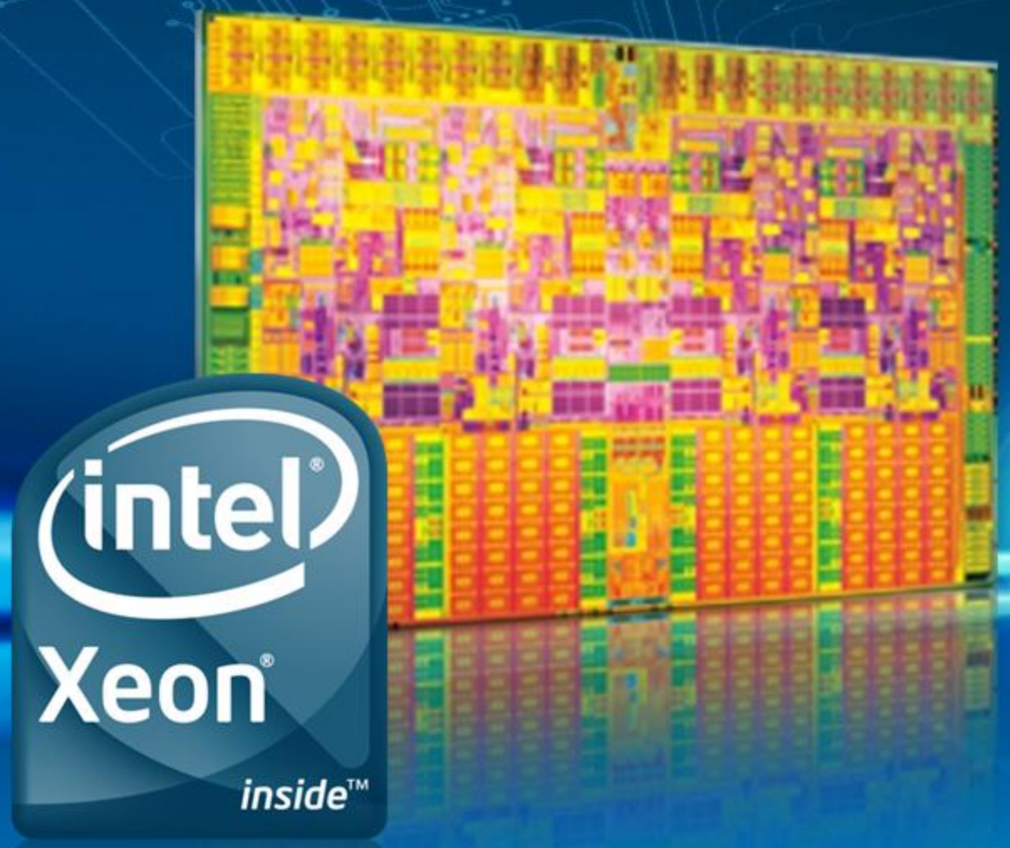

intel
INTELLIGENT
PROCESSORS.
TRANSFORMING
COMPUTING.
intel
Xeon
inside™



Paul Bergevin
Vice President, General Manager
Global Communications Group
Intel Corporation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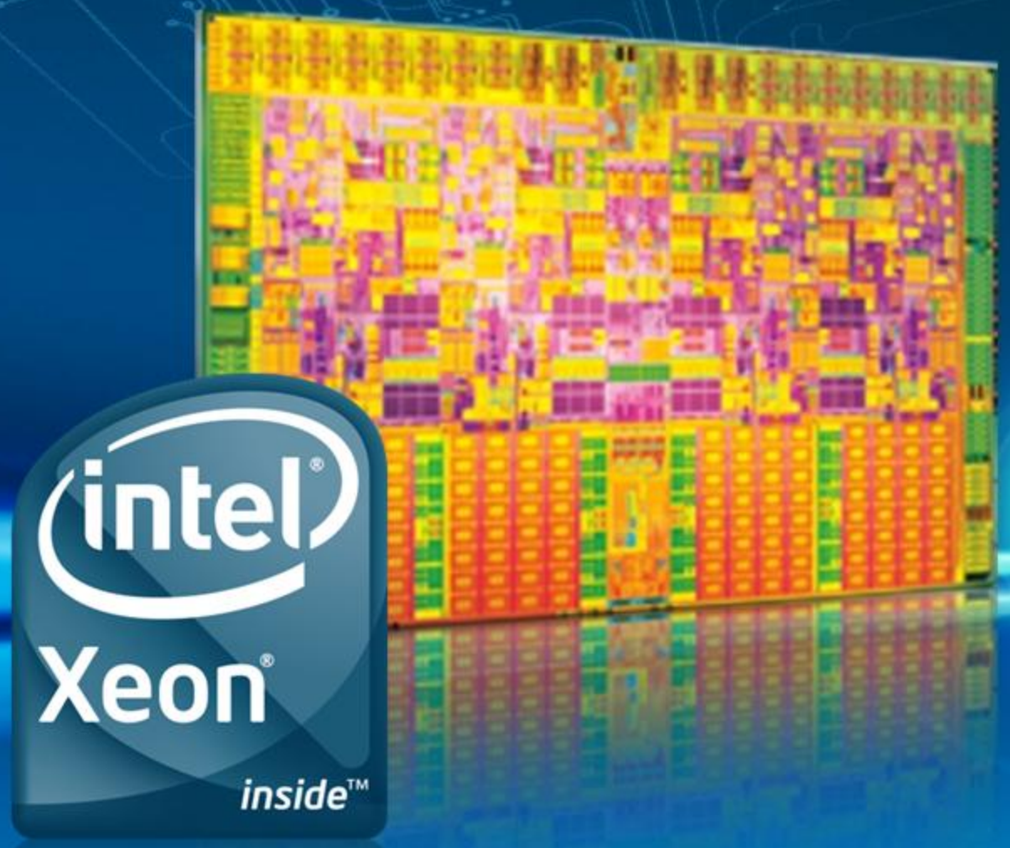

Transform

Intel® Xeon® Processor 5500 Series

Pat Gelsinger

Sr. Vice President, Intel Corporation

General Manager, Digital Enterprise Group

Intel® Xeon® Processor 5500 Series: Transforming Computing

Most Important Server Launch Since Pentium® Pro

15 Billion Connected Devices

Design and Discovery

Intelligent Platform

World's Most Adaptable Server Platform

Intelligent Choice

Delivers Higher Performance, Lower TCO

Estimated 8 Month Payback for Single-core Server Refresh

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Estimated 8 Month Payback for Single-core Server Refresh

