



インテル HPCプラットフォームの最新動向

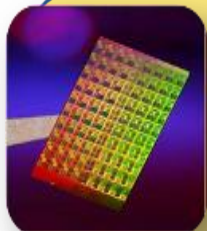
インテル株式会社

事業開発本部 HPC事業開発担当

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February 19, 2010

Intel in High Performance Computing



Terascale
Research



Manufacturing
Process



Leading
performance,
performance/
watt



Platform
building
blocks



Defined
HPC
application
platform



Broad SW
tools
portfolio



Dedicated,
renowned
expertise

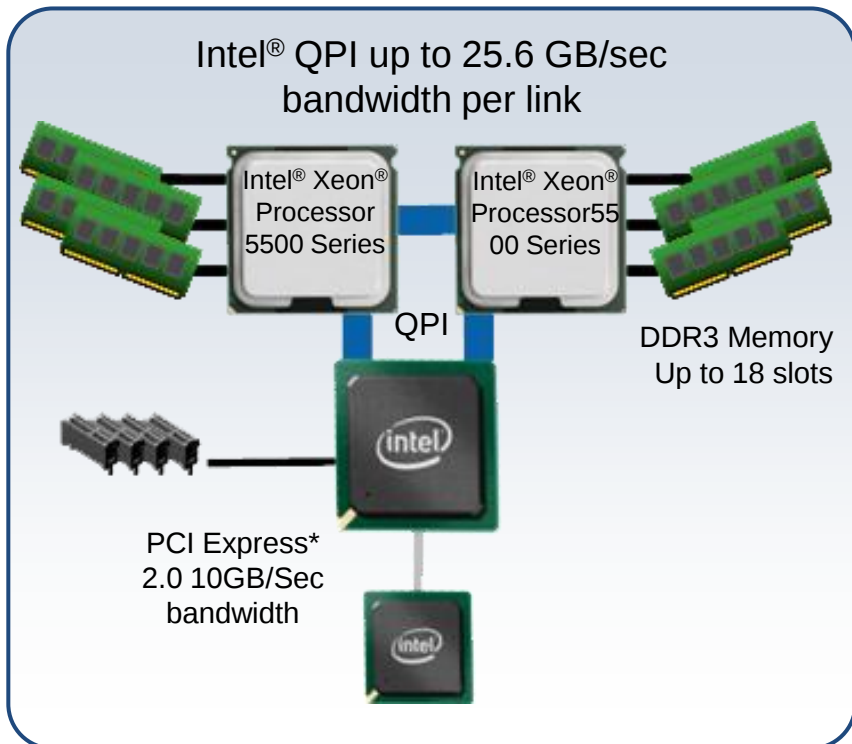


Large scale
clusters
for test and
optimization

A commitment to High Performance Computing

Balanced Solution To Deliver Real Results

The Intel® Xeon® Processor 5500 Series Based Platform



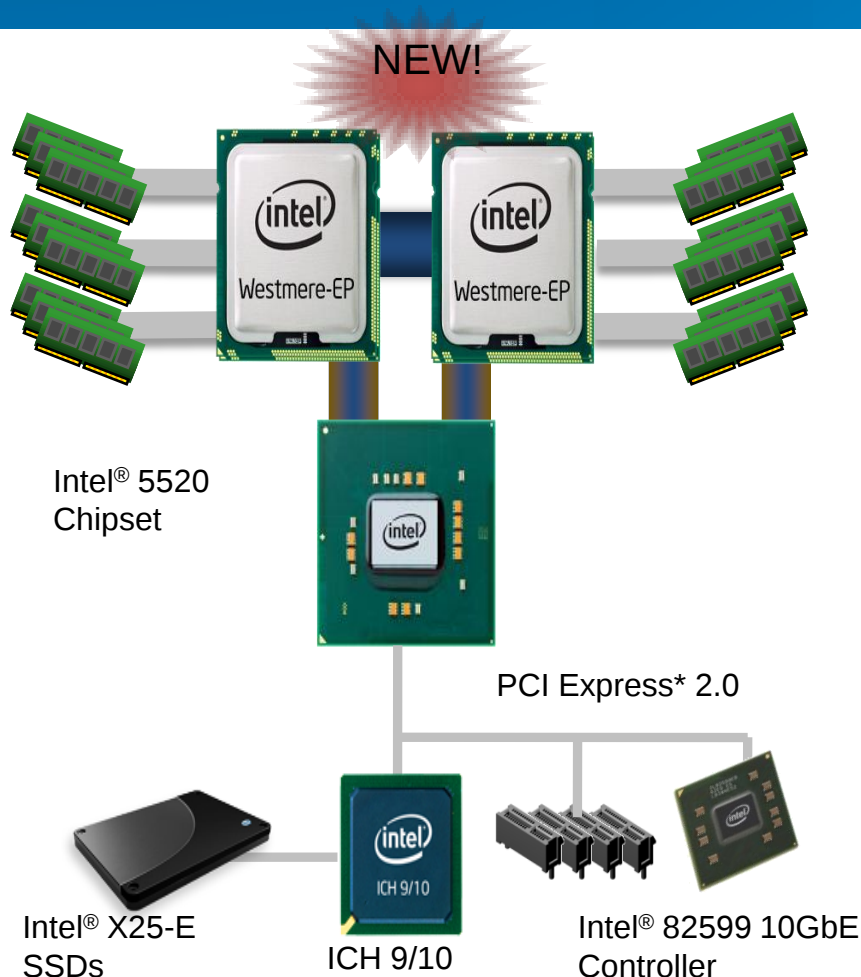
- Intelligent Performance
 - Intel® Turbo Boost Technology
 - Intel® Hyper-Threading Technology
 - Intel® QuickPath Interconnect (Intel® QPI)
 - Large Memory Capacity
- Automated Energy Efficiency
 - More Performance, Less Energy, More Density
 - Dynamic Scalability
 - Intel® Intelligent Power Technology

