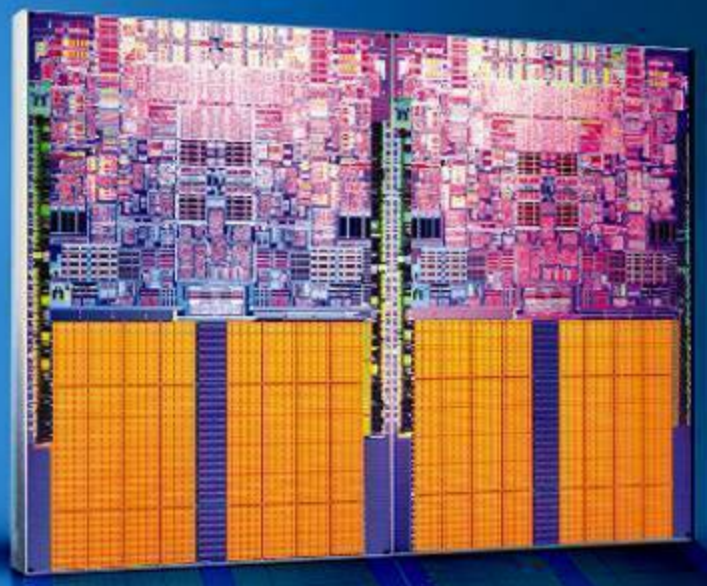


Server Platforms Group Update

February 21, 2007

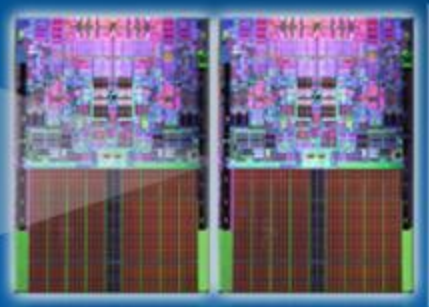
Kirk Skaugen

Vice President, Digital Enterprise Group
General Manager, Server Platforms Group

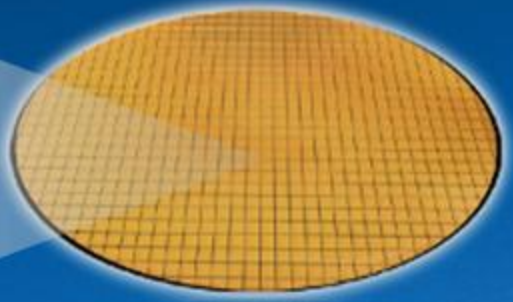
Intel's Energy-Efficient Performance

Process Technology

Microprocessor Design



Factory Network



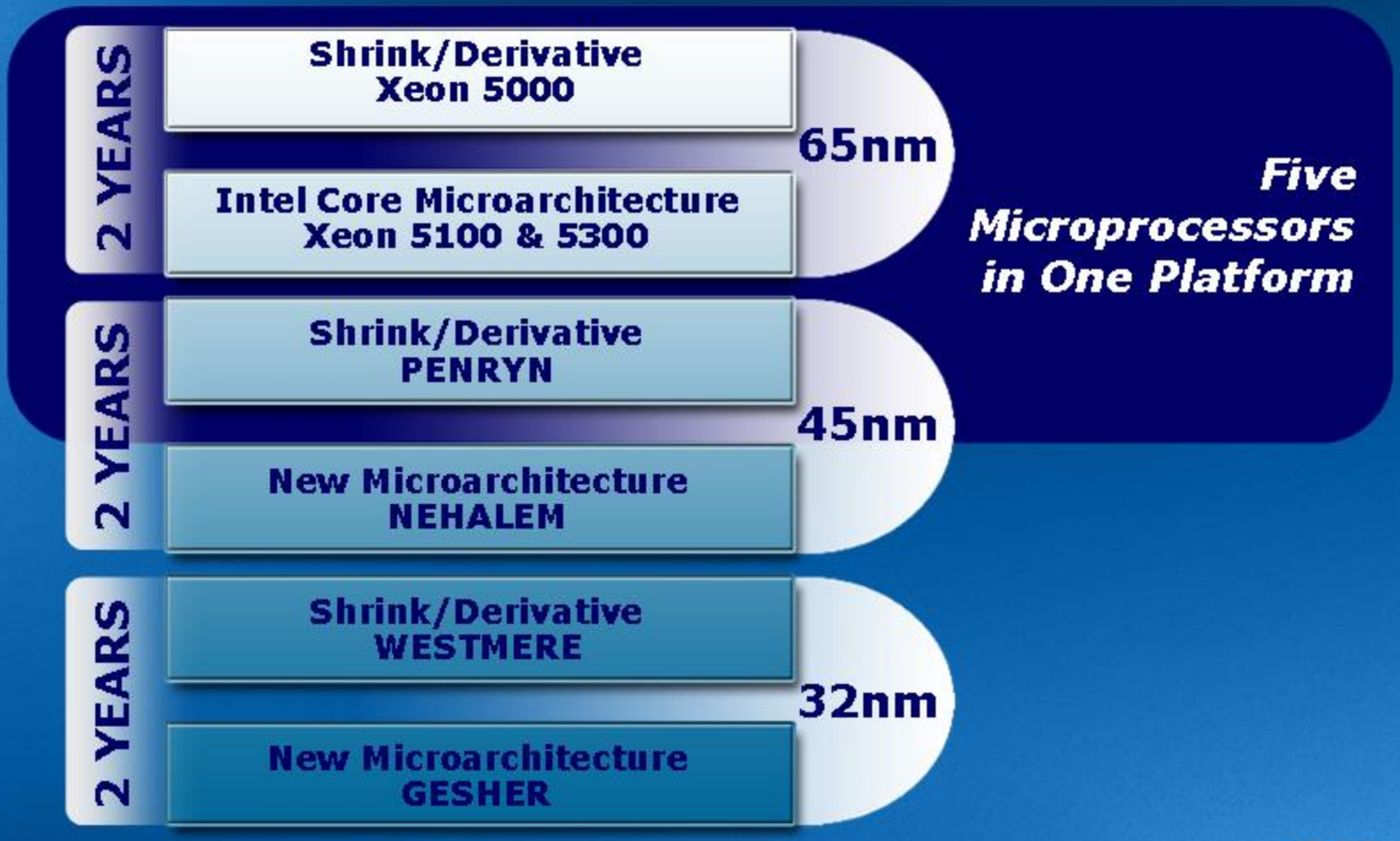
Outstanding Execution

Deliverable	Date	Status
Xeon 5100 (Woodcrest)	June '06	4 Months
Xeon 7100 (Tulsa)	August '06	5 Months
Xeon 5148 (40W LV)	September '06	1 Quarter
Xeon 5300 (Clovertown)	November '06	1 Quarter