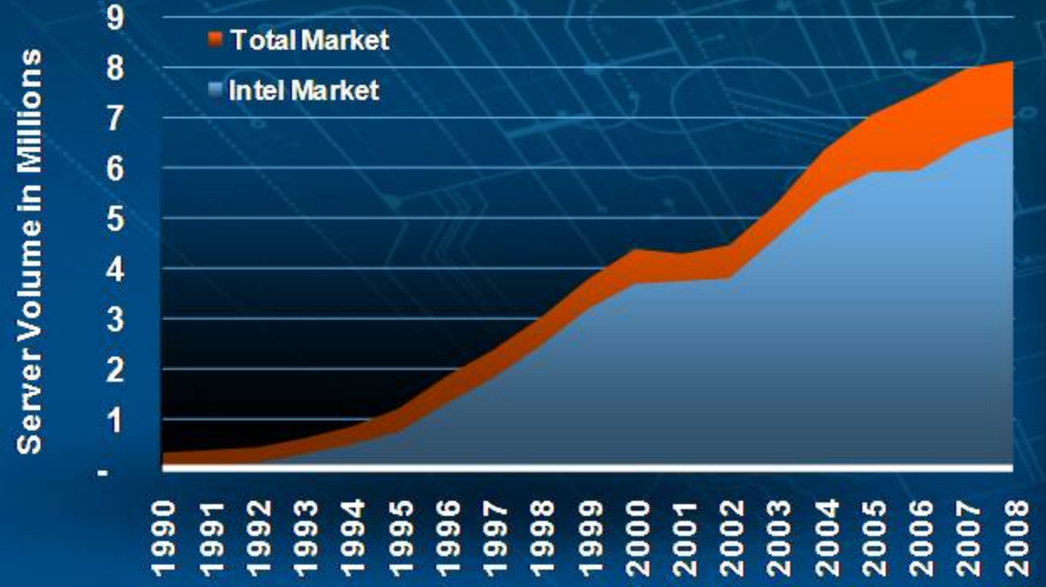
Intel® Pentium® Pro Processor

High Performance Lower Cost SMP

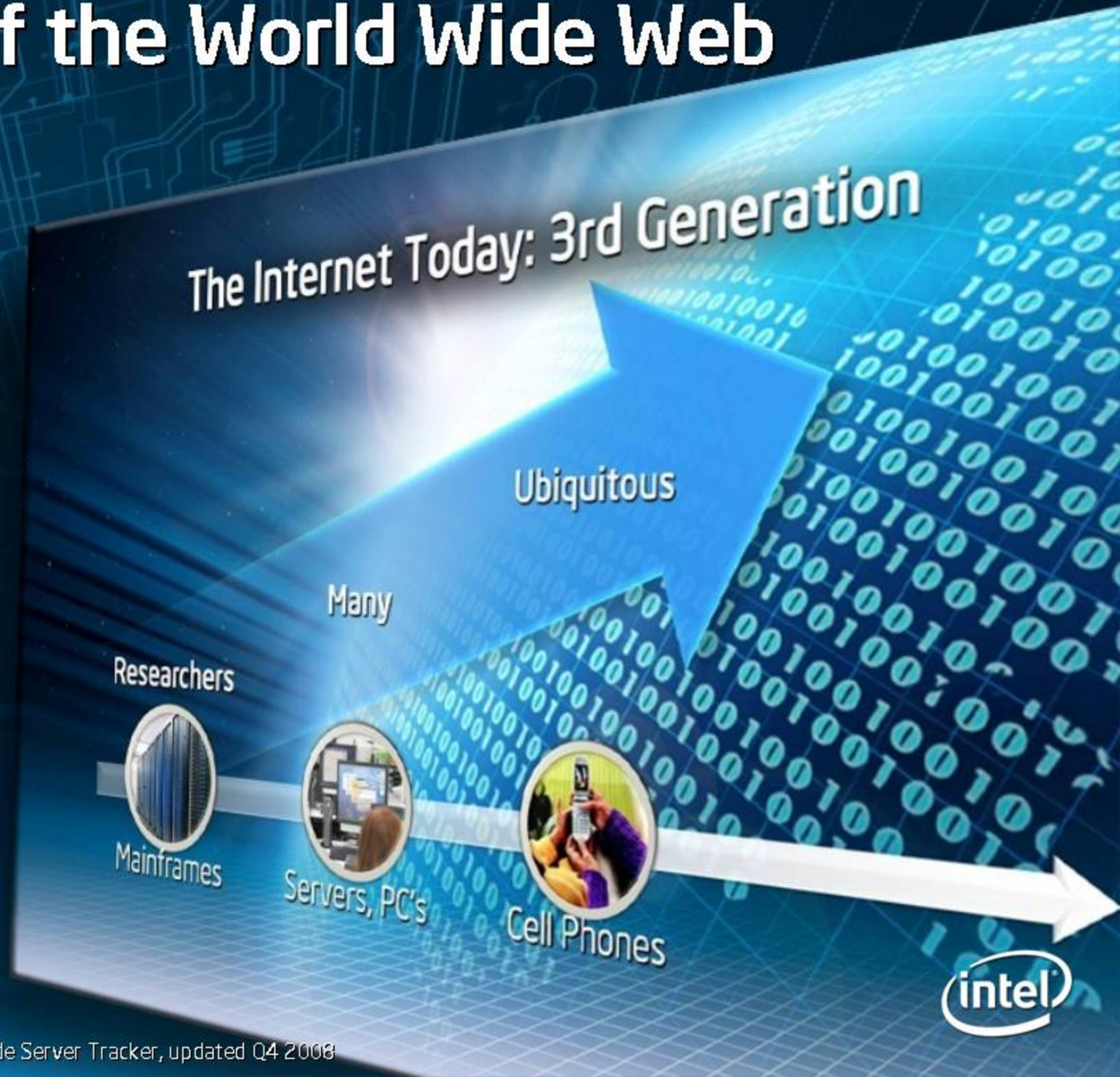
Established the Standard High Volume Server

The Foundation of the World Wide Web

Annual Server Unit Shipments

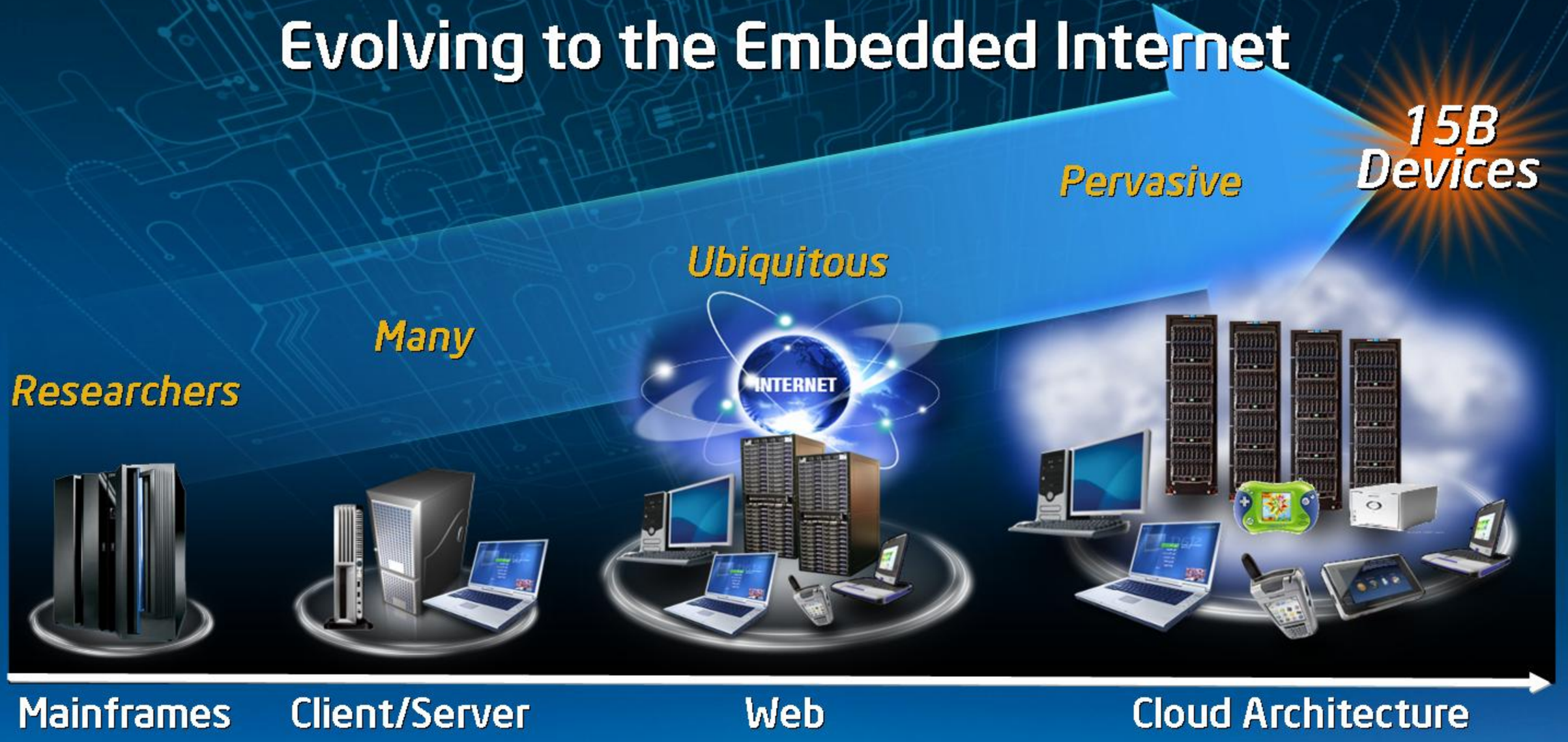


IA High Volume Server
Standards
Software



*Source: IDC Worldwide Server Tracker, updated Q4 2008

Evolving to the Embedded Internet



Requires Dynamic, Efficient and Scalable Infrastructure

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Next Gen of High Performance Computing
Transforming Design and Discovery

Design Smarter

Simulation

Analysis

Top Performing Manufacturers:

- Get product to market 58 days faster
- Have 48% lower prototyping costs

Make New Discoveries

NASA Ames will develop a computational system with one PetaFLOPs peak performance in 2009. "Such a monumental increase in performance will help fulfill NASA's increasing need for computing capacity...for future missions."

S. Pete Worden, Ames Director

"Scinet has an insatiable demand for performance... investigating the forces that govern the universe. The clusters based on the new Intel® Xeon® 5500 series processor keep us on the leading edge... to enable new discoveries."