Unlocking Application Performance

Real Performance Is Almost Always Bandwidth Limited

Coming: Intel® Server Processor (Westmere-EP)

Building on Intel® Xeon® 5500 Processor Series Performance

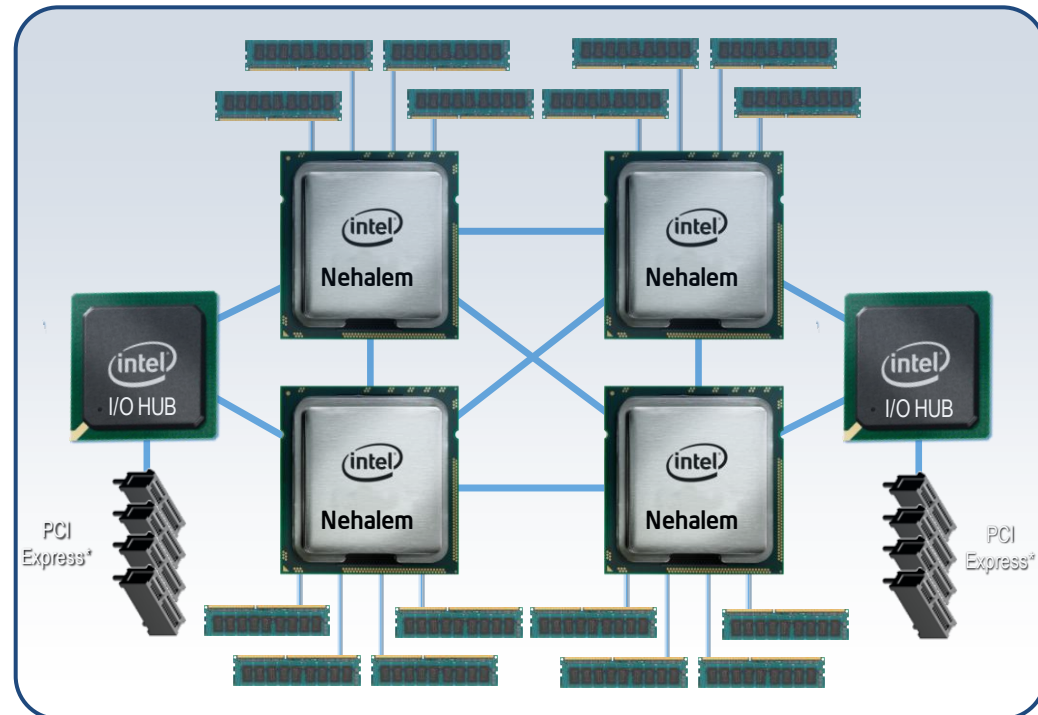


- Socket Compatible
- 32 nm process technology with 50% more threads and cache
- Improved Energy Efficiency with support for 1.35V low power memory
- Available 2010