Clovertown LV (50W)	Q1'07	On Track
Caneland Platform	Q3'07	On Track
45nm Xeon	2H'07	1 Quarter+

Operational Excellence Continues

All dates, product descriptions, availability and plans are forecasts and subject to change without notice.

Intel Design & Process Cadence



All dates, product descriptions, availability and plans are forecasts and subject to change without notice.

Initial Results

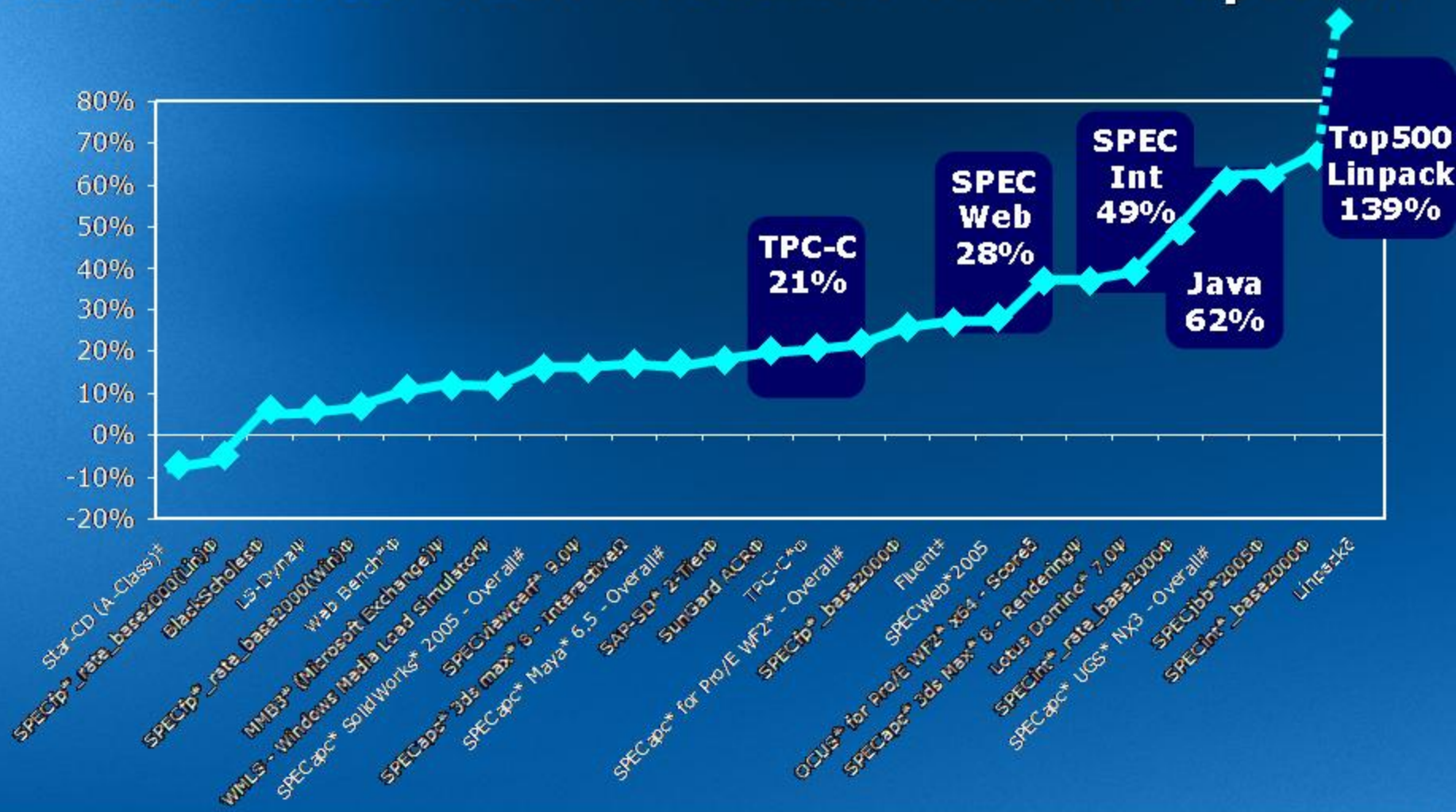
- Solid Market Performance
  - Record Volume in Q4'06
  - Market Segment Share Increased
  - Average Selling Price Higher
- Key Segment Momentum
  - Wall Street
  - Mega-Datacenters
  - High-Performance Computing