Dr. Chris Loken, Chief Technology Officer

Source: Aberdeen Group

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Estimated 8 Month Payback for Single-core Server refresh

Engineering Scalability

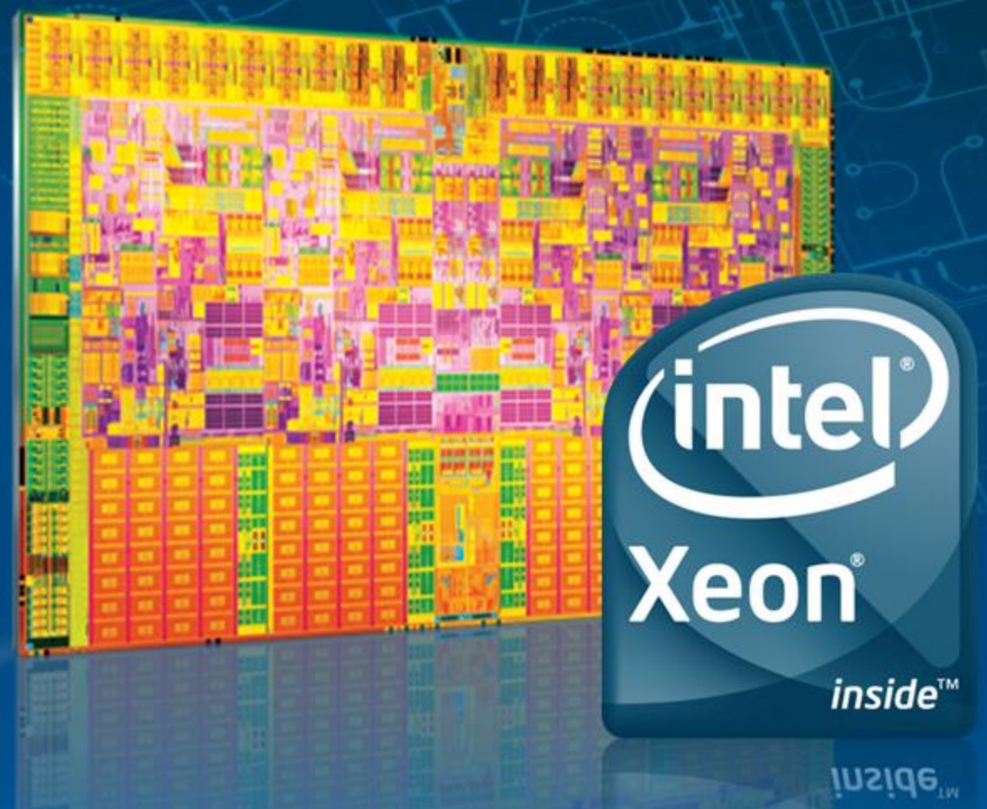
Supersonic Speed

Huge Capacity

Maximum Fuel Efficiency

Silicon Offers the Opportunity to Scale with a Single Design

Intel® Xeon® 5500 Processor

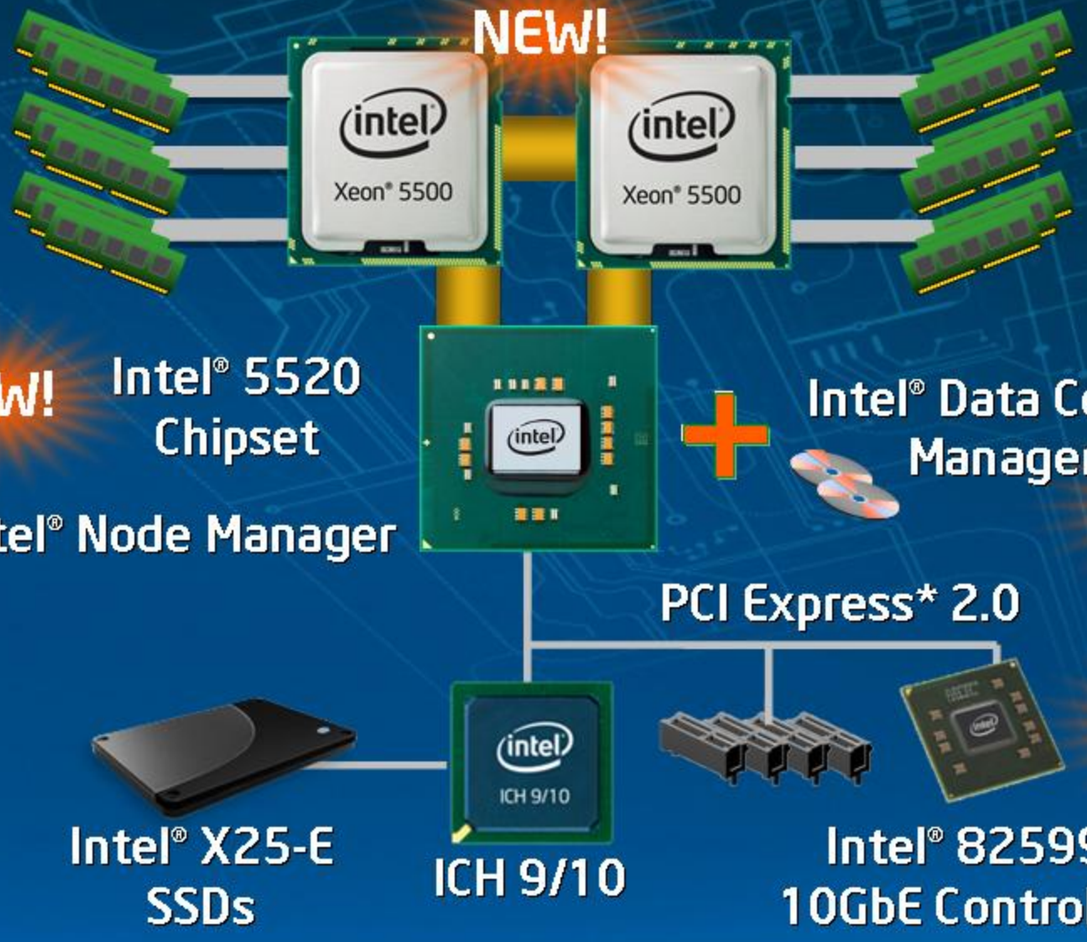


- 45 nm Hi-K Quad Core processor
- Intelligent Performance
- Adaptable Energy Efficiency
- Flexible Virtualization

A New Generation of Intelligent Server Processors

intel

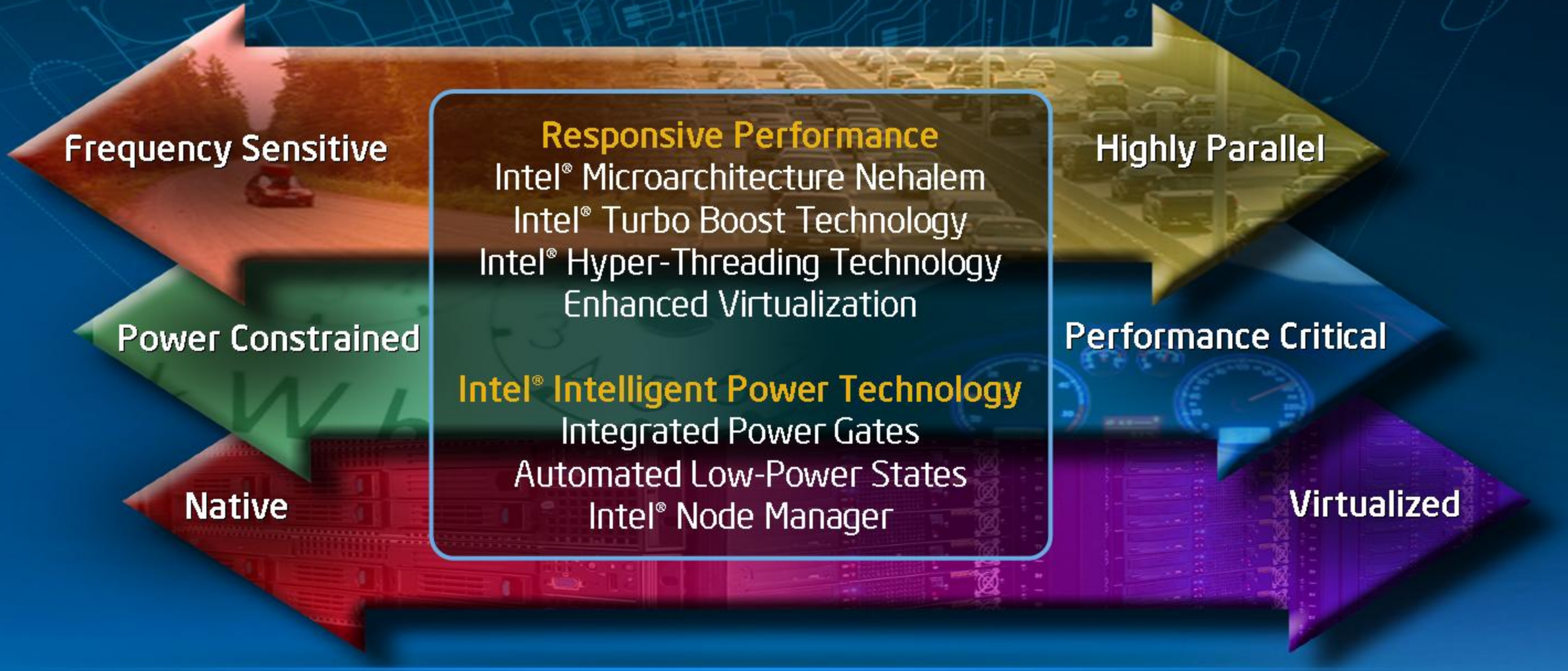
Intel® Xeon® 5500 Platform



- New Memory Subsystem
- Intel® QuickPath Interconnect
- Intel® Intelligent Power Technology
- New I/O Subsystem