Coming: Nehalem-EX Platform

More Powerful, More Balanced Computing

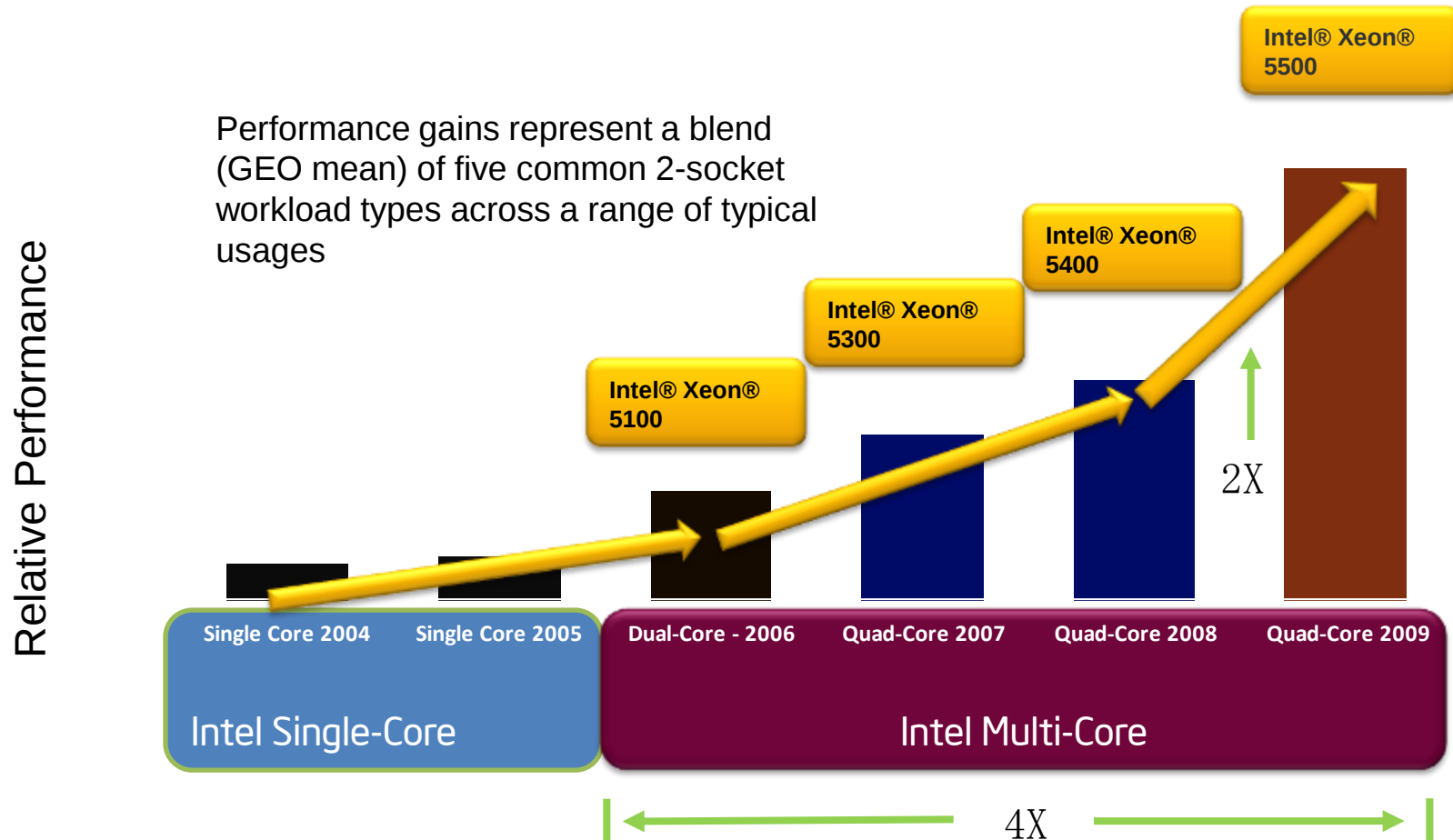
- Monolithic single die processor
- Up to 8 Intel® microarchitecture (Nehalem) cores, 16 threads
- Supports 2, 4 and 8 socket in glueless configs and larger systems using Node Controller (NC)
- 24MB shared L3 cache
- 2 integrated memory controllers
- Intel® Scalable Memory Interconnect (Intel® SMI) with support for up to 8 DDR channels
- 4 Intel® QuickPath Interconnect (Intel® QPI) links with up to 6.4GT/s



“Super Node”
Increasing Available Resources
Larger More Complex problems Scalable Performance

