Introducing Six-Core AMD Opteron™ Processors

Codename “Istanbul”

EMBARGOED UNTIL JUNE 1, 2009

Six-Core AMD Opteron™ Processor Codenamed "Istanbul"

Top-line Performance that's bottom-line efficient

More Versatility

- *Designed for full flexibility in the widest range of platforms*

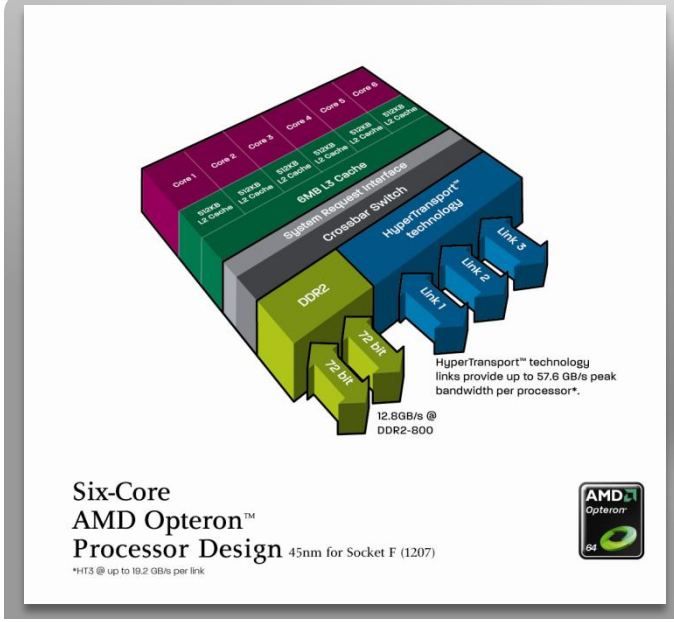
Workload Optimized

- *Designed to optimize both CPU-bound and Memory/IO-bound applications*

Total Cost Advantage

- *Consistent, common design and power efficiency help reduce TCO*

Six-Core AMD Opteron™ Processor ("Istanbul")



- Six true cores
- New HyperTransport™ technology HT Assist
- Increased HyperTransport™ 3 technology (HT3) bandwidth
- Higher performing Integrated Memory Controller
- Same power/thermal envelopes as Quad-Core AMD Opteron™ processor

***Up to a 30% performance increase** over Quad-Core AMD Opteron™ processor codenamed "Shanghai"**

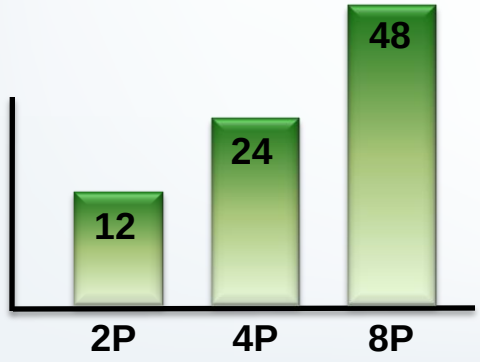
Series	Model	Cores	Freq	NB	Wattage	L2 Cache	L3 Cache	Expected Introduction
8000	8435	6	2.6GHz	2.2GHz	75W	512K/core	6MB	June 1st
8000	8431		2.4GHz					
2000	2435		2.6GHz					
2000	2431		2.4GHz					
2000	2427		2.2GHz					

Low-power EE, HE and higher performance SE processors expected to follow in 3Q09

*Based on internal testing at AMD performance labs as of 3/27/09. For configuration and performance information see slide 45.

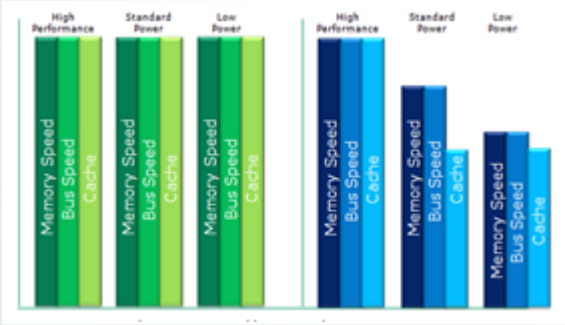
More Versatility

Scalable systems to 48 total cores

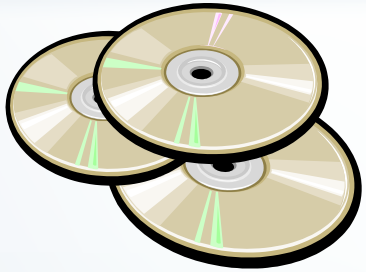


More performance in the same power/thermal envelopes*

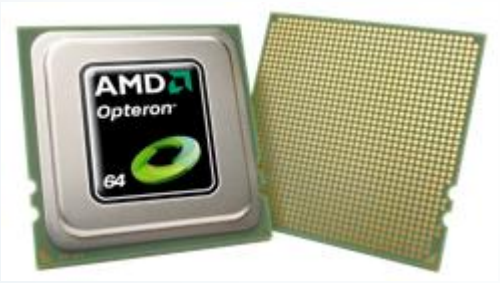
No compromises across the product family



Socket compatible for quick qualification



Platform consistency for easy software deployment

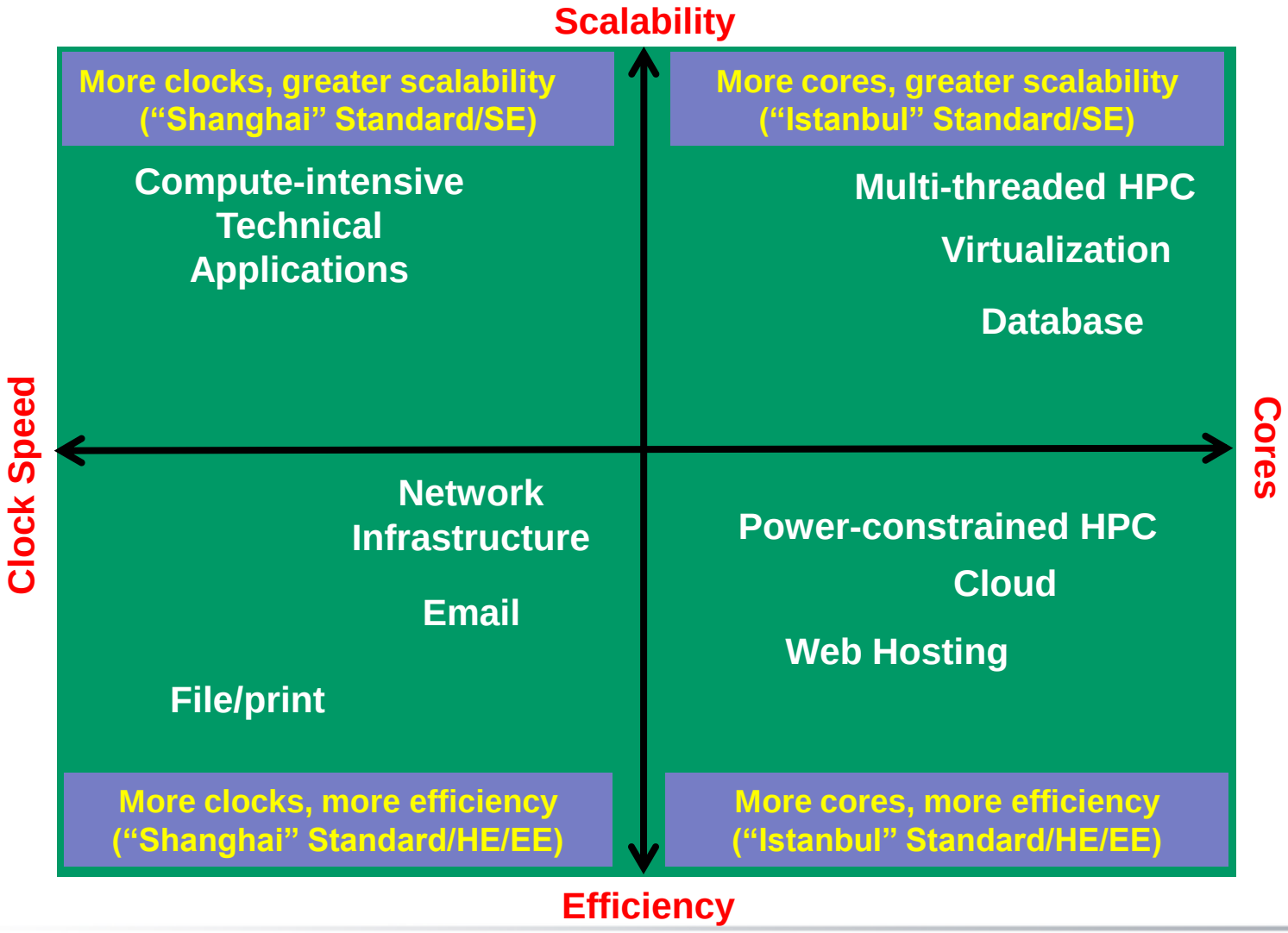


Full line of products from SE down to EE**

*Compared to Quad-Core AMD Opteron™ processor codenamed "Shanghai." **Six-Core AMD Opteron™ EE and SE processors planned launch Q3 09.