Intel & Sun Alliance Announcement

- Broad multi-year strategic alliance
- Sun* roadmap commitment
  - 1P, 2P, 4P, >4P
  - Telco, WS, Enterprise
- Intel endorsement of Solaris* as a mainstream OS for Xeon

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

Dual-Core Intel® Xeon® Processor vs. AMD* Opteron*

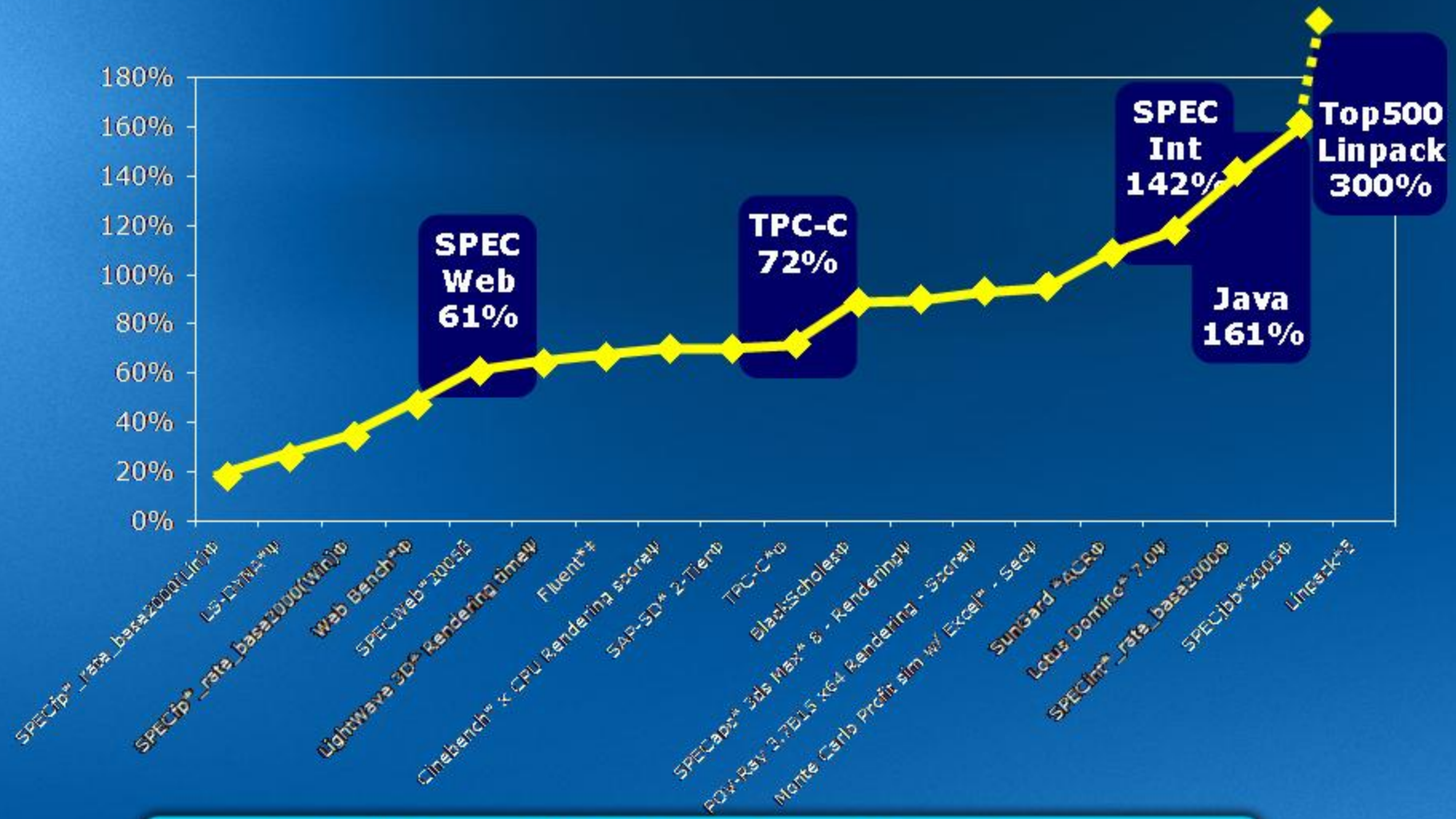


Intel Xeon 5100 Series – Energy Efficient Leadership

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. *Other names and brands may be claimed as the property of others.