Platform Ready for Future 32nm Products

Intel® Xeon® 5500: Intelligence Built-In



Adapts To Your Application and User Environment

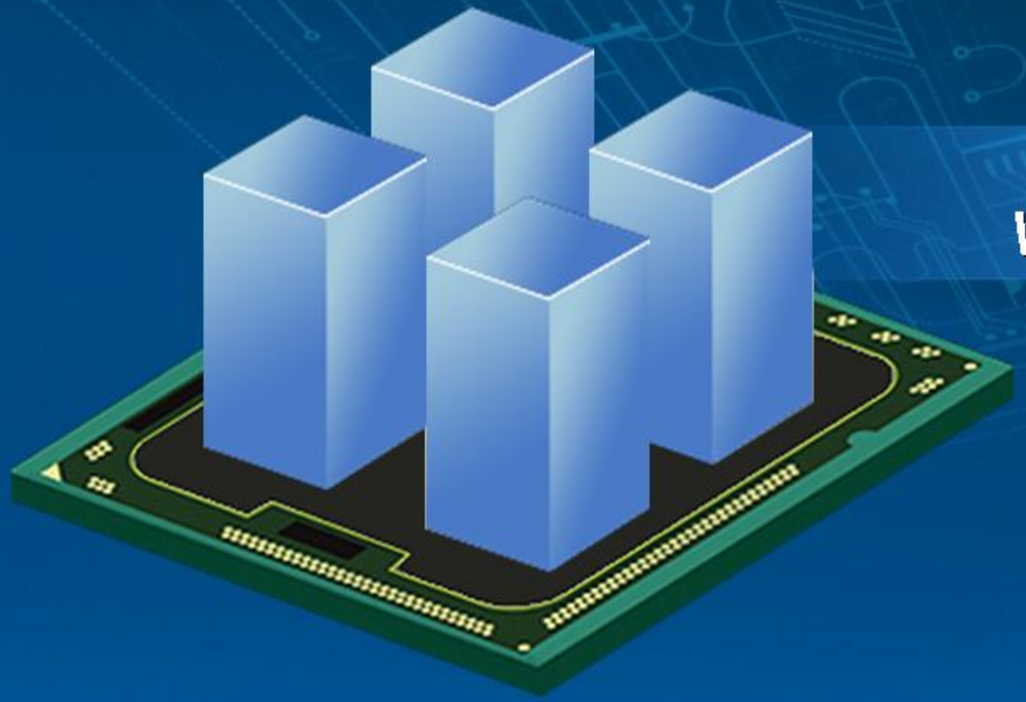
Intel® Xeon® 5500 Processor: Turbo Mode

Previous Generation
without Turbo

Intel Xeon® 5500
with Turbo

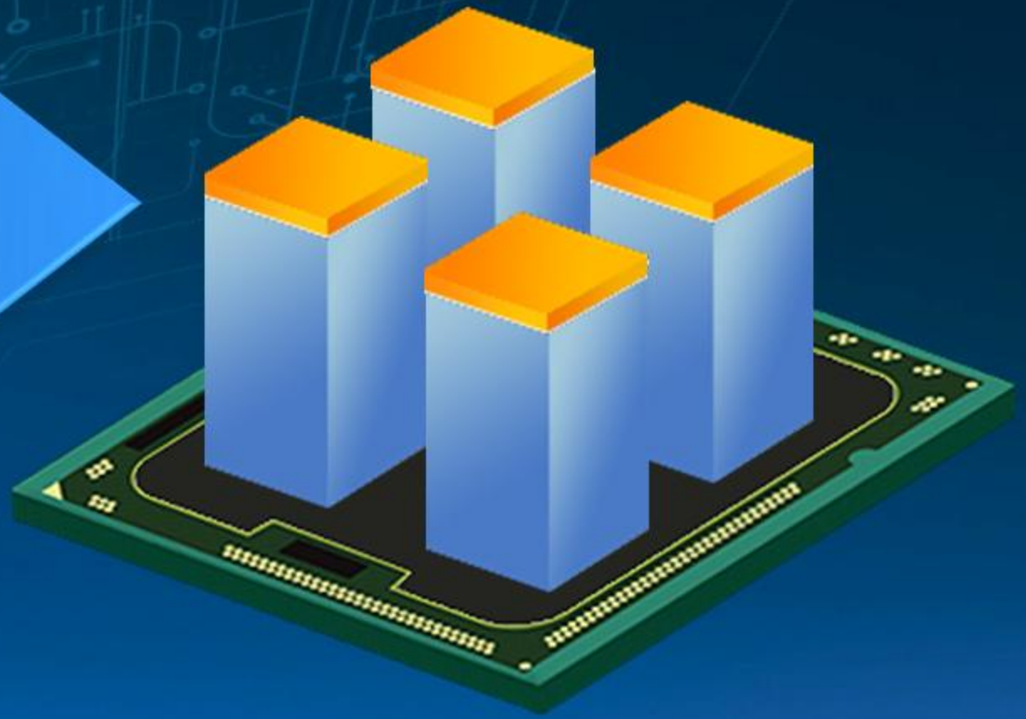
Intel® Xeon® 5500 Processor: Turbo Mode

Previous Generation
without Turbo



Threaded
Workload < TDP

Intel Xeon® 5500
with Turbo



Intel® Xeon® 5500 Processor: Turbo Mode

Previous Generation
without Turbo

Intel Xeon® 5500
with Turbo

Intel® Xeon® 5500 Processor: Turbo Mode

Previous Generation
without Turbo

Intel Xeon® 5500
with Turbo

Intelligently Delivering Optimal Performance and Energy Efficiency

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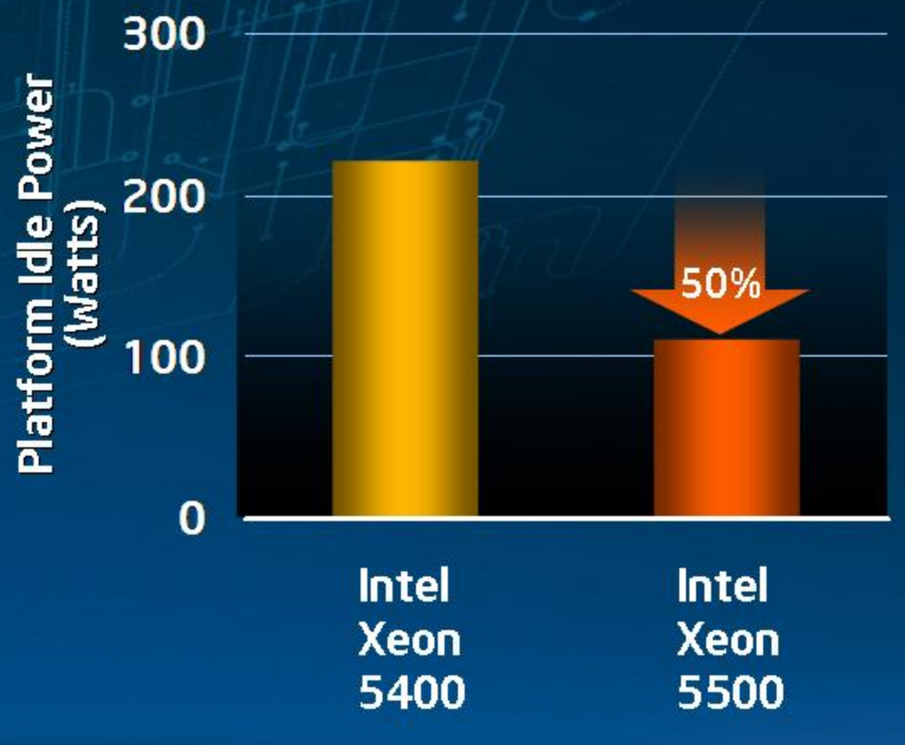
2-Socket Server Performance

The Greatest Intel® Xeon® Performance Leap In History!



Performance When You Need It. Power Savings When You Don't

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

Intel® Xeon® 5500 Performance Publications

SPECint*_rate_base2006
240 score (+71%)
FUJITSU

SPECpower*_ssj2008
1943 ssj_ops/watt (+71%)
Oracle JRockit* JVM
Verari systems

SPECfp*_rate_base2006
194 score (+125%)
FUJITSU
CISCO

SPECjAppServer*2004
3,975 JOPS (+93%)
Oracle WebLogic* Server
DELL

TPC*-C
631,766 tpmC (+130%)
Oracle 11g* database
hp

SAP-SD* 2-Tier
5,100 SD Users (+102%)
SAP* ERP 6.0/IBM DB2*
IBM

SPEComp*Mbase2001
43,593 score (+154%)
Intel Compiler 11.0/RHEL 5.3*
CISCO

TPC*-E
800 tpsE (+152%)
Microsoft SQL Server* 2008
FUJITSU

SPECWeb*2005
71,045 score (+140%)
Rock Web* Server
hp

Fluent* 12.0 benchmark
Geo mean of 6 (+127%)
ANSYS Fluent*
sgi

SPECjbb*2005
604,417 BOPS (+64%)
IBM J9* JVM
IBM

SPECapc* for Maya 6.5
7.70 score (+87%)
Autodesk* Maya
DELL

Over 30 New 2S Server and Workstation World Records!