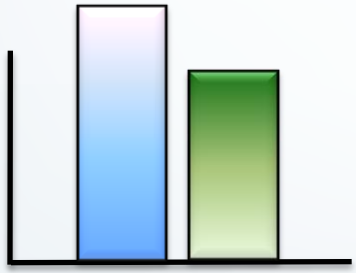
AMD
The future is fusion

Workload Optimized – Processors for Every Application

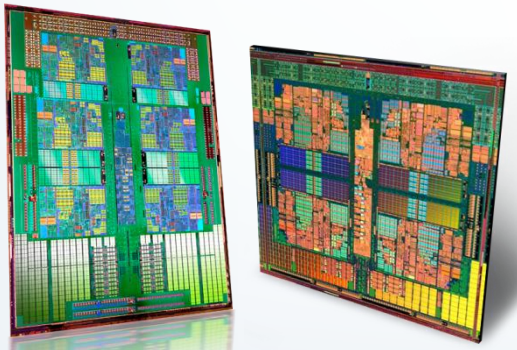


Total Cost Advantage

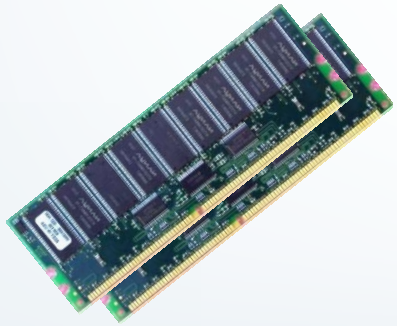
Low platform acquisition cost



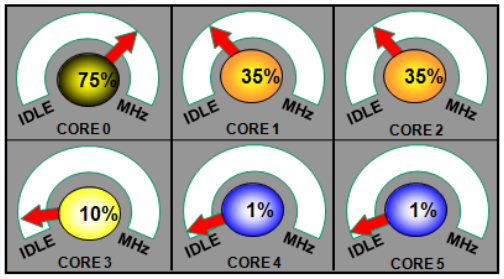
Consistency helps reduce long-term management costs



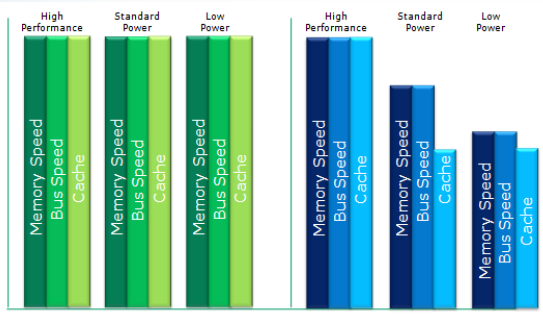
Memory architecture helps reduce system cost



HE & EE 6-core low power processors*



Power efficiency to help drive down utility costs



Consistent features deliver full functionality

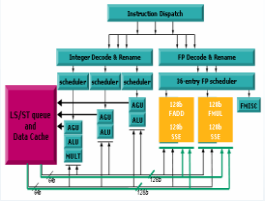
*Six-Core AMD Opteron™ EE and SE processors planned launch Q3 09.

AMD
The future is fusion

Prior Generation Innovations that Continue

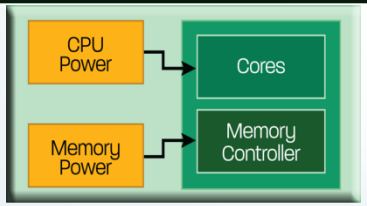
All the performance-enhancing features of "Shanghai"

AMD Wide Floating-Point Accelerator

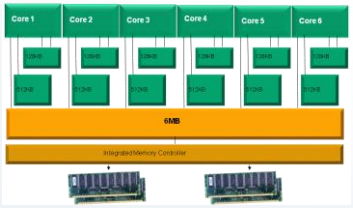


AMD Memory Optimizer Technology

Dual Dynamic Power Management™

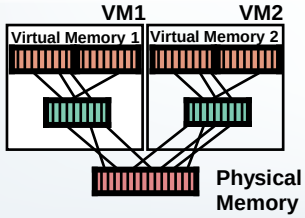


AMD Balanced Smart Cache



HyperTransport™ Technology 3.0

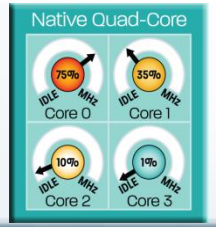
AMD-V



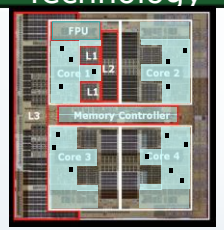
Prior Generation Innovations that Continue

All the power-efficiency features of "Shanghai"

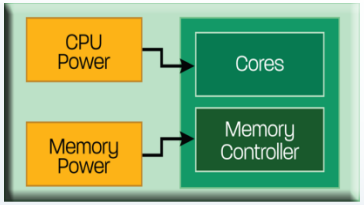
Independent Dynamic Core Technology



AMD CoolCore™ Technology

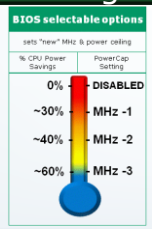


Dual Dynamic Power Management™

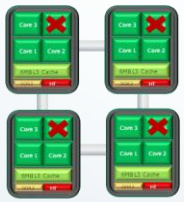


Low-Power DDR2 Memory

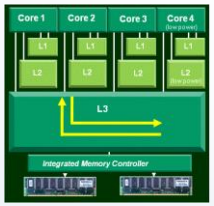
AMD Power Cap manager



Core Select



AMD Smart Fetch



Innovations New to "Istanbul"