Xeon 5160 – Dual-Core Intel® Xeon® Processor 5160
Φ Dual-Core AMD Opteron* Model 222DSE (2.80 GHz); β Dual-Core AMD Opteron* Model 221B (2.60 GHz); Ψ Dual-Core AMD Opteron* Model 285 (2.60 GHz)
δ Dual-Core AMD Opteron* Model 280 (2.40 GHz); ‡ Dual-Core AMD Opteron* Model 275 (2.20 GHz); Ω Single-Core AMD Opteron* Model 256 (3.0 GHz)
Single-Core AMD Opteron* Model 254 (2.80 GHz)
Data as of February 20, 2007

Quad-Core Intel® Xeon® Processor vs. AMD* Opteron*



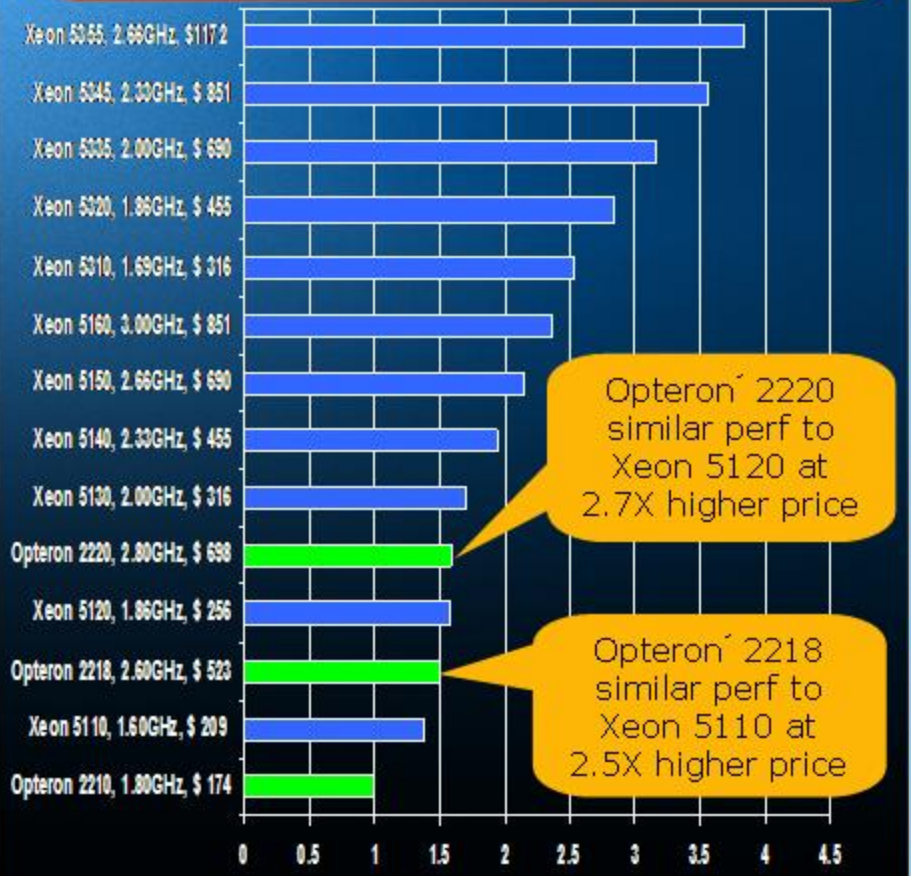
Intel Xeon 5300 Series – Breakaway

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. * Other names and brands may be claimed as the property of others.

Xeon X5355 - Quad-Core Intel® Xeon® Processor X5355; Xeon E5345 - Quad-Core Intel® Xeon® Processor E5345; Xeon 5160 - Dual-Core Intel® Xeon® Processor 5160;
Φ Dual-Core AMD Opteron* Model 2220SE (2.8 GHz); β Dual-Core AMD Opteron* Model 2218 (2.6 GHz); Ψ Dual-Core AMD Opteron* Model 285 (2.6 GHz)
δ Dual-Core AMD Opteron* Model 280 (2.4 GHz); ‡ Dual-Core AMD Opteron* Model 275 (2.2 GHz); Ω Single-Core AMD Opteron* Model 256 (3.0 GHz)
Single-Core AMD Opteron* Model 254 (2.8 GHz)
Data as of February 20, 2007