Percentage gains shown are based on comparison to Xeon 5400 series; Performance results based on published/submitted results as of March 30, 2009. Platform configuration details are available at http://www.intel.com/performance/server/xeon/summary.htm *Other names and brands may be claimed as the property of others

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Examples of Software Optimized for the Intel® Xeon® 5500

Over 100 Optimized Software Products From Around The World

* The highest gains are typically in applications that are memory bandwidth or latency sensitive. Results vary by application.

Examples of Software Optimized for the Intel® Xeon® 5500

Energy
Schlumberger
roxar
MAXIMUM RESERVOIR PERFORMANCE

Financial Services
THOMSON REUTERS
SUNGARD®

Healthcare
SIEMENS

Security
iOmniscient
high IQ surveillance

Online Gaming
KINGSOFT 金山软件

Over 100 Optimized Software Products From Around The World

*With Over 30 Real World Applications Seeing Up to 2-3X Performance Gains**

Telecom
espial
Neusoft 东软

Manufacturing
ANSYS

Enterprise
Kingdee
UFIDA

Rendering
Bunkspeed

Weather
INFOWRAP

intel

* The highest gains are typically in applications that are memory bandwidth or latency sensitive. Results vary by application.

Transforming the Datacenter

"Private Cloud"
Automated, Scalable
and On-Demand

Dynamic Resource
Management

Server
Consolidation

Balanced Platform
Performance, Memory and I/O Capabilities

Efficient Datacenter
Platform/Rack Efficiency, Higher ambient temp

Server Pool Flexibility
Similar Instruction Set Between Servers

Unified Network
10Gb Ethernet for Storage and Network

Technology Foundation for the Dynamic Datacenter

Compute

Intel® Xeon® 5500 Platform with
Enhanced Compute and I/O
Virtualization

IT Result:

Workload Agility
Simpler and Lower Cost
Performance for Responsive Scalability

Network

10Gb Ethernet with Built-in
Support for Unified Fabric

Storage

Open Platforms and
Performance Breakthroughs
(SSDs)

Technology Foundation for the Dynamic Datacenter

Compute

Intel® Xeon® 5500 Platform with
Enhanced Compute and I/O
Virtualization

inspur 浪潮

DELL

Virtualization Performance:

Up to 160% Greater Performance
Based on VMware* VMmark[1]

CISCO

IBM

Network

10Gb Ethernet with Built-in
Support for Unified Fabric

Storage

Open Platforms and
Performance Breakthroughs
(SSDs)

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[1]Compared to the Intel Xeon processor 5400 series based platform


Intel® Active Management Technology
Network Settings
Active Management Technology
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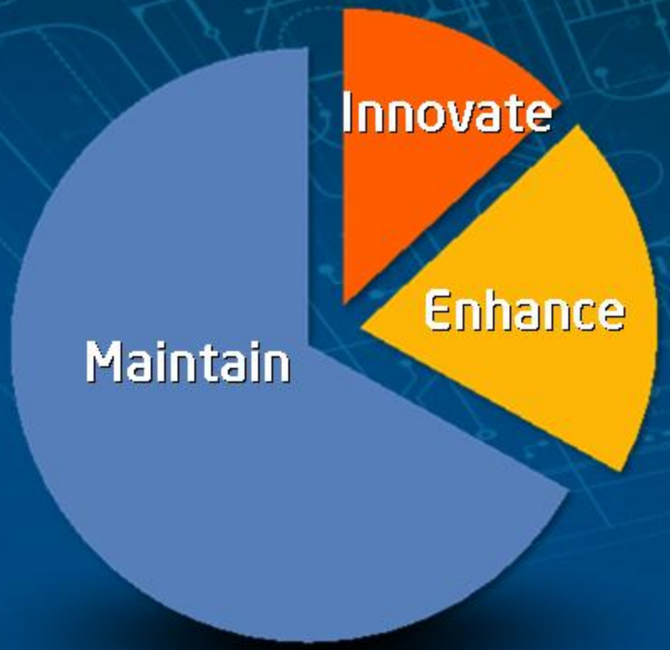
Intelligent Choice

Delivers Higher Performance, Lower TCO

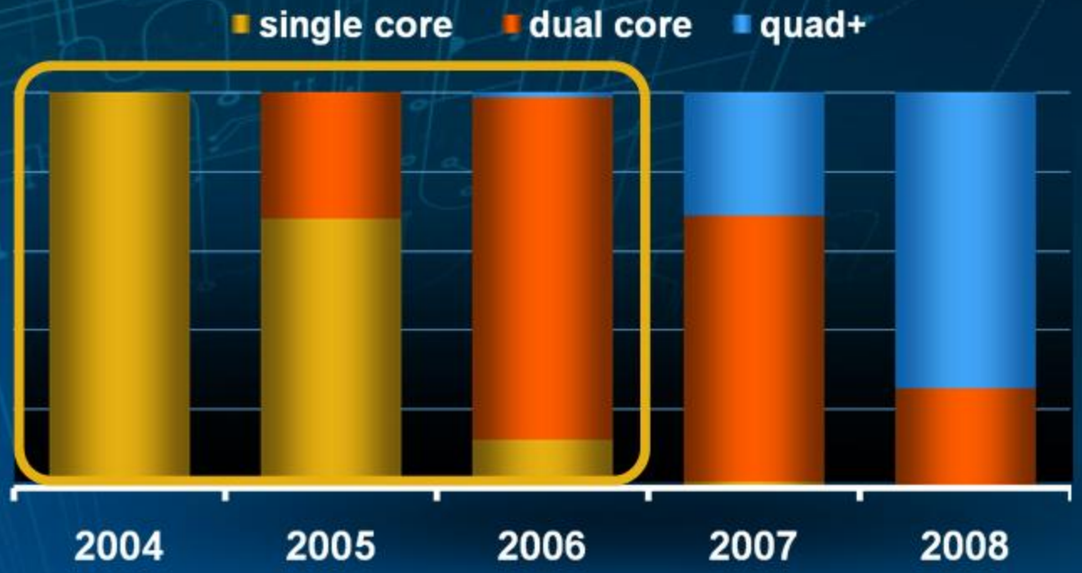
Estimated 8 Month Payback for Single-core Server Refresh

The Server Install Base

Where IT Spends



Intel® Xeon® Shipments



Estimate 40% Single-core, 40% Dual-core In Traditional IT Infrastructure Today

Source: Gartner IT Key Metrics Data 2008

Source: Intel internal data

Refresh Benefits

2005

184 Intel® Xeon® Single Core Servers

Performance Refresh

184 Intel® Xeon® 5500 Based Servers

Up to **9x** Performance

18% Annual Energy Costs Estimated Reduction

- OR -

Efficiency Refresh

21 Intel® Xeon® 5500 Based Servers

As low as **8 Month** Payback

90% Annual Energy Costs Estimated Reduction

Source: Intel estimates as of Nov 2008. Performance comparison using SPECjbb2005 bops (business operations per second). Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance. For detailed calculations, configurations and assumptions refer to the legal information slide in backup.

Price/Performance vs. RISC

T5240 SUN* UltraSPARCT2+*	
SPECJbb2005*	1.18x
SPECint*-rate 2006	1.65x
SPECfp*-rate2006	1.71x
Less than 1/2 System Cost	Up to 1.71X Performance

P570 IBM* POWER6*	
SPECJbb2005*	2.20x
SPECint*-rate 2006	2.22x
SPECfp*-rate2006	1.86x
Less than 1/10 System Cost	Up to 2.45X Performance

Source: UltraSPARCT2+ results published on spec.org. Intel estimates as of Feb 2009. Intel results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance. For detailed calculations, configurations and assumptions refer to the legal information slide in backup. All systems priced with 32GB memory, T5240 actual cost from published pricing information, Estimated price used for 2S Xeon system, based on existing 2S system published pricing information. Estimated price used for 2S P570 system. Other brands and names are the property of their respective owners.