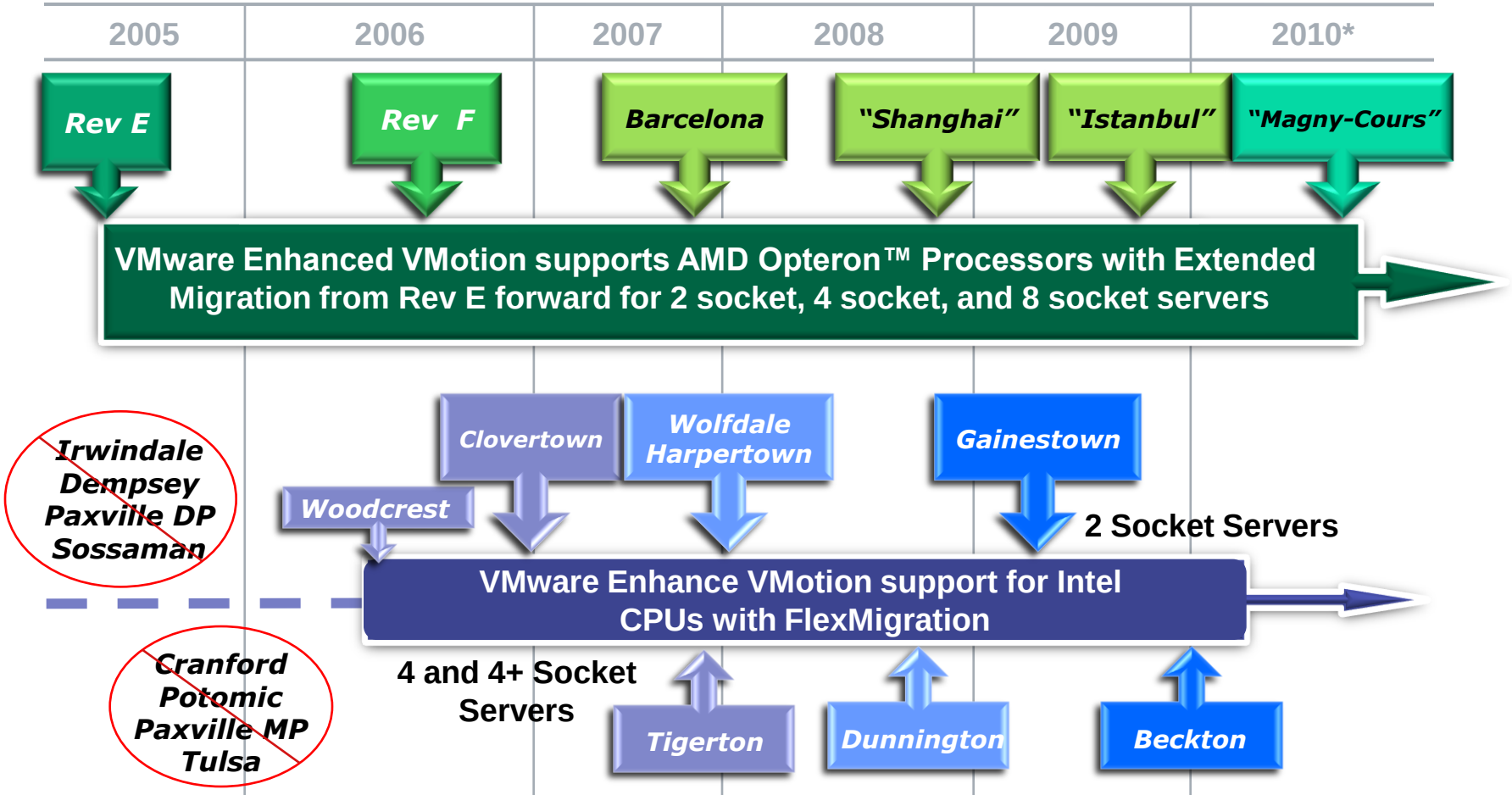
Feature	Description	Benefit
Six Cores per Socket	*Six Core support for F (1207) Socket infrastructure*	*Improves Performance*
HT Assist	*Reduces probe traffic and resolves probes more quickly in multi-socket systems*	*Increases HT bus efficiency*
Higher HyperTransport™ 3.0 Technology Speeds	*Support for up to 4.8GT/s per link*	*Overall System Performance*
APML Remote Power Management Interface (RPMI)	*Remote monitor and control of P-state limits*	*Processor Power Savings*
x8 ECC	Correction for x4 and x8 device failures	*Superior Reliability*
Continued Drop-in Upgradeability for F (1207) Platforms	*Six Cores within same power bands*	*Investment Protection and Time to Market*

"Istanbul" Software Enhancement Strategy

Maintain Software Compatibility	• Maintain compatibility with the existing x86 software ecosystem while achieving optimal performance and power efficiency
Improved Software Performance	• Provide software enhancements that can improve application and virtualization performance
Least Amount of Software Disruption	• Ensure new features are available without requiring code changes for majority of software ecosystem

Support available for major ISVs including Citrix, Microsoft, Novell, Oracle, Red Hat, Sun, and VMware

Flexibility to add new hardware



Source: http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1003212

**** Planned product launch dates and features. Timeline is an approximation.***

*Roadmap subject to change without notice

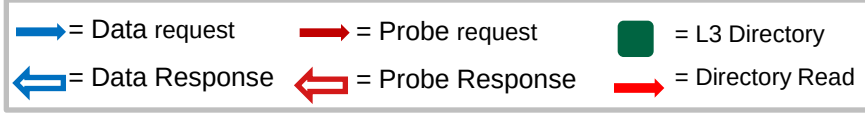
Why HT Assist is important

HT Assist helps increase overall system performance in four-socket and eight socket servers by reducing cache probe traffic between processors

- 4-Way Stream memory bandwidth performance improves by ~60% (42GB/s with HT Assist vs. 25.5GB/s without HT Assist)[1]

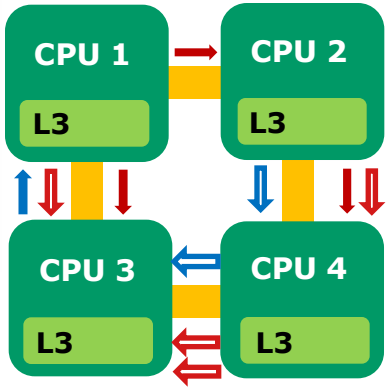
Can result in faster queries that can increase performance for cache sensitive applications including:

- Database
- Virtualization
- HPC



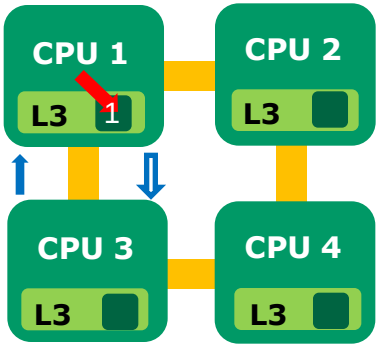
Query Example

Without HT Assist



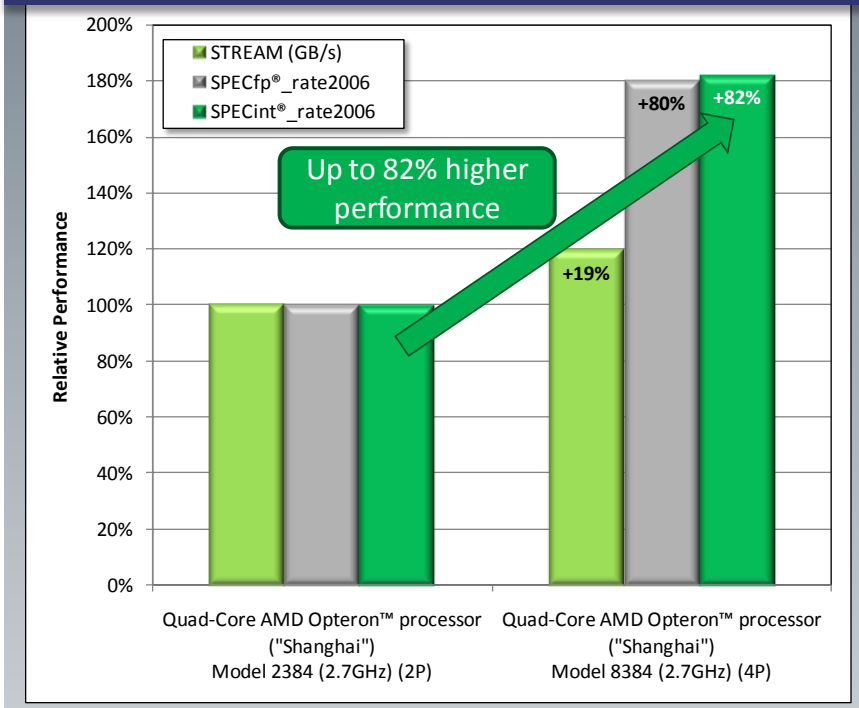
10 transactions

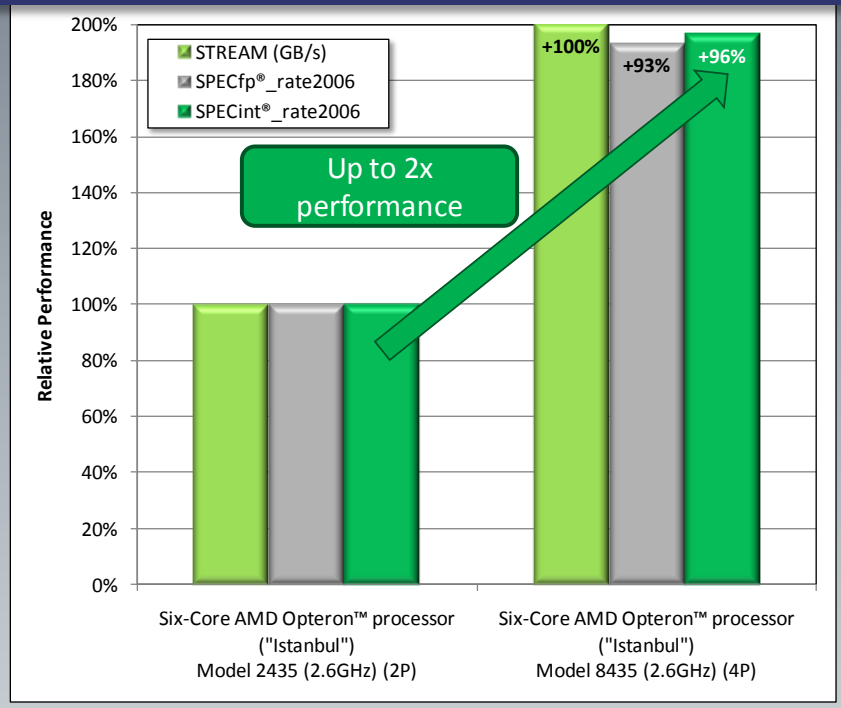
With HT Assist



2 transactions

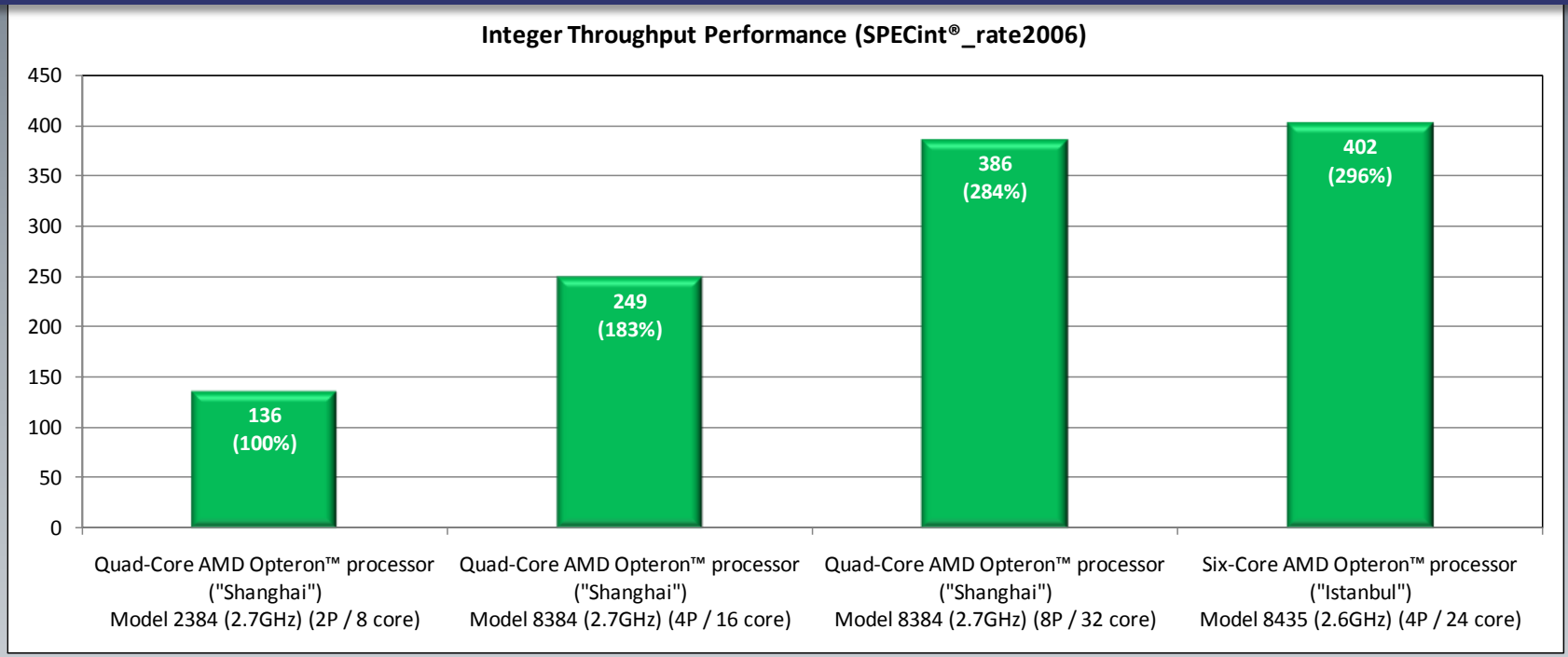
HT Assist Improves Two-Socket to Four-Socket Server Performance Scaling





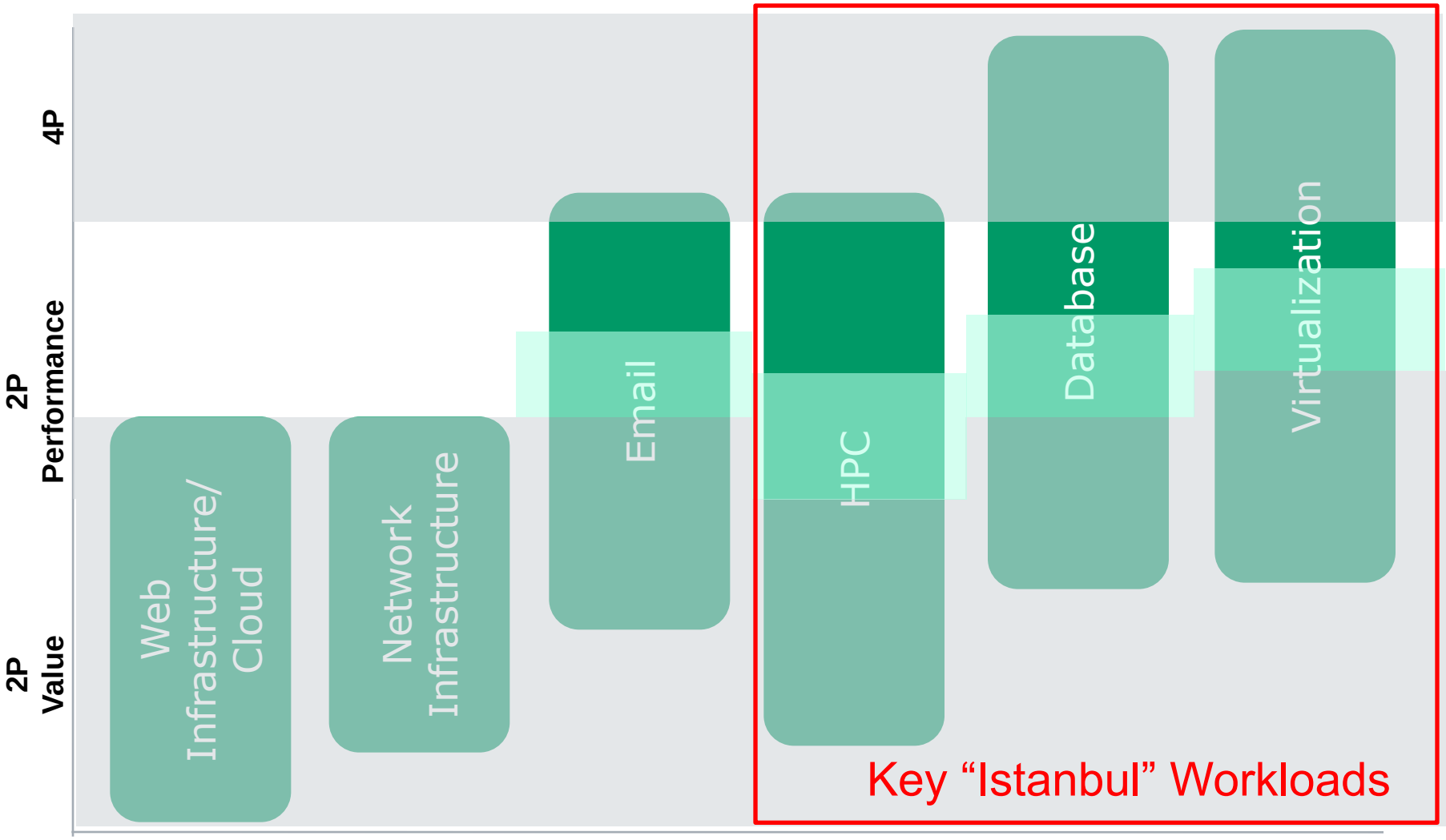
SPEC, SPECint, and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. The SPECint_rate and SPECfp_rate results for Six-Core AMD Opteron™ processors are based upon data submitted to Standard Performance Evaluation Corporation as of May 12, 2009. The other SPECint_rate and SPECfp_rate results stated above reflect results published on http://www.spec.org/ as of May 12, 2009. The STREAM results are based on measurements at AMD performance labs as of May 12, 2009. The SPECint_rate and SPECfp_rate comparisons presented above are based on the best performing two-socket and four-socket servers using AMD Opteron™ processor Models 2384, 8384, 2435, and 8435. For the latest results, visit www.spec.org. Please see backup slides for configuration information.