Generations of Performance Gains

Intel® Xeon® Processor 5500 Series Platforms



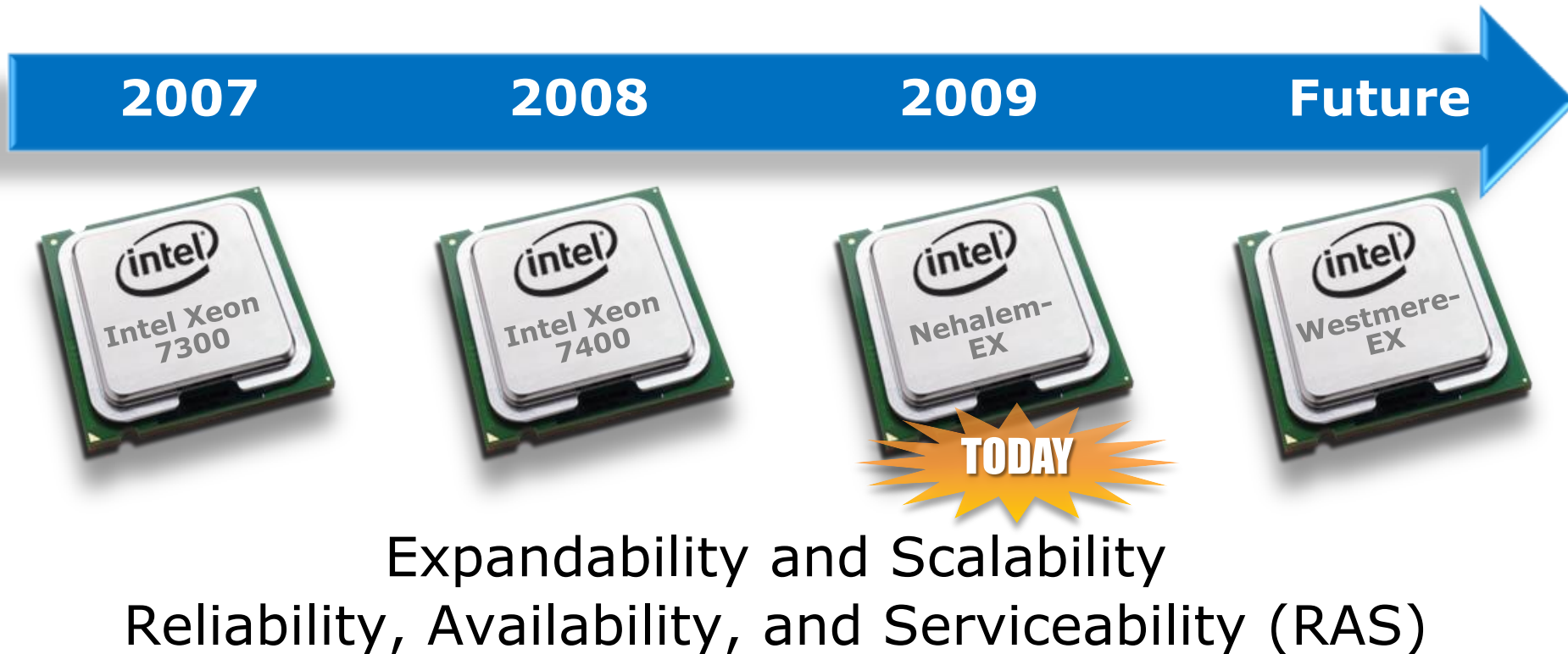
Source: Published/submitted/measured results March 30, 2009. Each bar represents the geo mean of best published results on five industry standard benchmarks – SPECint*_rate_base2006, SPECfp*_rate_base2006, SPECjbb*2005, TPC*-C and SAP-SD*. See backup slides for further information.



Where Data Becomes Knowledge: HPC from Intel

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Intel® Xeon® Processor - EXpandable (EX) Segment Roadmap



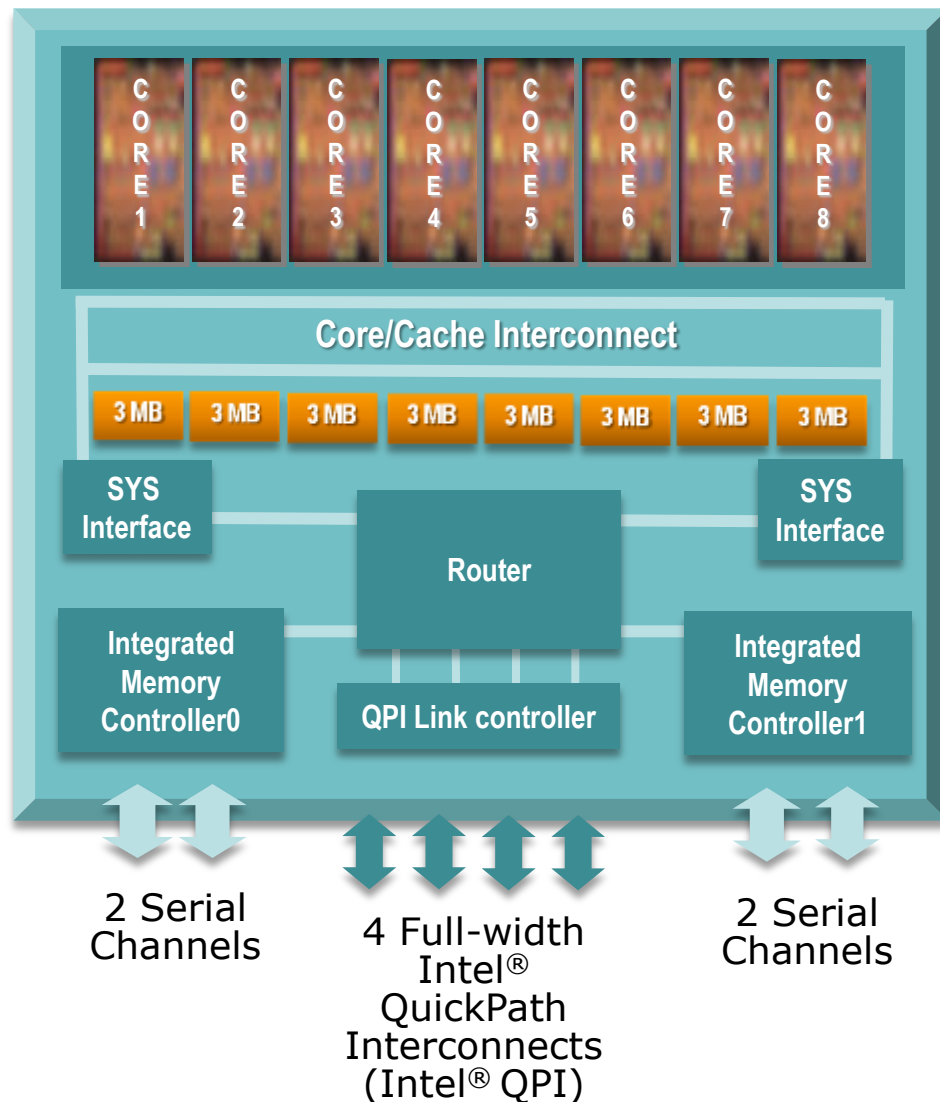
Designed for Demanding Apps and Large-Scale Consolidation