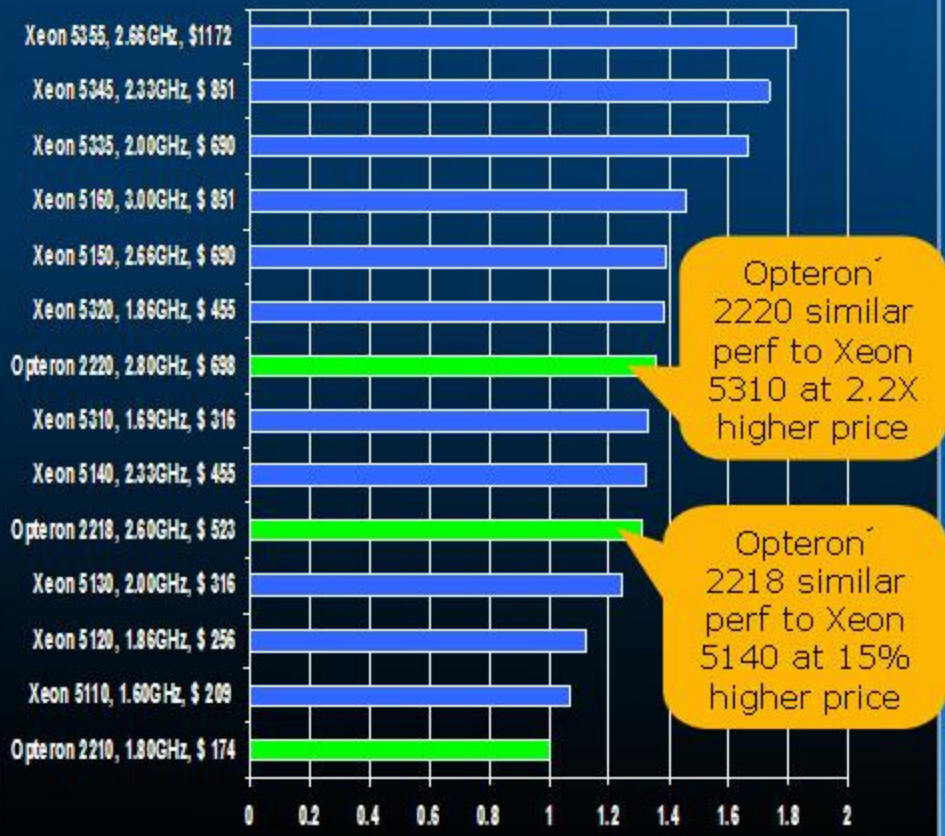
Performance and Price

Relative Windows* Integer Performance
(Posted Results – AMD Pricing as of 2/6/2007)



SPECint*_rate_base2000 published results on Windows*

Relative Windows* Floating Point Performance
(Posted Results – AMD Pricing as of 2/6/2007)



SPECfp*_rate_base2000 published results on Windows*

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. * Other names and brands may be claimed as the property of others.

Multi-Core Power Efficiency

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. *Other names and brands may be claimed as the property of others.

Intel® Xeon® Processor 7100 Series Performance

Gains over Previous Generation

- >2x Performance
- Nearly 3x Performance Per Watt
- 4x Performance Per Dollar

Leadership Benchmarks

- Broad new leadership publications
- Up to 54% over Opteron

		vs. Best Opteron Pub
TPC-C*	Microsoft SQL Server 2005	1.26x¥
SAP-SD* 4P	SAP / Windows Server	1.08x†
SAP-SD* 8P	SAP / Windows Server	1.54x‡‡
SPECjbb*2005	bea / Windows Server	1.33x
SPECint*_rate_base2000		1.02x
SPECfp*_rate_base2000		0.75x