Four-socket servers using Six-Core AMD Opteron™ processors (24 total cores) can outperform eight-socket servers using Quad-Core AMD Opteron™ processors (32 total cores)



SPEC and SPECint are registered trademarks of the Standard Performance Evaluation Corporation. The SPECint_rate result for Six-Core AMD Opteron™ processor Model 8435 has submitted to Standard Performance Evaluation Corporation as of May 12, 2009. The other SPECint_rate results stated above reflect results published on http://www.spec.org/ as of May 12, 2009. The SPECint_rate comparison presented above is based on the best performing two-socket, four-socket, and eight-socket servers using AMD Opteron™ processor Models 2384, 8384, and 8435. For the latest results, visit www.spec.org. Please see backup slides for configuration information.

"Shanghai" and "Istanbul" – Competitively Addressing the Major Workloads

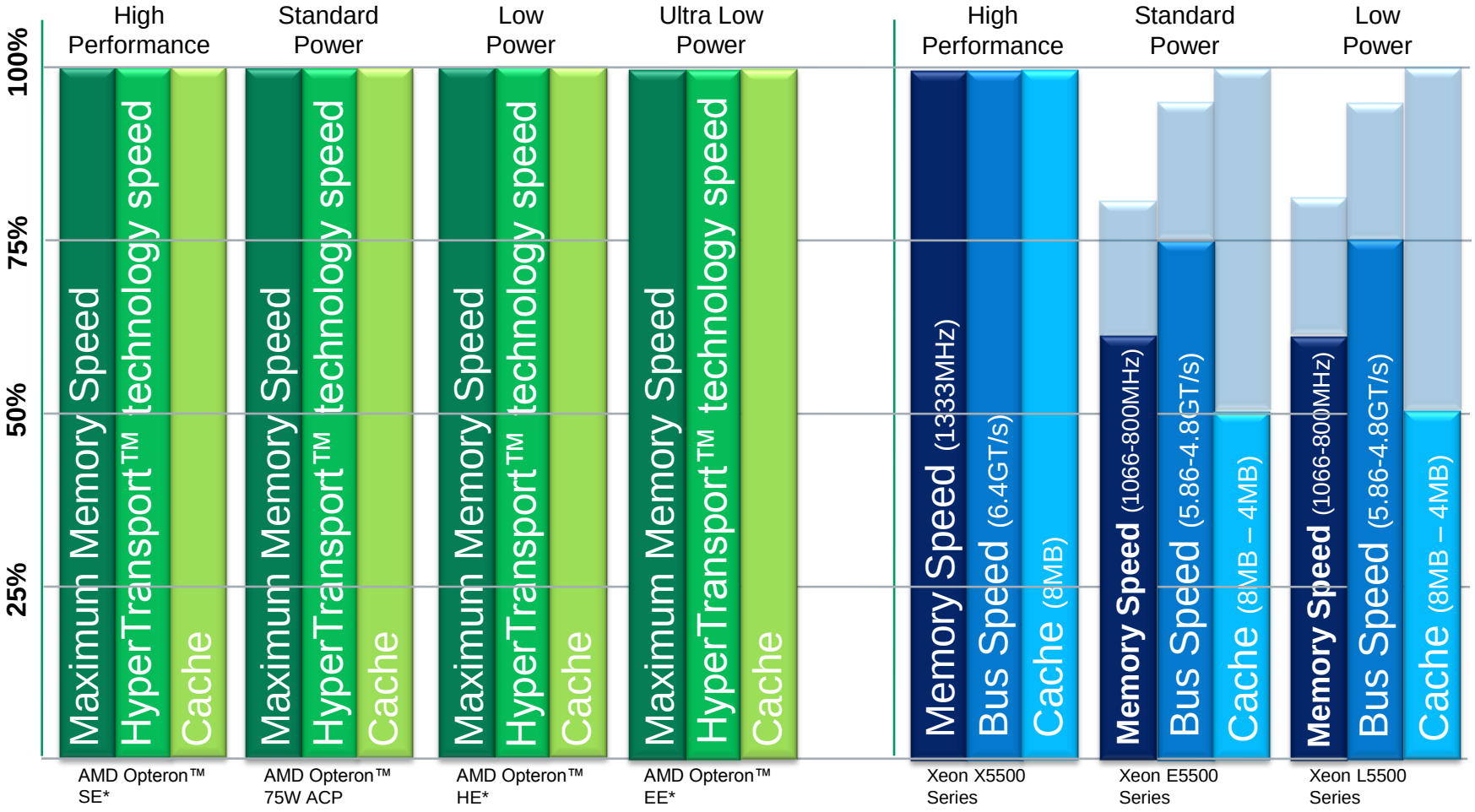


*Information based on AMD research

Workload Needs | Current Shanghai Coverage | New Istanbul Coverage

AMD The future is fusion

Feature Scaling Consistency

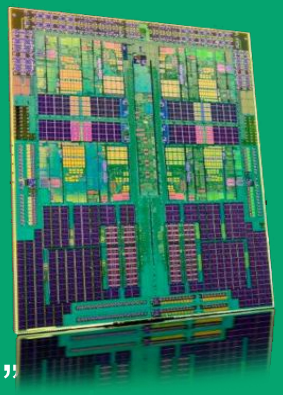


- Consistency in the memory and bus speed support gives customers a more predictable, no-compromise approach to data center deployment
- Helps capacity planning, software image deployment and validation efforts

*Six-Core AMD Opteron™ SE, HE, and EE processors planned launch Q3 09. Intel specifications as of 5/15/09: http://www.intel.com/Assets/PDF/prodbrief/xeon-5500.pdf.

"Shanghai" Versus "Istanbul"

Two processors, one strong value proposition

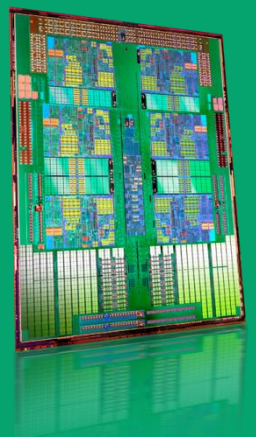


"Shanghai"

Quad-core performance for applications that need a balance of clock speed and threading

Web serving, network infrastructure, email, clock-sensitive HPC

Both deliver outstanding power efficiency and scalability



"Istanbul"

Six-core performance for applications that need a higher amount of threading

Virtualization, database, Performance HPC, cloud computing

Power Efficiency

Six Core AMD Opteron Processor

Server/Workstation Business Unit

Power Efficient Innovations

AMD PowerNow!™ Technology with Independent Dynamic Core Technology
Allows processors and cores to dynamically operate at lower power and frequencies, depending on usage and workload to help reduce TCO and to lower power consumption in the datacenter

AMD Smart Fetch Technology
Can reduce power consumption by allowing idle cores to enter a "halt" state