Westmere = Intel® microarchitecture, codenamed Westmere

Nehalem-EX (NHM-EX) = High-End Intel® Server Platform, Codenamed Nehalem-EX

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INTEL DEVELOPER FORUM

Scalable Processor Cores

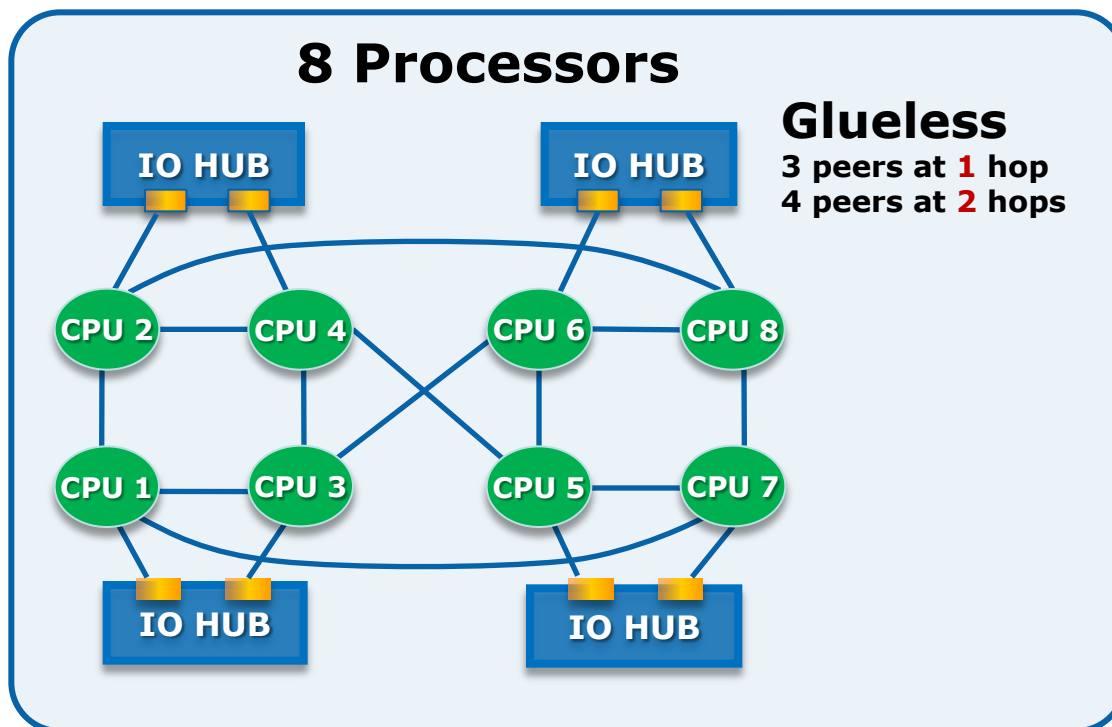
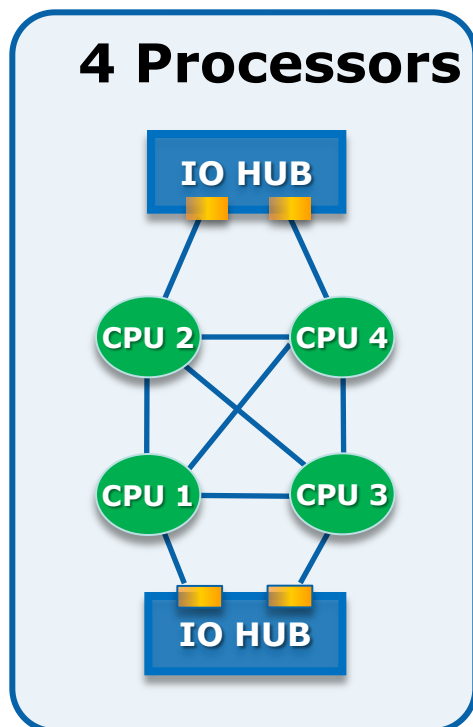