Intel® Xeon® 5500 Platform: Extending IA Leadership in Embedded

Military
Aerospace
Government

Medical
Imaging

Communications

Intel® Xeon® 5500 Platform: Extending IA Leadership in Telecommunications

Intel® Xeon® 5500 Platform

- Thermal Profile for Telecommunications
- LV SKUs for Ultra Dense Form Factors
- 7 Year Extended Life Product Support
- Telecommunications-Grade Reliability

Ten of the World's Top Ten TEMs Design with IA

Outstanding Examples of Technologies That Support the Intel® Xeon® 5500 Series

IBM System x iDataPlex

HP BladeSystem C-class

Cisco Unified Computing Solution

CRAY THE SUPERCOMPUTER COMPANY CX1 Supercomputer

Verari systems Bladerack 2 X-series

SenecaData Nexlink StableFlex Modular Server

DELL PowerEdge Blade Server

Rackable systems CloudRack

Intel® Xeon® 5500 Series: Worldwide Industry Support

Broadest Ecosystem of Server, Storage & Embedded Partners

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Announcing the Data Center Efficiency Challenge
Competition for Video Proposals: Design a More Efficient Data Center
Winners Announced at IDF Fall In San Francisco
Visit Intel's Server Room Community for More Details
Http://communities.intel.com/openport/community/server
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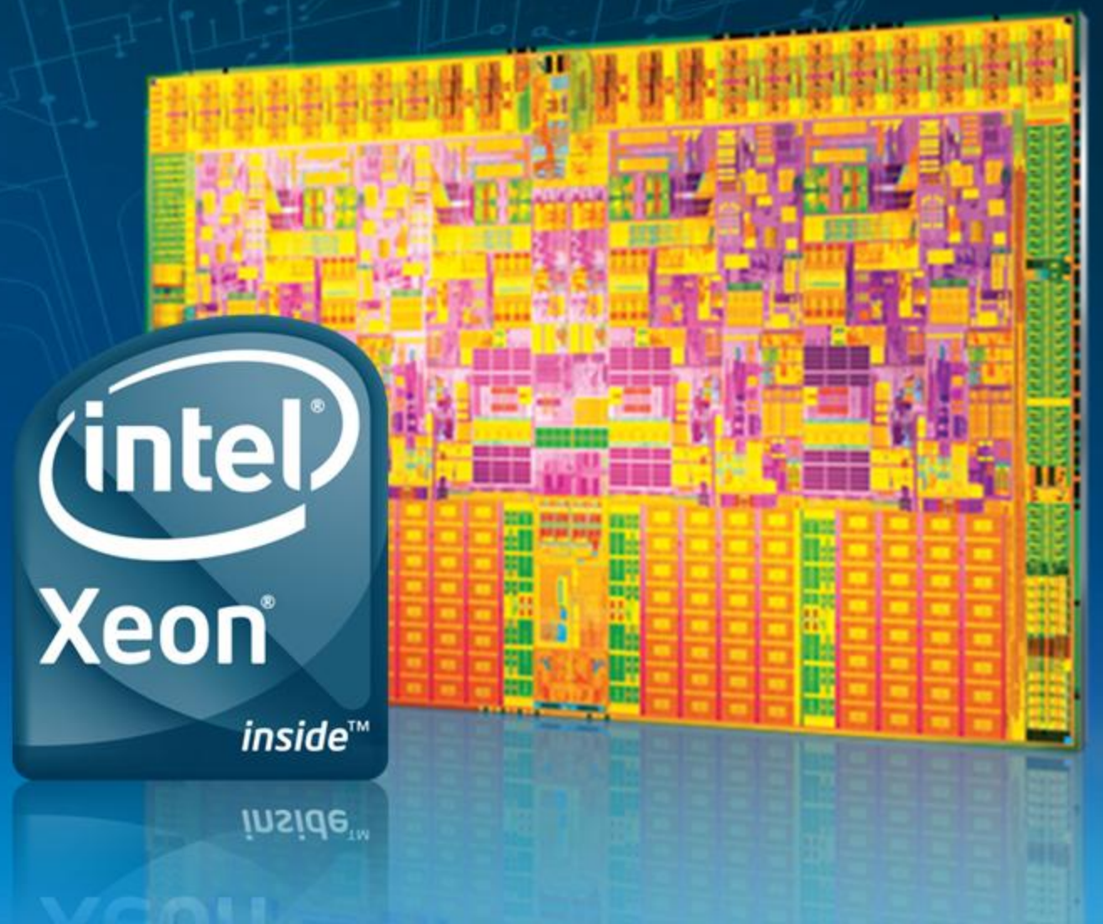
Summary

Most Important Server Introduction Since the Pentium® Pro

Intelligent Platform

Intelligent Choice



Join the Industry's Xeon® 5500 Processor Series Conversation Online at www.intel.com/server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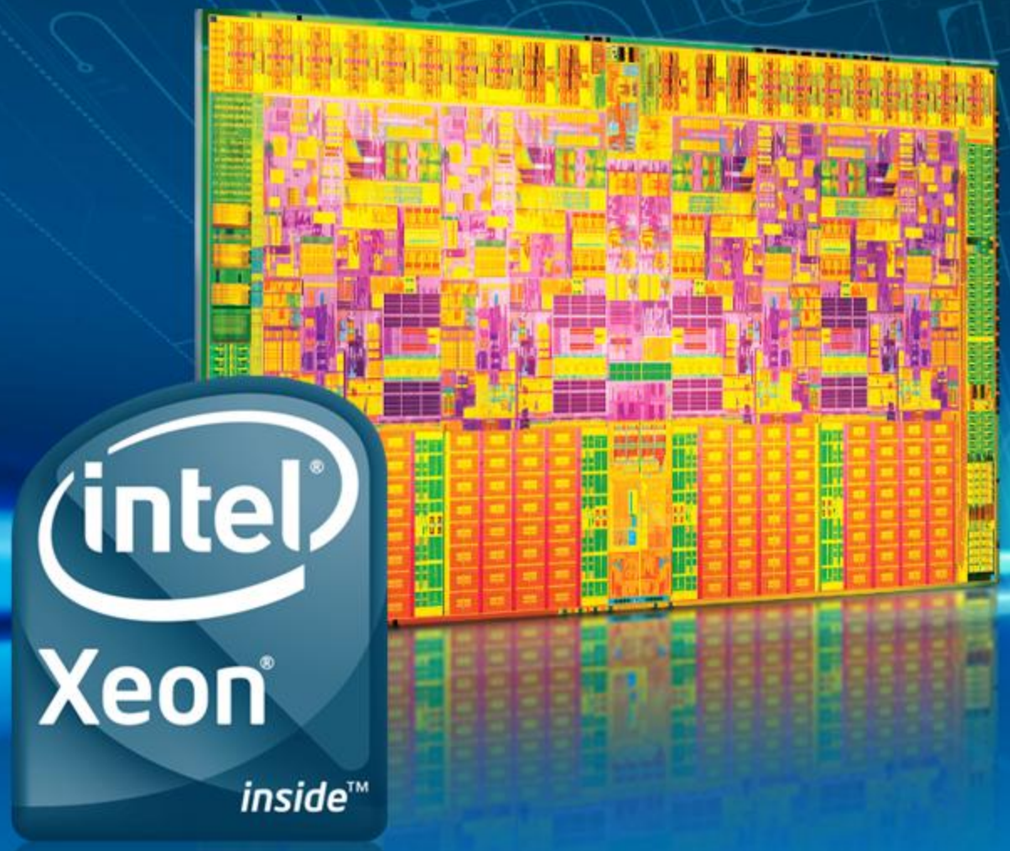

Executive Panel

Pat Gelsinger
Moderator
Intel Corporation

Lincoln Wallen
Head of Research and Development
DreamWorks Animation SKG

Josh Crowe
Vice President
of Engineering
Savvis, Inc.

HUMANA®

Guidance when you need it most

Paul Ratner
Vice President
IT Operations
Humana, Inc.

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Mazen Rawashdeh

Sr. Director of Operations
Infrastructure and Engineering
eBay, Inc.

Keith Gray
Manager High Performance &
Technical Computing
BP, Inc.

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Relative performance is calculated by assigning a baseline value of 1.0 to one benchmark result, and then dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms, and assigning them a relative performance number that correlates with the performance improvements reported.

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Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

Hyper-Threading Technology requires a computer system with a processor supporting HT Technology and an HT Technology-enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. For more information including details on which processors support HT Technology, see here

Intel® Turbo Boost Technology requires a Platform with a processor with Intel Turbo Boost Technology capability. Intel Turbo Boost Technology performance varies depending on hardware, software and overall system configuration. Check with your platform manufacturer on whether your system delivers Intel Turbo Boost Technology. For more information, see http://www.intel.com/technology/turboboost."