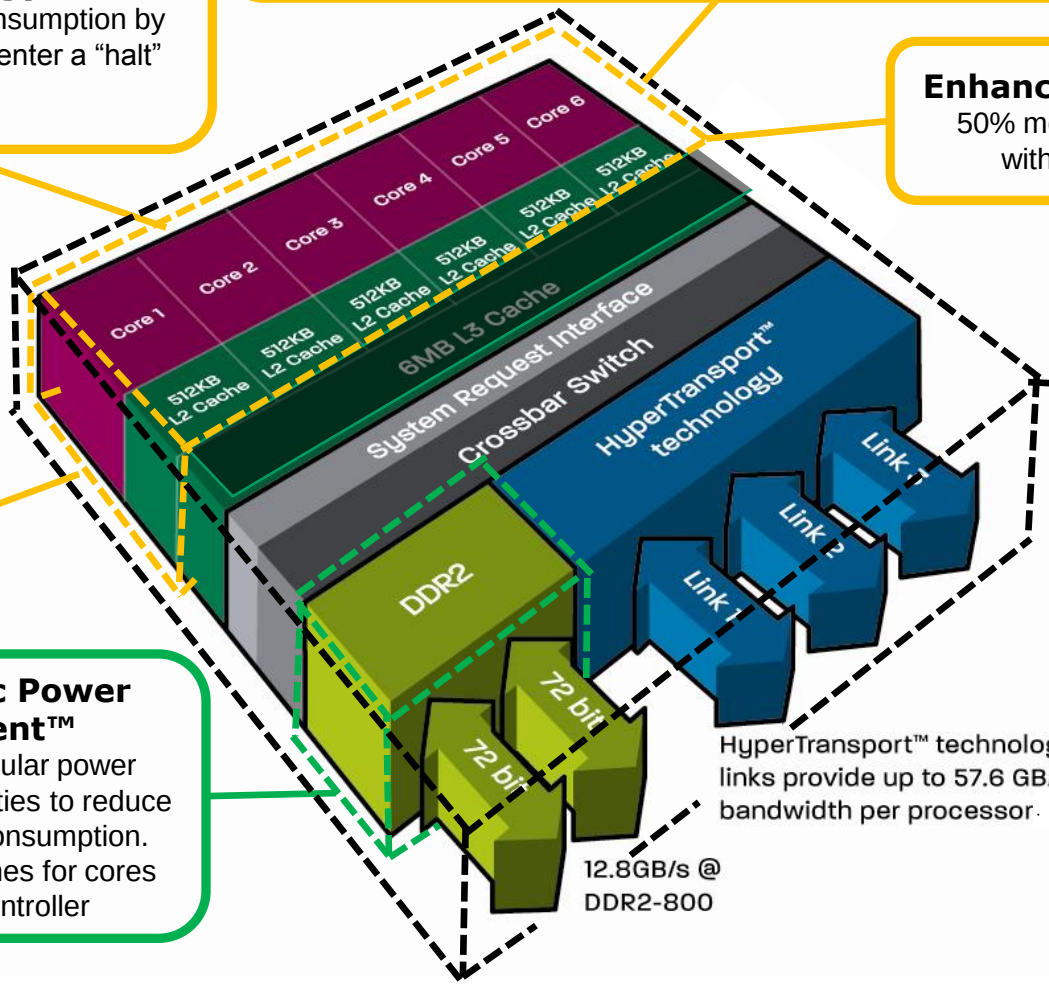
Enhanced Performance-per-watt
50% more compute cores vs. quad-core within the same power envelope*

AMD PowerCap Manager
Allows IT datacenter managers to set a fixed limit on a server's processor power consumption

AMD CoolCore™ Technology
Can reduce processor energy consumption by dynamically turning off sections of the processor when inactive

Extends to the L3 Cache

Dual Dynamic Power Management™
Enables more granular power management capabilities to reduce processor energy consumption. Separate power planes for cores and memory controller



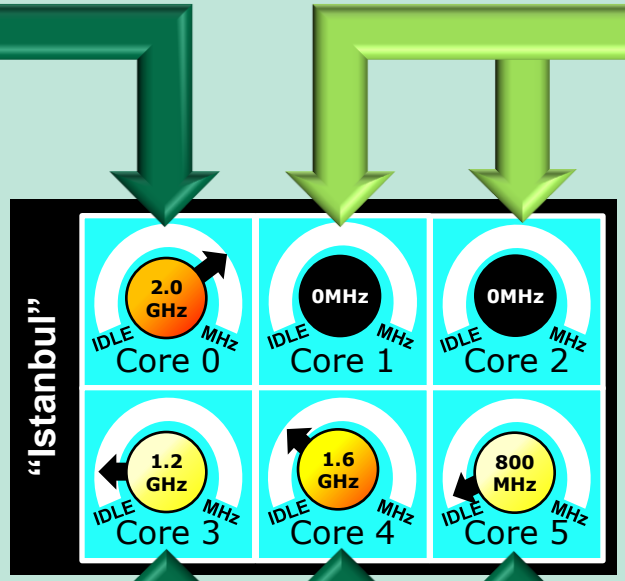
*Compared to Quad-Core AMD Opteron processor codenamed "Shanghai."

Enhanced AMD PowerNow!™ Technology

Enhanced performance-per-watt efficiencies per core

Enhanced AMD PowerNow!™ Technology

Optimizes performance and power for each individual cores workload which can **help reduce processor power across utilization <u>including platform active idle</u>**



AMD Smart Fetch Technology

Turns cores clocks off during **<u>idle processing cycles</u>** to help reduce processor power across utilization