Dynamically Scalable Micro-architecture

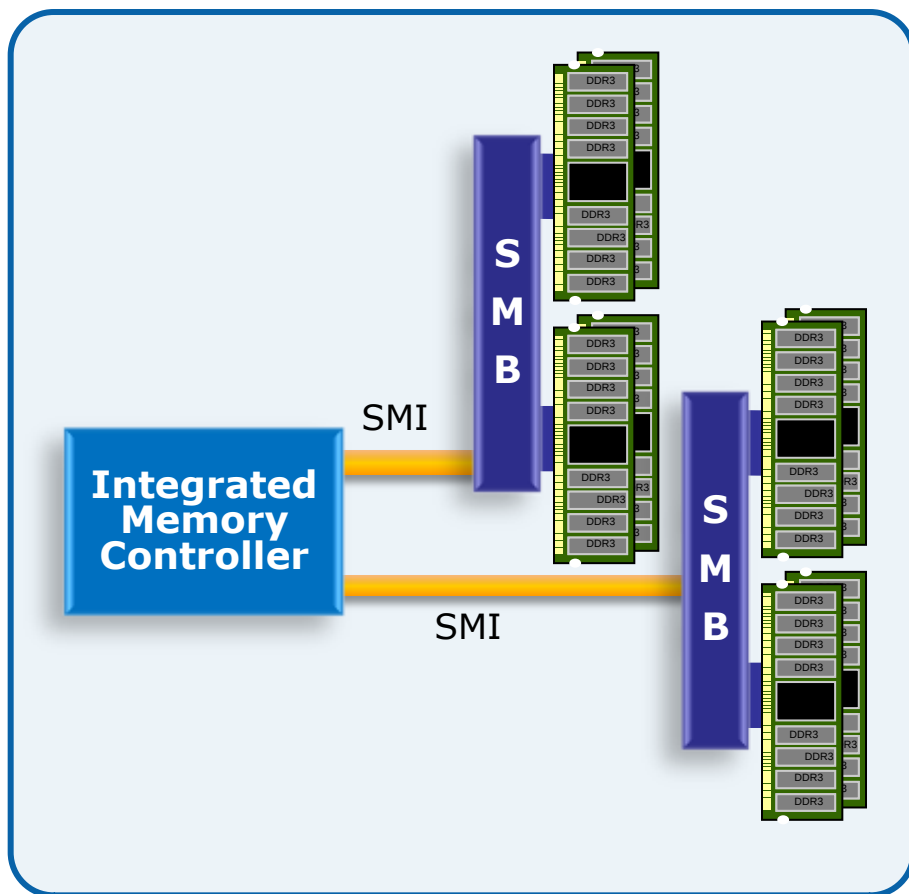
- Up to 8 cores per socket
- Intel® Hyper-Threading Technology (2 threads/core)
- 24MB shared last level cache
- Intel® Turbo Boost Technology for performance boost
- CPU TDP: 130W; 105W; 95W

Scalable Sockets 2, 4, and up to 8+

Sample Platform Configurations



Scalable Memory Subsystem



Integrated Memory Controller (IMC):

- ✓ 2 IMCs per socket
- ✓ High capacity / bandwidth per controller:
 - Up to 8 DIMMs per memory controller
 - 4 DDR Channels for two SMI interface

Scalable Memory Interface (SMI):

- ✓ High speed serial links for maximum bandwidth
- ✓ Run in lockstep mode to minimize latencies & enable RAS

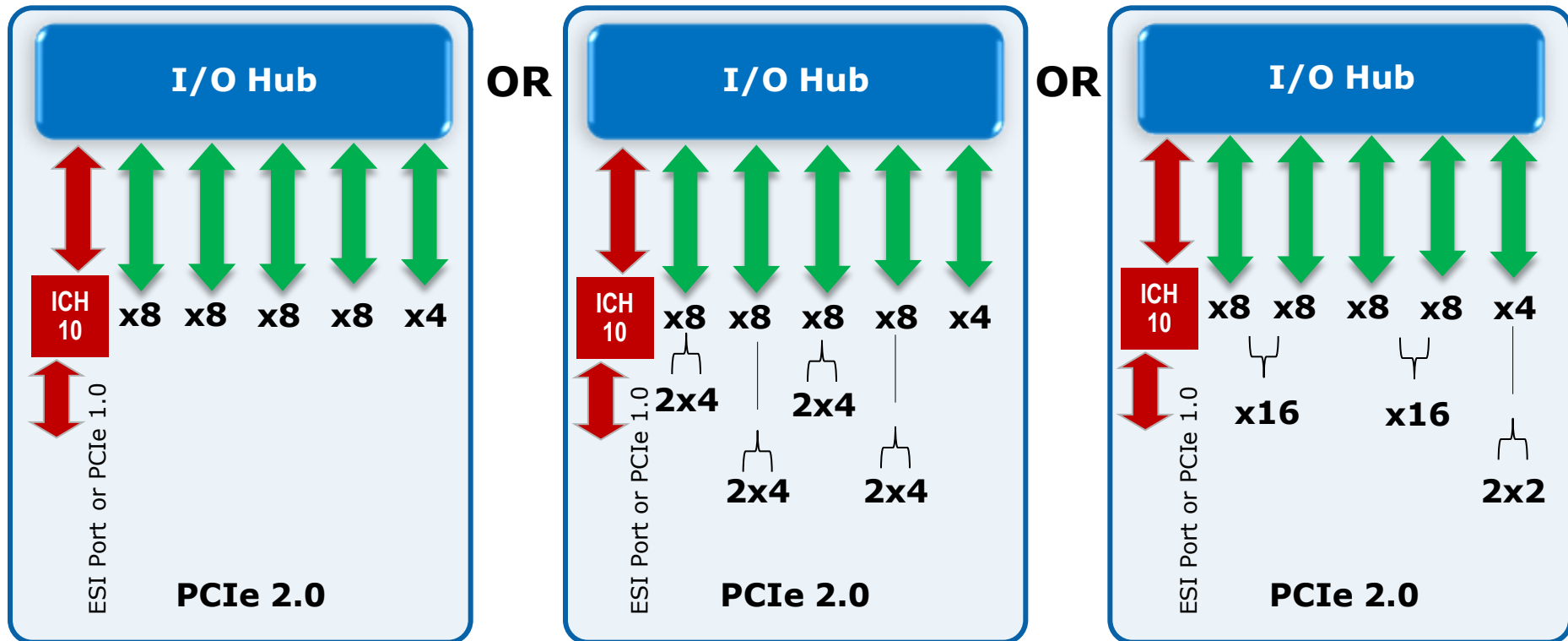
Scalable Memory Buffer (SMB):