Renewed Intel® Xeon® Processor Leadership

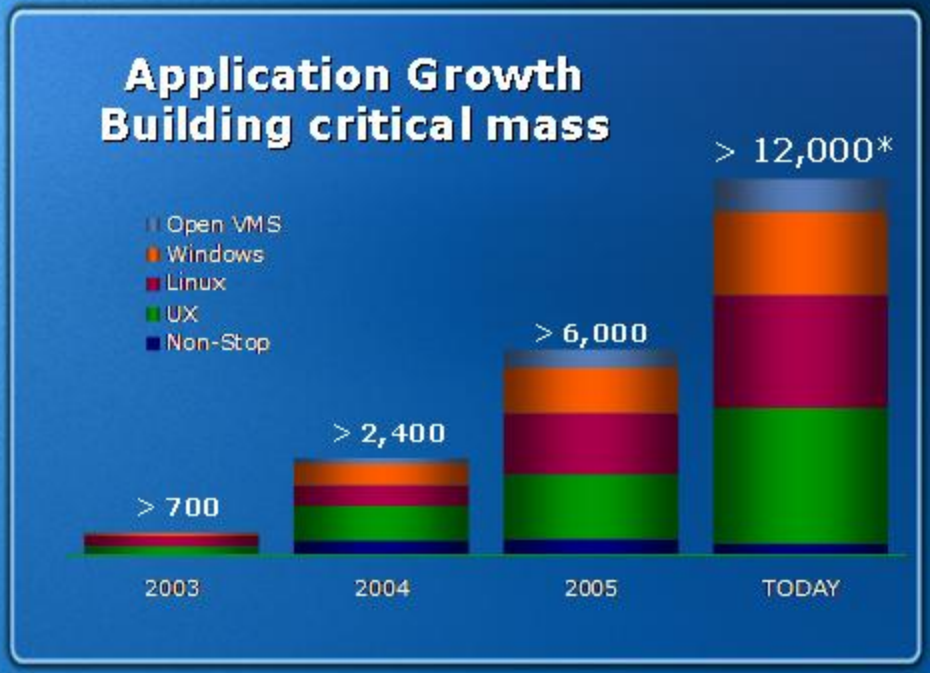
Data as of Feb 17, 2007

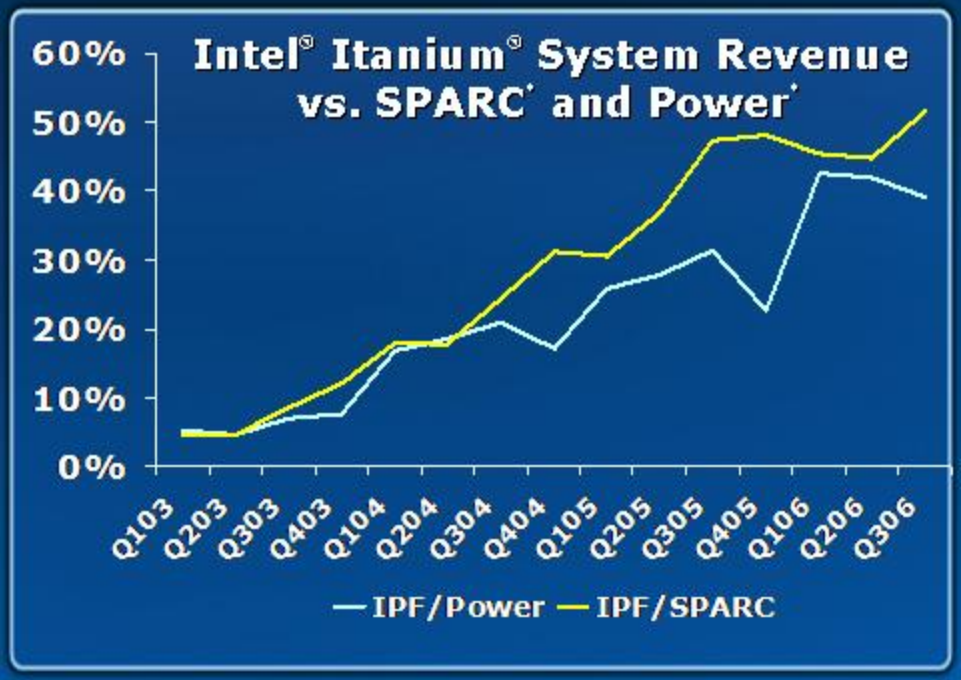
¥ Xeon 7150N – Dual-Core Intel® Xeon® Processor 7150N ("Tulsa 3.50 GHz"); Xeon 7140M – Dual-Core Intel® Xeon® Processor 7140M ("Tulsa 3.40 GHz"); Xeon 7041 – Dual-Core Intel® Xeon® Processor 7041 ("Paxville-MP 3.00 GHz")

AMD Opteron model 8220SE (LATEST); † AMD Opteron model 885 (2.60 GHz); ‡‡ AMD Opteron model 880 (2.4GHz)

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. * Other names and brands may be claimed as the property of others.

Intel® Itanium® Processor Critical Mass





- $6B+ cumulative system revenue
- 100% Volume Increase 2H'06 vs. 2H'05 driven by Dual-Core
- Tokyo Stock Exchange committed to Itanium Architecture
- 80% customer wins in top "G100" global accounts
- Itanium Solutions Alliance $10B investment on-track
- ~50% of New Itanium Application Ports on Windows* & Linux*

* Source: IDC Q3'06 Server Tracker
SPARC Includes: SPARC I, SPARC II, SPARC III, SPARC IV, SPARC 64 and SPARC 64 V;
POWER Includes: Power RS64 II, Power RS64 III, Power RS64 III, Power 3, Power 4, Power 5, and PowerPC
Other names and brands may be claimed as the property of others

Innovation Cycle Continues

- **New:** 3GHz Clovertown
- HPC and Workstation Innovation
  - **New:** Xeon 5000 Series HPC/WS Chipset 2H'07
  - 1600MHz FSB, Larger Snoop Filter
- Intel® Core™ Microarchitecture in Xeon 7000 Sequence
  - On Track for Q3'07
  - Enabling High Density Blades
  - Dedicated Quad Independent Bus
- Virtualization for Directed I/O (VT-d)

All dates, product descriptions, availability and plans are forecasts and subject to change without notice.