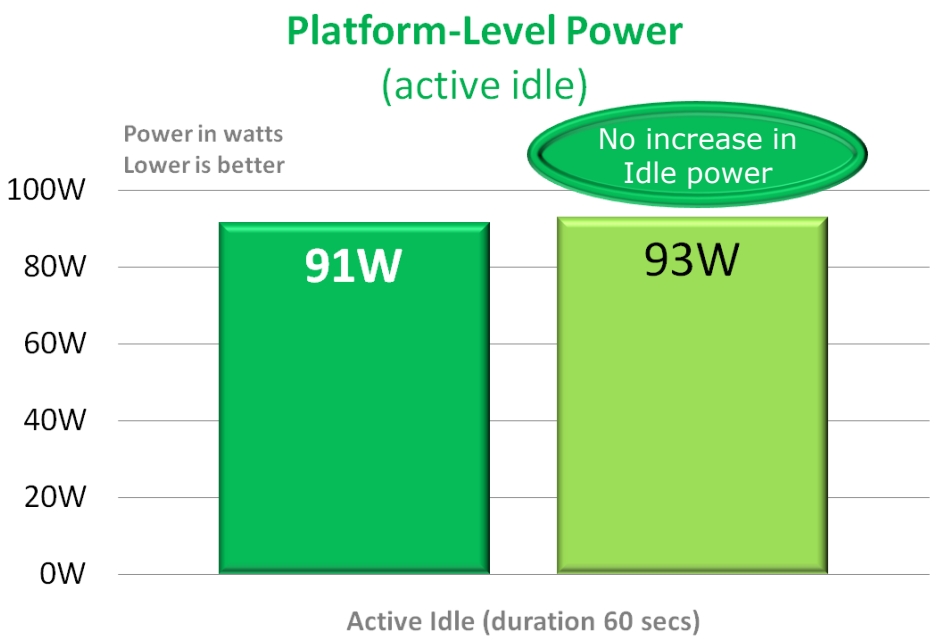
Enhanced AMD PowerNow!™ Technology

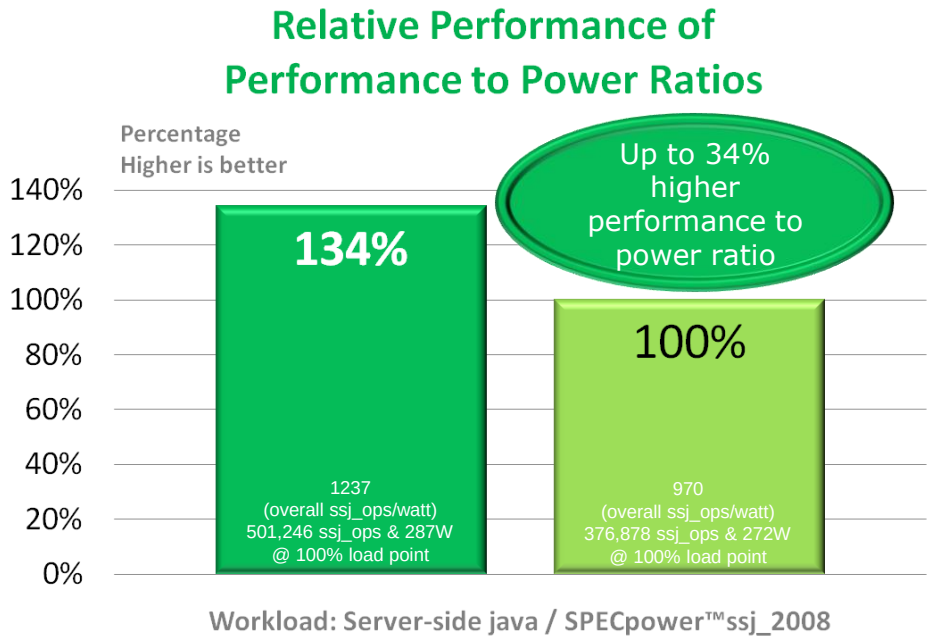
Built-in driver support for Windows Server® 2008, Novell SLES 10, and Red Hat RHEL 5

NOTE: frequencies are for illustration purposes only and might not reflect final product performance

Platform-level energy efficiency

Enhanced Performance-per-watt





Exact same platform
Same # of CPUs, chassis, hard disk, power supply and # of DIMMs

*see backup slides for detailed config info

SPEC and the benchmark name SPECpower_ssj are trademarks of the Standard Performance Evaluation Corporation. For the latest SPECpower_ssj2008 benchmark results, visit http://www.spec.org/power_ssj2008.

Customer Focused Innovations

Offering flexibility for end-customers

What is AMD PowerCap Manager?

- BIOS selectable options that set maximum 100%/voltage limits
  - Choose a setting and the processor(s) can operate up to that set limit

BIOS Setup Utility

Main **Advanced** PCI/PnP Boot Security Chipset Exit

AMD PowerNow Configuration	Enabled/Disabled PowerNow
PowerNow [Enabled]	←→ Select Screen ↑↓ Select Item +/- Change Option F1 General Help F10 Save and Exit ESC Exit

BIOS selectable options

sets "new" 100% & power ceiling

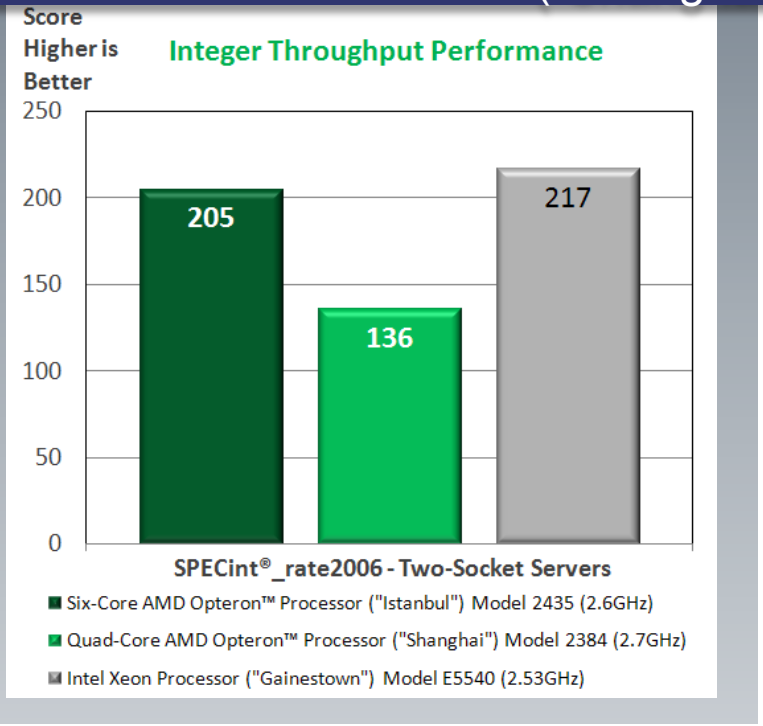
% CPU Power Savings	PowerCap Setting
0%	DISABLED
~30%	100% -1
~40%	100% -2
~60%	100% -3

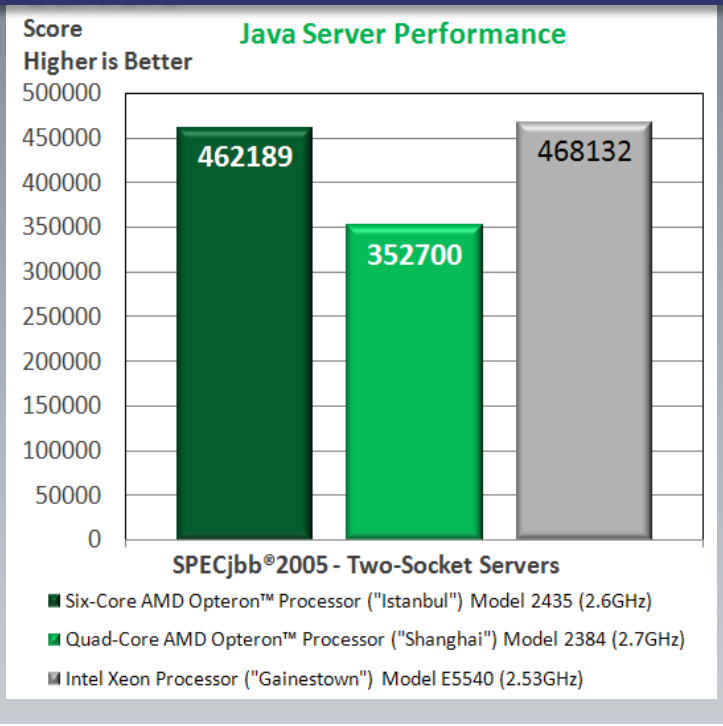
Low Power configurable options

BIOS selectable options for frequency & voltage ceilings

Excellent Two-Socket Integer Throughput and Java Server Performance

SPECint®_rate and SPECjbb performance that is competitive with Intel (“Gainestown”) Model E5540-based servers and up to 51% higher than Quad-Core AMD Opteron™ processor Model 2384 (“Shanghai”)-based servers