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See http://www.intel.com/products/processor_number for details. Intel products are not intended for use in medical, life saving, life sustaining, critical control or safety systems, or in nuclear facility applications. All dates and products specified are for planning purposes only and are subject to change without notice

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

Benchmark configuration details

- All comparisons based on published/submitted/approved results as of March 30, 2009
- **SPECint_rate_base2006:**
- Baseline Intel® Xeon® processor X5470 based platform details: Fujitsu Siemens PRIMERGY* RX200 S4 server platform with two Intel Xeon processors X5470 3.33GHz, 12MB L2 cache, 1333MHz FSB, 16GB memory (8x2GB DDR2 PC2-5300F, 2 rank, CAS 5-5-5, with ECC), SUSE Linux Enterprise Server 10 SP2 x86_64 Kernel 2.6.16.60-0.21-smp*, Intel C++ Compiler for Linux32* and Linux64* version 11.0 build 20080730. Referenced as published at 140. For more information see http://www.spec.org/cpu2006/results/res2008q3/cpu2006-20080901-05156.html.
- Intel® Xeon® processor X5570 based platform details: Fujitsu PRIMERGY* TX300 S5 server platform with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 48 GB memory (6x8 GB PC3-10600R, 2 rank, CL9-9-9, ECC), SUSE Linux Enterprise Server 10 SP2 x86_64 Kernel 2.6.16.60-0.21-smp, Intel C++ Compiler for Linux32 and Linux64 version 11.0 build 20010131. Submitted to www.spec.org for review at 240 as of March 30, 2009.
- **SPECfp_rate_base2006**
- Baseline Intel® Xeon® processor X5482 based platform details: Hewlett-Packard ProLiant DL160 G5p server platform* with two Intel Xeon processors X5482 3.20GHz, 12MB L2 cache, 1600MHz FSB, 16GB memory (8x2GB 800MHz CL5 FB-DIMM), 64-Bit SUSE Linux Enterprise Server 10 SP1, Intel C++ Compiler for Linux32 and Linux64 version 10.1 build 20080730. Referenced as published at 86.4. For more information see http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081013-05587.html.
- Intel® Xeon® processor X5570 based platform details: Fujitsu PRIMERGY* TX200 S5 server platform with two Quad-Core Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 24 GB memory (6x4 GB PC3-10600R, 2 rank, CL9-9-9, ECC), SUSE Linux Enterprise Server 10 SP2 x86_64 Kernel 2.6.16.60-0.21-smp, Intel C++ Compiler for Linux32 and Linux64 version 11.0 build 20010131. Submitted to www.spec.org for review at 194 as of March 30, 2009.
- Intel® Xeon® processor X5570 based platform details: Cisco B-200 M1 server platform with two Quad-Core Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 24 GB memory (6x4 GB PC3-10600R, 2 rank, CL9-9-9, ECC), SUSE Linux Enterprise Server 11_RC4 x86_64 2.6.27.15-2-default, Intel C++ Compiler for Linux32 and Linux64 version 11.0 build 20010131. Result measured at 194 as of March 30, 2009.
- **SAP-SD 2-Tier**
- Baseline Intel® Xeon® processor X5470 based platform details: HP ProLiant BL460C server platform* with two Intel Xeon processors X5470 3.33GHz, 12MB L2 cache, 1333MHz FSB, 32GB memory, Microsoft Windows Server 2003 Enterprise Edition, Microsoft SQL Server 2005, SAP ECC Release 6.0 . Referenced as published at 2,518 SD users. Certification number 2008048.
- Intel® Xeon® processor X5570 based platform details: IBM System x3650 M2 Server with two Intel Xeon processors X5570, 2.93GHz 8MB L3 cache, 6.4QPI, 48GB memory, Microsoft Windows Server 2003 Enterprise Edition, DB2 9.5, SAP ECC Release 6.0 (2005). Referenced as published at 5,100 SD users. Certification number 2008079.
- **TPC-C**
- Baseline Intel® Xeon® processor X5460 based platform details: HP ProLiant ML370 G5 platform with Intel Xeon processor X5460 3.16GHz (2 processors / 8 cores / 8 threads), 2x6MB L2 cache, 1333 MHz system bus, 64GB memory, Microsoft SQL Server 2005 x64 Enterprise Edition SP2, Microsoft Windows Server 2003 Enterprise x64 Ent. R2. Referenced as published at 275,149 tpmC and $1.44/tpmC; availability date January 7, 2008. For more information see http://tpc.org/tpcc/results/tpcc_result_detail.asp?id=108010701.
- Intel® Xeon® processor X5570 based platform details: HP ProLiant DL370 G6* platform with two Intel Xeon processors X5570 2.93GHz (2 processors / 8 cores / 16 threads), 8MB L3 cache, 6.4GT/s QPI, 144 GB memory (18x8 GB DDR3). Oracle 11g database* with Oracle Enterprise Linux OS*. Result submitted to www.tpc.org as of March 30, 2009.

Benchmark configuration details

- All comparisons based on published/submitted/approved results as of March 30, 2009
- **TPC-E**
- Baseline Intel® Xeon® processor X5460 based platform details: Fujitsu-Siemens PRIMERGY TX300 S4 server platform* with Intel Xeon processor X5460 3.16GHz (2 processors / 8 cores / 8 threads), 2x6MB L2 cache, 1333 MHz system bus, 64GB memory, Microsoft SQL Server 200 x64 Enterprise Edition*, Microsoft Windows Server 2008 Enterprise x64*. Referenced as published at 317.45 tpsE and $523.49/tpsE; availability date August 30, 2008. For more information see http://www.tpc.org/tpce/results/tpce_result_detail.asp?id=12.
- Intel® Xeon® processor X5570 based platform details: Fujitsu-Siemens PRIMERGY RX300 S5 server platform* with two Intel Xeon processors X5570 2.93GHz (2 processors / 8 cores / 16 threads), 8MB L3 cache, 6.4GT/s QPI, 96 GB memory (12x8 GB DDR3-1066), Microsoft SQL Server 2008 x64 Enterprise Edition, Microsoft Windows Server 2008 Enterprise x64. Result submitted to www.tpc.org at 800tpsE and $343.91/tpsE as of March 30, 2009. Availability date April 1, 2009.
- **SPECjbb2005**
- Baseline Intel® Xeon® processor X5470 based platform details: Fujitsu Siemens PRIMERGY RX200 S4 server platform* with two Intel Xeon processors 5470 3.33GHz, 12MB L2 cache, 1333MHz FSB, 16GB memory, Microsoft Windows Server 2008 Enterprise x64 Edition*, Oracle JRockit 6 P28.0.0 (build P28.0.0-8-109238-1.6.0_05-20090130-1408-windows-x86_64) 4 JVM instances. Referenced as published at 368,034 BOPS. For more information see http://www.spec.org/osg/jbb2005/results/res2009q1/jbb2005-20090220-00583.html.
- Intel® Xeon® processor X5570 based platform details: IBM Bladecenter HS22 Server platform* with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 24 GB memory (6x4 GB DDR-1333MHz), Microsoft Windows Server 2008 Enterprise x64 Edition, IBM J9 2.4 JRE 1.6.0 (build pwa6460sr5-20090323_04(SR5)) run with 4 JVM instances. Result measured at 604417 BOPS - March 30, 2009.
- **SPECweb2005**
- Baseline Intel® Xeon® processor X5460 based platform details: HP Proliant DL380 G5 server platform with two Intel Xeon processors X5460 3.16GHz, 12MB L2 cache, 32GB memory (8x4G 667MHz ECC DDR2 FB-DIMM), RedHat Enterprise Linux 5 (2.6.18-53.el5), Rock Web Server v1.4.6 x86_64. Referenced as published at 29591. For more information see http://www.spec.org/web2005/results/res2008q1/web2005-20080225-00104.html.
- Intel® Xeon® processor X5570 based platform details: HP ProLiant DL380 G6 platform* with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 144 GB memory (18x8 GB DDR3), Red Hat Enterprise Linux 5.2 .Rock Web Server v1.4.7 (x86_64). Result submitted to www.spec.org for review at 71,045 as of March 30, 2009.
- **Fluent:**
- Baseline Intel® Xeon® processor X5482 based platform details: Supermicro X7DB8+* server platform with two Intel® Xeon® processors X5482 3.20GHz, 12MB L2 cache, 1600MHz FSB, 16GB memory (8x2GB 800MHz DDR2 FB-DIMM), 64-bit RedHat Enterprise Linux 5.3*. Performance measured using Fluent Version 12.0 Beta. (Version 12.0.13)*. Six individual benchmarks are shown as a measure of single node performance. "Overall" performance is the geometric mean of the six individual benchmarks.
- Intel® Xeon® processor X5570 based platform details: SGI Altix ICE 8200EX* server platform with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, QPI 6.4 MT/sec, 24GB memory (12x2GB 1066MHz DDR3), 64-bit Suse Linux Enterprise Server* 10 SP2 with ProPack 6SP2*. Performance measured using Fluent Version 12.0 Beta. (Version 12.0.9) Six individual benchmarks are shown as a measure of single node performance. "Overall" performance is the geometric mean of the six individual benchmarks.