- ✓ Memory buffer is on board or memory riser
- ✓ 2 DDR channels & up to 4 DIMMs per buffer

Memory Capacity: Max population with 16GB DIMMS = 256 GB / Socket
Theoretical Peak Bandwidth: 50 GB/s/Socket

Scalable I/O PCIe Interconnect

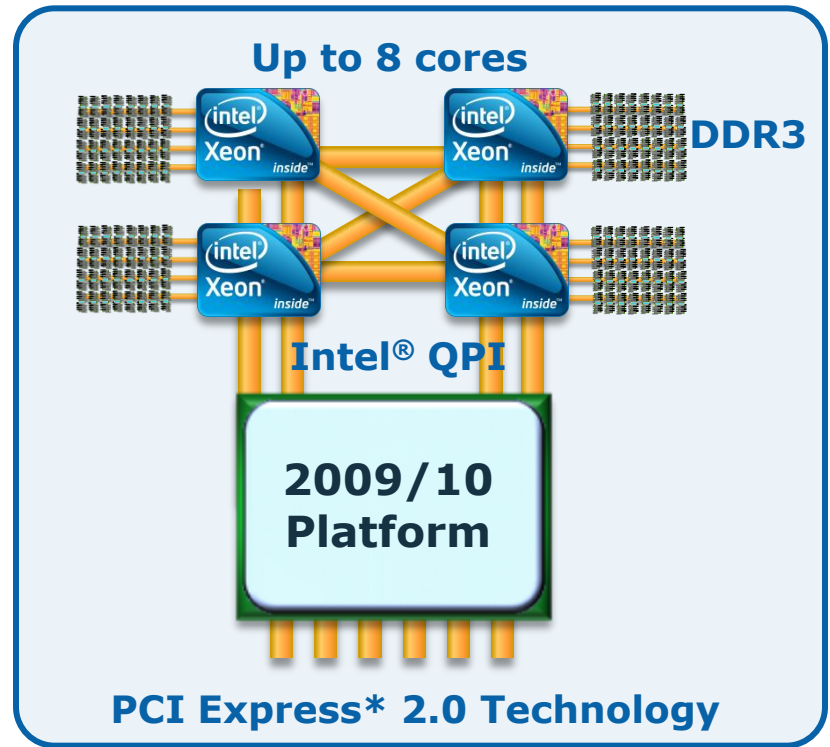
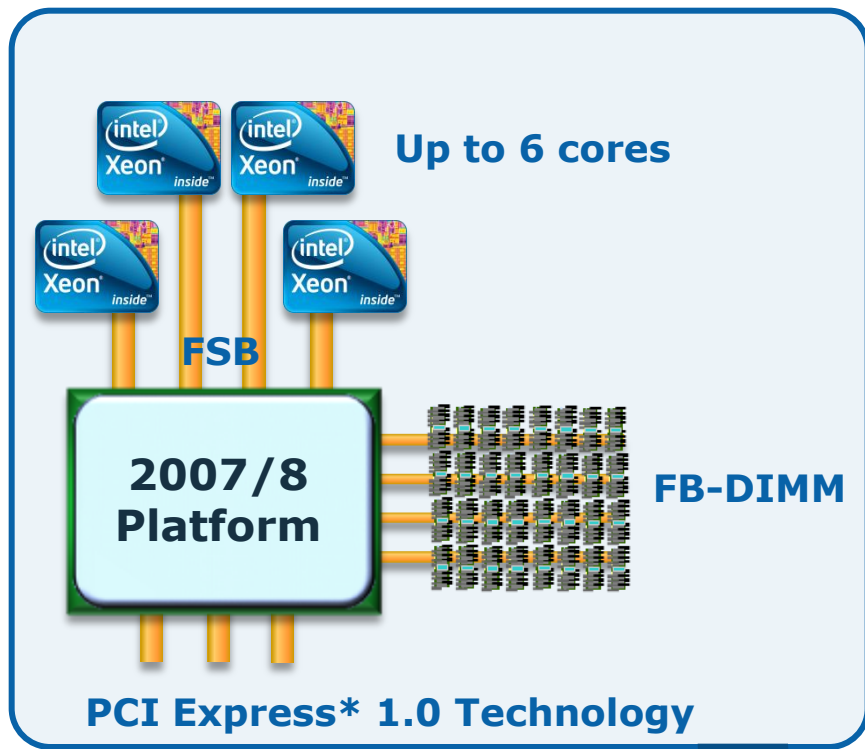
PCI Express* (PCIe) Technology Configurations