Risk Factors

This presentation contains forward-looking statements that involve a number of risks and uncertainties. These statements do not reflect the potential impact of any mergers, acquisitions, divestitures, investments or other similar transactions that may be completed in the future. The information presented is accurate only as of today's date and will not be updated. In addition to any factors discussed in the presentation, the important factors that could cause actual results to differ materially include the following: 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, significant pricing pressures, and product demand that is highly variable and difficult to forecast. 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, marketing programs and pricing pressures and Intel's response to such actions; Intel's ability to respond quickly to technological developments and to incorporate new features into its products; and the availability of sufficient components from suppliers to meet demand. Factors that could cause demand to be different from Intel's expectations include customer acceptance of Intel and competitors' products; changes in customer order patterns, including order cancellations; changes in the level of inventory at customers; and changes in business and economic conditions. The gross margin percentage could vary significantly from expectations based on changes in revenue levels; product mix and pricing; capacity utilization; variations in inventory valuation; excess or obsolete inventory; 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, including start-up costs. Expenses, particularly certain marketing and compensation expenses, vary depending on the level of demand for Intel's products, the level of revenue and profits and impairments of long-lived assets. Intel is in the midst of a structure and efficiency program which is resulting in several actions that could have an impact on expected expense levels and gross margin. The tax rate expectation is based on current tax law and current expected income and assumes Intel continues to receive tax benefits for export sales. The tax rate may be affected by the closing of acquisitions or divestitures; the jurisdictions in which profits are determined to be earned and taxed; changes in the estimates of credits, benefits and deductions; the resolution of issues arising from tax audits with various tax authorities; and the ability to realize deferred tax assets. Gains or losses from equity securities and interest and other could vary from expectations depending on equity market levels and volatility; gains or losses realized on the sale or exchange of securities; impairment charges related to marketable, non-marketable and other investments; interest rates; cash balances; and changes in fair value of derivative instruments. Dividend declarations and the dividend rate are at the discretion of Intel's board of directors, and plans for future dividends may be revised by the board. Intel's dividend and stock buyback programs could be affected by changes in its capital spending programs, changes in its cash flows and changes in the tax laws, as well as by the level and timing of acquisition and investment activity. Intel's results could be affected by the amount, type, and valuation of share-based awards granted as well as the amount of awards cancelled due to employee turnover and the timing of award exercises by employees. Intel's results could be impacted by unexpected economic, social, political and physical/infrastructure conditions in the countries in which Intel, its customers or its suppliers operate, including military conflict and other security risks, natural disasters, infrastructure disruptions, health concerns and fluctuations in currency exchange rates. Intel's results could be affected by adverse effects associated with product defects and errata (deviations from published specifications), and by litigation or regulatory matters involving intellectual property, stockholder, consumer, antitrust and other issues, such as the litigation and regulatory matters described in Intel's SEC reports. A more detailed discussion of these and other factors that could affect Intel's results is included in Intel's SEC filings, including the report on Form 10-Q for the quarter ended Sept. 30, 2006.

intel®

Leap ahead™

Data as of Feb 20, 2007

Intel Xeon 5160 Performance Publications

SERVER BENCHMARKS		Xeon 5160 over Opt 2xxx
TPC-C*	HP, SQL Server 2005	1.21x[Φ]
SAP-SD* 2-Tier	IBM, SAP, Windows Server	1.18x[Φ]
SPECjbb*2005	DELL, Windows Server	1.62x[Φ]
MMB3* (Microsoft Exchange)	Fujitsu Siemens, Windows Server	1.12x[Ψ]
Lotus Domino* 7.0	IBM, SUSE, Lotus software	1.39x[Ψ]
SPECWeb*2005	DELL, SUSE	1.28x[β]
SPECint*_rate_base2000	DELL, Windows Server	1.49x[Φ]
SPECfp*_rate_base2000(Lin	DELL, redhat	0.95x[Φ]
SPECfp*_rate_base2000(Wir	IBM, Windows Server	1.07x[Φ]
SPECint*_base2000	DELL, Windows Server	1.67x[Φ]
SPECfp*_base2000	DELL, redhat	1.26x[Φ]
Web Bench*		1.11x[Φ]

HPC BENCHMARKS		Xeon 5160 over Opt 2xxx
Linpack	Verari systems, redhat	2.39x[δ]
Fluent	FLUENT, redhat	1.27x[‡]
LS-Dyna	ANSYS, redhat	1.06x[Ψ]
Star-CD (A-Class)	CD-adapco, redhat	0.93x[‡]

WORKSTATION BENCHMARKS		Xeon 5160 over Opt 2xxx
SPECapc* SolidWorks* 2005 - Overall	DELL	1.16x[#]
SPECviewperf* 9.0	HP	1.16x[Ψ]
SPECapc* 3ds Max* 8 - Rendering	HP	1.37x[Ψ]
SPECapc* 3ds max* 8 - Interactive	HP	1.17x[Ω]
OCUS* for Pro/E WF2* x64 - Score	HP	1.37x[δ]
SPECapc* Maya* 6.5 - Overall	IBM	1.17x[#]
SPECapc* for Pro/E WF2* - Overall	IBM	1.22x[#]
SPECapc* UGS* NX3 - Overall	Fujitsu Siemens	1.61x[#]