Benchmark configuration details

- All comparisons based on published/submitted/approved results as of March 30, 2009
- **SPECompM2001**
- Baseline Intel® Xeon® processor E5472 based platform details: Supermicro X7DB8+ server platform* with two Intel Xeon processors E5472 3.0GHz, 12MB L2 cache, 1600MHz FSB, 32GB memory (8x4GB 800MHz DDR2 FB-DIMM), SUSE LINUX 10.1* (X86-64) (Linux 2.6.16.13-4-smp). Binaries built with Intel Compiler 10.1. Referenced as published at 17187. (SPECompMbase2001). For more information see http://www.spec.org/omp/results/res2007q4/omp2001-20071127-00274.html.
- Intel® Xeon® processor X5570 based platform details: Cisco B-200 M1 server platform* with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 24 GB memory (6x4 GB DDR3-1333MHz), Red Hat EL 5.3, Linux Kernel 2.6.18-128.el5 SMP x86_64, Binaries built with Intel® C/C++ Compiler 11.0 for Linux. Result submitted to www.spec.org for review at 43593 (SPECompMbase2001) as of March 30, 2009.
- **SPECpower_ssj2008**
- Baseline Intel® Xeon® processor L5430 based platform details: Powerleader PR2510D2 server platform* with two Intel Xeon processors L5430 2.33GHz, 12MB L2 cache, 1333MHz FSB, 8GB memory, Oracle JRockit* (build P27.5.0-5_o_CR371811_CR374296-100684-1.6.0_03-20080702-1651-windows-x86_64, compiled mode). Published at 1135 ssj_ops/watt. For more information see: http://www.spec.org/power_ssj2008/results/res2008q4/power_ssj2008-20081007-00086.html.
- Intel® Xeon® processor X5570 based platform details: Verari Systems, Inc. VB1305 server platform* with two Intel Xeon processor X5570, 2.93GHz, 8 GB (4 x 2), Microsoft Windows Server 2008 Enterprise* Service Pack 2 OS. Oracle JVM (build P28.0.0-14-111048-1.6.0_05-20090303-1104-windows-x86_64, (compiled mode) result of 1943 provided by Verari as of 3/30/2009.
- **SPECjAppServer2004**
- Baseline Intel® Xeon® processor X5460 based platform details: HP Proliant BL460c G1 server platform with two Intel Xeon processors X5460 3.16GHz, 12MB L2 cache, 16GB memory (8x2G 667MHz ECC DDR2 FB-DIMM), Oracle Application Server 10G Release 10.1.3.3 - Java Edition, BEA JRockit(R) 6.0 JDK (R27.3.0-106) (Linux x86 32bit), Oracle Database Enterprise Edition Release 11.1.0.6. Referenced as published at 2056. For more information see http://www.spec.org/osg/jAppServer2004/results/res2007q4/jAppServer2004-20071023-00088.html .
- Intel® Xeon® processor X5570 based platform details: Dell PowerEdge R610 server platform* with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 24 GB memory (12x2 GB DDR3), Oracle WebLogic Server Standard Edition Release 10.3, Oracle JRockit(R) 6.0 JDK (R27.6.0-50) (Linux x86 32bit), Oracle Database Enterprise Edition Release 11.1.0.7, Result submitted to www.spec.org for review at 3975 as of March 30, 2009.
- **VMmark:**
- Baseline Intel® Xeon® processor X5470 based platform details: HP Proliant* ML370 G5 server platform with two Intel Xeon processors X5470 3.33GHz, 2x6MB L2 cache, 1333MHz FSB, 48GB memory, VMware ESX V3.5. Update 3 Published at 9.15@7 tiles. For more information see www.vmware.com/files/pdf/vmmark/VMmark-HP-2008-10-09-ML370.pdf.
- Intel® Xeon® processor X5570 based platform details: Dell PowerEdge* R710 Server platform with two Intel Xeon processors X5570 2.93GHz, 8MB L3 cache, 6.4GT/s QPI, 96 GB memory (12x8 GB DDR3-1066MHz), VMware ESX beta build 150817. Submitted to VMware for review at 23.55@16 tiles.

Xeon 5500 Refresh Slides (System Configurations)

- Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit Intel Performance Benchmark Limitations

- Single Core to Xeon 5500 Refresh Configuration Details
- Source: Intel internal measurements 2005 – 2008 comparing 2S Xeon 3.8GHz (Irwindale), 8x1GB DIMMs, 1 HDD, 382W power under load to 2S Xeon X5570 (Nehalem 2.93GHz), 6x2GB DIMMs, 1 HDD, 315W power under load.

- Dual Core Xeon 5100 to Xeon 5500 Refresh Configuration Details
- Source: Intel internal measurements 2005 – 2008 comparing 2S Xeon 5160 (Woodcrest 3.0GHz), 8x2GB DIMMs, 1 HDD, 354W power under load to 2S Xeon X5570 (Nehalem 2.93GHz), 6x2GB DIMMs, 1 HDD, 315W power under load.

Single Core Energy Efficient Refresh Calculation Details

	2005	2009	Delta / Notes
Product	Intel Xeon single core (3.8Ghz w/ 2M cache)	Intel Xeon 5500 series (2.93GHz)	
Performance per Server	50,970 bops SPECjbb2005*	447,000 bops SPECjbb2005*	**Up to 8.8x per/server**
kWh per Server/Day	6.704 (382w active / 228w idle)	4.936 (315W active / 151 idle)	Server active 8hrs and idle for 16 hrs per day
Desired Performance Target = 9.4 millions business operations per second			
# Servers needed	184	21	~ 9:1 server consolidation
# Racks needed	9 racks	1 rack	**9:1 Rack Consolidation**
Total Perf	9.38 million bops	9.38 million bops	Same Performance
Annual kWhr	451,474	37,938	**Estimated 92% lower energy costs**
Annual Energy Costs	$90,295	$7,588	$82,707 electricity costs per year. Assumes $0.10/kWhr and 2x cooling factor
OS Licensing Costs	$165,600	$18,900	$146,700 less per year Assumes a RHEL 1yr license at $900 Source www.dell.com as of 12/16/08
Annual Cost Savings of $229,407			
Cost of new HW	n/a	$147,000	Assume $7,000 per server
Estimated Payback Period of 8 months			

Single Core Performance Refresh Calculation Details

	2005	2009	Delta / Notes
Product	Intel Xeon single core (3.8Ghz w/ 2M cache)	Intel Xeon 5500 series (2.93GHz)	
Performance per Server	50,970 bops SPECjbb2005*	447,000 bops SPECjbb2005*	bops = business operations per second
Power Consumption per Server	382W active	315W active	Server active 24hr per day (assuming HPC application)
Data Center Capability = 1 MW			
DC Cooling Factor	1.6 PUE	1.6 PUE	**Same Design** PUE: = Power Usage Effectiveness.
# of Servers	1,637	1,637	**Same Footprint**
Data Center Performance	83,437,890 bops	731,739,000 bops	**Up to 8.8x Performance Increase**
Data Center Power	1,000 KW	825 kW	**Estimated 18% Lower Power** # of Servers * Svr Power * PUE

For 50% Lower Platform Idle Power

Configuration details for 50% lower idle power: Intel internal measurements of 221W at idle with Supermicro 2xE5450 (3.0GHz 80W) processors, 8x2GB 667MHz FBDIMMs, 1x700W PSU, 1x320GB SATA hard drive vs. 111W at idle with Supermicro software development platform with 2xE5540 (2.53GHz Nehalem 80W) processors, 6x2GB DDR3-1066 RDIMMs, 1x800W PSU, 1x150GB 10k SATA hard drive. Both systems were running Windows 2008 with USB suspend select enabled and maximum power savings mode for PCIe link state power management. Measurements as of Feb 2009.

Vs UltraSPARCT2+
Intel results achieved with 8 Cores and 16 threads vs 16 cores and 128 threads for SPARC Enterprise T5240 with 1.4 GHz 8-core UltraSPARCT2+. Intel Xeon Processor 5570 (2.93Ghz) vs SUN SPARC T5240 2S/16C 1.4Ghz
SPECjbb2005: T5240 384,934 bops and 24,058 bops/jvm Vs Intel Xeon Processor 5570 604,417 bops (see previous slide for details)
SPECint*rate 2006base T5240: 142 base...Intel Xeon Processor 5570 240 (see previous slides for details)
SPECfp*-rate 2006base T5240 :111 base...Intel Xeon Processor 5570 194 base (see previous slides for details)

Note: All systems priced with 32GB memory. DL580 currently at $13k, Sun Fire X4150 $11k for systems based on Xeon 5400. Estimating that Nehalem-EP systems will have a 20% premium. T5240 with 32GB memory from SUN website is $36,495

Vs POWER6
Intel results achieved with Intel Xeon Processor 5570 2.93Ghz. Vs IBM Power* 570 Server with 2 POWER 6 4.7Ghz processors

SPECjbb2005: P570 205,917 bops and 102,959 bops/jvm Vs Intel Xeon Processor 5570 604,417 bops (see previous slide for details)

SPECint*rate 2006base: P570 106 base...Intel Xeon Processor 5570 240 (see previous slides for details)
SPECfp*-rate 2006base: P570 102 base...Intel Xeon Processor 5570 194 base (see previous slides for details)

Note: All systems priced with 32GB memory. DL580 currently at $13k, Sun Fire X4150 $11k for systems based on Xeon 5400. Estimating that Nehalem-EP systems will have a 20% premium. Estimated P570 pricing from http://tpc.org/results/individual_results/IBM/IBM_570_4_20070806_es.pdf with 32GB memory
10,195 for base p570 server, plus 2 AC power supplies $3,004, plus 32x 1GB memory activation at $1,515 per GB, plus $92,000 for 4 cpu activations, +23,000 for the physical processor cards