Scalability:

- 2 Sockets – up to 2 I/O Hubs = (72+10) Lanes
- 4 Sockets – 2 or 3 I/O Hubs = (72+10) or (108+14) Lanes
- 8 Sockets – 4 I/O Hubs = (144 + 18) Lanes

Platform Capability Enhancement



Peak CPU-CPU BW: 8 GB/s
Peak CPU-Chipset: 34 GB/s
Peak Memory BW: 32 (FBD-667)
Peak I/O BW: 2.5GT/s , PCIe 1.0

Architectural Innovations:

- Front Side Bus (FSB) to Intel® QuickPath Interconnect with integrated memory controller
- FB-DIMM to DDR3
- PCI Express* Technology (PCIe) 1.0 to 2.0...

Peak CPU-CPU BW: 25.6 GB/s
Peak CPU-Chipset: 102.4 GB/s
Peak Memory BW: 200 (DDR3-1067)
Peak I/O BW: 5GT/s, PCIe 2.0

Note: Peak Memory BW represents theoretical peak; not actual measurement

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Intelligent and Expandable High-End Intel® Server Platform

Business Driver	Performance	Nehalem-EX vs. Intel Xeon® 7400
Consolidation	Memory Bandwidth	Up to 9X
High Data Demands	Database Performance	>2.5X
Virtualization	Integer Throughput	>1.7X
Scalability	FP Throughput	>2.2X

Note: The comparison is based on 6-core Intel Xeon®7400 and 8-core Nehalem-EX

Nehalem-EX (NHM-EX)= High-End Intel® Server Platform, Codenamed Nehalem-EX

Risk Factors

The above statements and any others in this document that refer to plans and expectations for the third quarter, the year and the future are forward-looking statements that involve a number of risks and uncertainties. Many factors could affect Intel's actual results, and variances from Intel's current expectations regarding such factors could cause actual results to differ materially from those expressed in these forward-looking statements. Intel presently considers the following to be the important factors that could cause actual results to differ materially from the corporation's expectations. Ongoing uncertainty in global economic conditions pose a risk to the overall economy as consumers and businesses may defer purchases in response to tighter credit and negative financial news, which could negatively affect product demand and other related matters. Consequently, demand could be different from Intel's expectations due to factors including changes in business and economic conditions, including conditions in the credit market that could affect consumer confidence; customer acceptance of Intel's and competitors' products; changes in customer order patterns including order cancellations; and changes in the level of inventory at customers. Intel operates in intensely competitive industries that are characterized by a high percentage of costs that are fixed or difficult to reduce in the short term and product demand that is highly variable and difficult to forecast. Additionally, Intel is in the process of transitioning to its next generation of products on 32nm process technology, and there could be execution issues associated with these changes, including product defects and errata along with lower than anticipated manufacturing yields. Revenue and the gross margin percentage are affected by the timing of new Intel product introductions and the demand for and market acceptance of Intel's products; actions taken by Intel's competitors, including product offerings and introductions, marketing programs and pricing pressures and Intel's response to such actions; and Intel's ability to respond quickly to technological developments and to incorporate new features into its products. The gross margin percentage could vary significantly from expectations based on changes in revenue levels; capacity utilization; start-up costs, including costs associated with the new 32nm process technology; variations in inventory valuation, including variations related to the timing of qualifying products for sale; excess or obsolete inventory; product mix and pricing; manufacturing yields; changes in unit costs; impairments of long-lived assets, including manufacturing, assembly/test and intangible assets; and the timing and execution of the manufacturing ramp and associated costs. Expenses, particularly certain marketing and compensation expenses, as well as restructuring and asset impairment charges, vary depending on the level of demand for Intel's products and the level of revenue and profits. The current financial stress affecting the banking system and financial markets and the going concern threats to investment banks and other financial institutions have resulted in a tightening in the credit markets, a reduced level of liquidity in many financial markets, and heightened volatility in fixed income, credit and equity markets. There could be a number of follow-on effects from the credit crisis on Intel's business, including insolvency of key suppliers resulting in product delays; inability of customers to obtain credit to finance purchases of our products and/or customer insolvencies; counterparty failures negatively impacting our treasury operations; increased expense or inability to obtain short-term financing of Intel's operations from the issuance of commercial paper; and increased impairments from the inability of investee companies to obtain financing. 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