APPLICATION PERFORMANCE	Xeon 5160 over Opt 2xxx
BlackScholes	1.06x[Φ]
SunGard ACR	1.20x[Φ]
WMLS - Windows Media Load Simulator	1.12x[Ψ]

PERFORMANCE PER WATT	Xeon 5160 over Opt 2xxx
SPECint_rate_base2000	1.84x[Ψ]
WebBench	1.47x[Ψ]
SunGard ACR	1.43x[Ψ]
BlackScholes	1.38x[Ψ]
WMLS	1.33x[Ψ]

Continued Leadership vs. Latest Opteron*

Xeon 5160 – Dual-Core Intel® Xeon® Processor 5160
Φ Dual-Core AMD Opteron* Model 2220SE (2.80 GHz); β Dual-Core AMD Opteron* Model 2218 (2.60 GHz); Ψ Dual-Core AMD Opteron* Model 285 (2.60 GHz)
δ Dual-Core AMD Opteron* Model 280 (2.40 GHz); ‡ Dual-Core AMD Opteron* Model 275 (2.20 GHz); Ω Single-Core AMD Opteron* Model 256 (3.0 GHz)
Single-Core AMD Opteron* Model 254 (2.80 GHz)

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. * Other names and brands may be claimed as the property of others.

Data as of Feb 20, 2007

Intel® Xeon® 5100 and 5300 Series Performance Publications

SERVER BENCHMARKS			Xeon x5355/ Xeon 5160 vs. Opt 2xxx
TPC-C*	hp	SQL Server 2005	1.72x[Φ]
SAP-SD* 2-Tier	hp	SAP, Windows Server	1.70x[Φ]
SPECjbb*2005	DELL	bea, Windows Server	2.61x[Φ]
MMB3* (Microsoft Exchange)	Fujitsu Siemens	Windows Server	1.12x[Ψ]
Lotus Domino* 7.0	IBM	suse, Lotus software	2.18x[Ψ]
SPECWeb*2005	Fujitsu Siemens	redhat	1.61x[β]
SPECint*_rate_base2000	Fujitsu Siemens	Windows Server	2.42x[Φ]
SPECfp*_rate_base2000(Lin)	Fujitsu Siemens	suse	1.18x[Φ]
SPECfp*_rate_base2000(Win	IBM	Windows Server	1.34x[Φ]
SPECint*_base2000	DELL	Windows Server	1.67x[Φ]
SPECfp*_base2000	DELL	redhat	1.26x[Φ]
Web Bench*			1.47x[Φ]

HPC BENCHMARKS				
Linpack*	Verari systems		redhat	4.00x[δ]
Fluent*	IBM	FLUENT	redhat	1.67x[‡]
LS-DYNA*	IBM	ANSYS	redhat	1.26x[Ψ]
Star-CD *(A-Class)		CD-adapco	redhat	0.93x[‡]

WORKSTATION BENCHMARKS		Xeon x5355/ Xeon 5160 vs. Opt 2xxx
POV-Ray 3.7B15 x64 Rendering - Score		1.93x[Ψ]
Monte Carlo Profit sim w/ Excel* - Sec	hp	1.95x[Ψ]
LightWave 3D* Rendering time		1.64x[Ψ]
Cinebench* x CPU Rendering score	hp	1.70x[Ψ]
SPECapc* 3ds Max* 8 - Rendering	hp	1.90x[Ψ]
SPECapc* 3ds max* 8 - Interactive	hp	1.17x[Ω]
OCUS* for Pro/E WF2* x64 - Score	hp	1.37x[δ]
SPECapc* Maya* 6.5 - Overall	IBM	1.17x[#]
SPECapc* for Pro/E WF2* - Overall	IBM	1.22x[#]
SPECapc* UGS* NX3 - Overall	Fujitsu Siemens	1.61x[#]

APPLICATION PERFORMANCE	Xeon X5355 vs. Opteron 2.80(F)
BlackScholes*	1.89x[Φ]
SunGard *ACR	2.09x[Φ]
Windows Media Load Simulator (WMLS)	1.12x[Ψ]

Data Source: Published or Submitted results as of Nov 13, 06

Intel Xeon 5300 Series Extends Performance Leadership

Xeon X5355 – Quad-Core Intel® Xeon® Processor X5355; Xeon E5345 – Quad-Core Intel® Xeon® Processor E5345; Xeon 5160 – Dual-Core Intel® Xeon® Processor 5160;
Φ Dual-Core AMD Opteron* Model 2220SE (2.80 GHz); β Dual-Core AMD Opteron* Model 2218 (2.60 GHz); Ψ Dual-Core AMD Opteron* Model 285 (2.60 GHz)
δ Dual-Core AMD Opteron* Model 280 (2.40 GHz); ‡ Dual-Core AMD Opteron* Model 275 (2.20 GHz); Ω Single-Core AMD Opteron* Model 256 (3.0 GHz)
Single-Core AMD Opteron* Model 254 (2.80 GHz)

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 http://www.intel.com/performance/resources/limits.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104. Copyright © 2006, Intel Corporation. * Other names and brands may be claimed as the property of others.