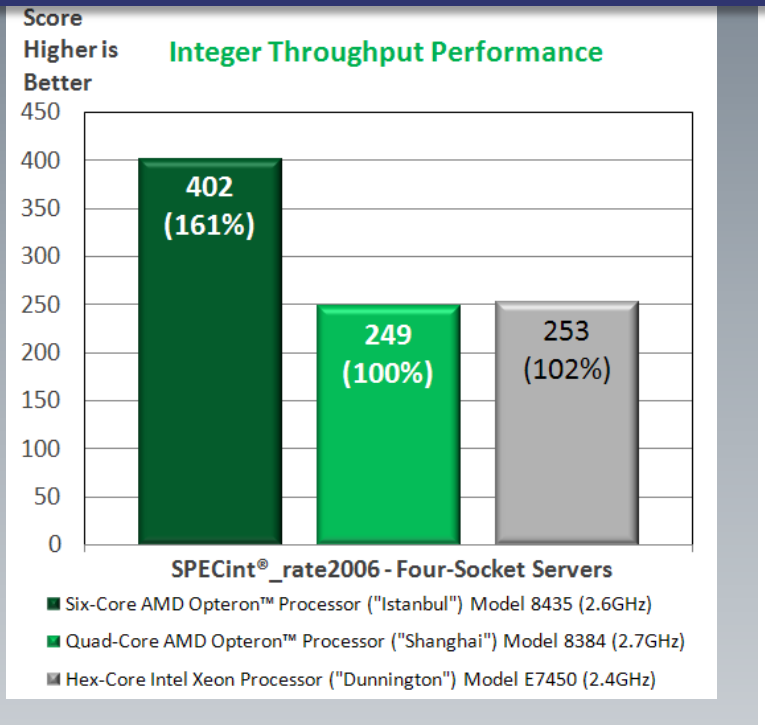


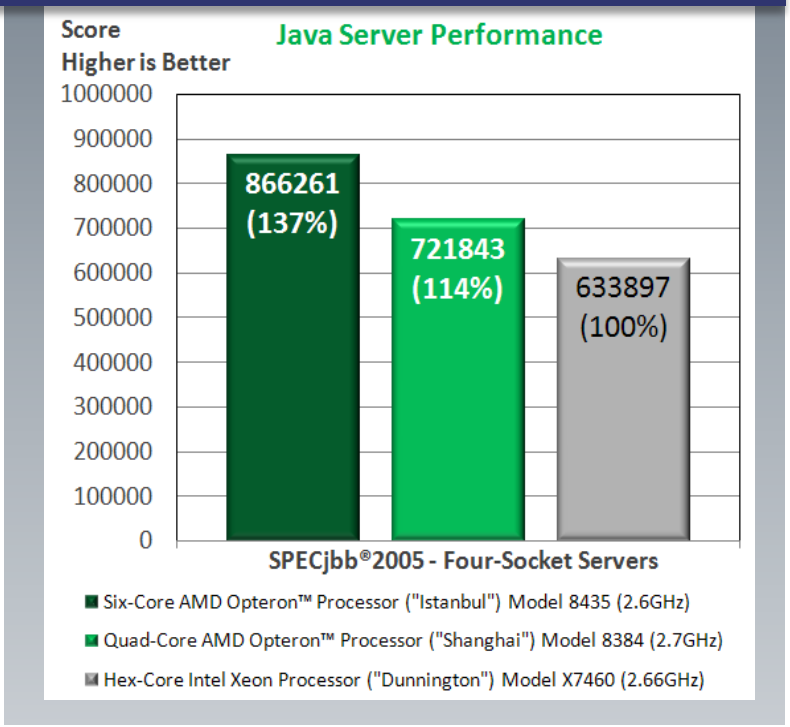


SPEC, SPECint, and SPECjbb are registered trademarks of the Standard Performance Evaluation Corporation. The SPECint_rate and SPECjbb results for Six-Core AMD Opteron™ processors are based upon data submitted to Standard Performance Evaluation Corporation as of May 12, 2009. The other SPECint_rate results and the Quad-Core AMD Opteron™ SPECjbb result stated above reflect results published on http://www.spec.org/ as of May 12, 2009. The Intel Gainestown SPECjbb result stated above reflects results published on April 30, 2009 in a presentation entitled “New Economics of Mid-Market Computing”. The SPECint_rate and SPECjbb comparisons presented above are based on the best performing two-socket servers using AMD Opteron™ processor Models 2384 and 2435 and Intel Xeon processor Model E5540. For the latest results, visit www.spec.org. Please see backup slides for configuration information.

Superior Four-Socket Integer Throughput and Java Server Performance

Significantly higher SPECint®_rate and SPECjbb performance than Intel Dunnington-based servers and Quad-Core AMD Opteron™ processor Model 8384 (“Shanghai”)-based servers

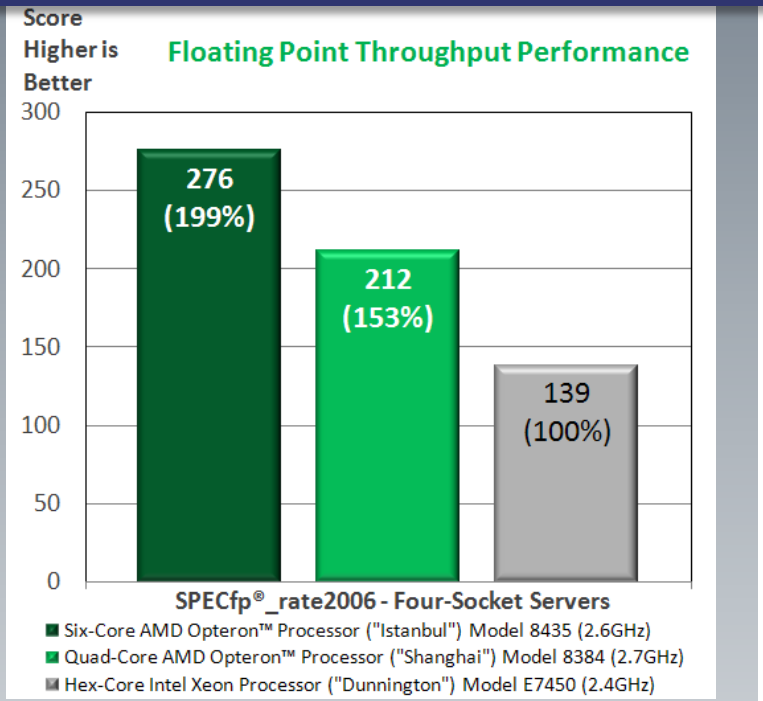


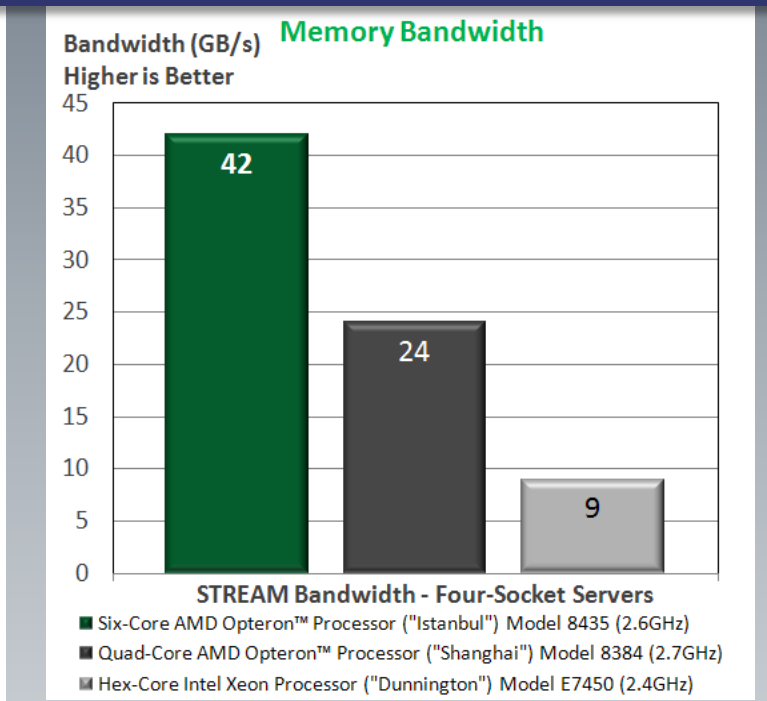


SPEC, SPECint, and SPECjbb are registered trademarks of the Standard Performance Evaluation Corporation. The SPECint_rate and SPECjbb results for Six-Core AMD Opteron™ processors are based upon data submitted to Standard Performance Evaluation Corporation as of May 12, 2009. The other SPECint_rate and SPECjbb result stated above reflect results published on http://www.spec.org/ as of May 12, 2009. The SPECint_rate and SPECjbb comparisons presented above are based on the best performing four-socket servers using AMD Opteron™ processor Models 8384 and 8435 and Intel Xeon processor Models E7450 and X7460. For the latest results, visit www.spec.org. Please see backup slides for configuration information.

Superior Four-Socket HPC Performance

Significantly higher Floating Point Throughput Performance and Memory Bandwidth than Intel Dunnington-based servers and Quad-Core AMD Opteron™ processor Model 8384 (“Shanghai”)-based servers





SPEC, SPECint, and SPECjbb are registered trademarks of the Standard Performance Evaluation Corporation. The SPECint_rate and SPECjbb results for Six-Core AMD Opteron™ processors are based upon data submitted to Standard Performance Evaluation Corporation as of May 12, 2009. The other SPECint_rate and SPECjbb result stated above reflect results published on http://www.spec.org/ as of May 12, 2009. The SPECint_rate and SPECjbb comparisons presented above are based on the best performing four-socket servers using AMD Opteron™ processor Models 8384 and 8435 and Intel Xeon processor Models E7450 and X7460. For the latest results, visit www.spec.org. Please see backup slides for configuration information.

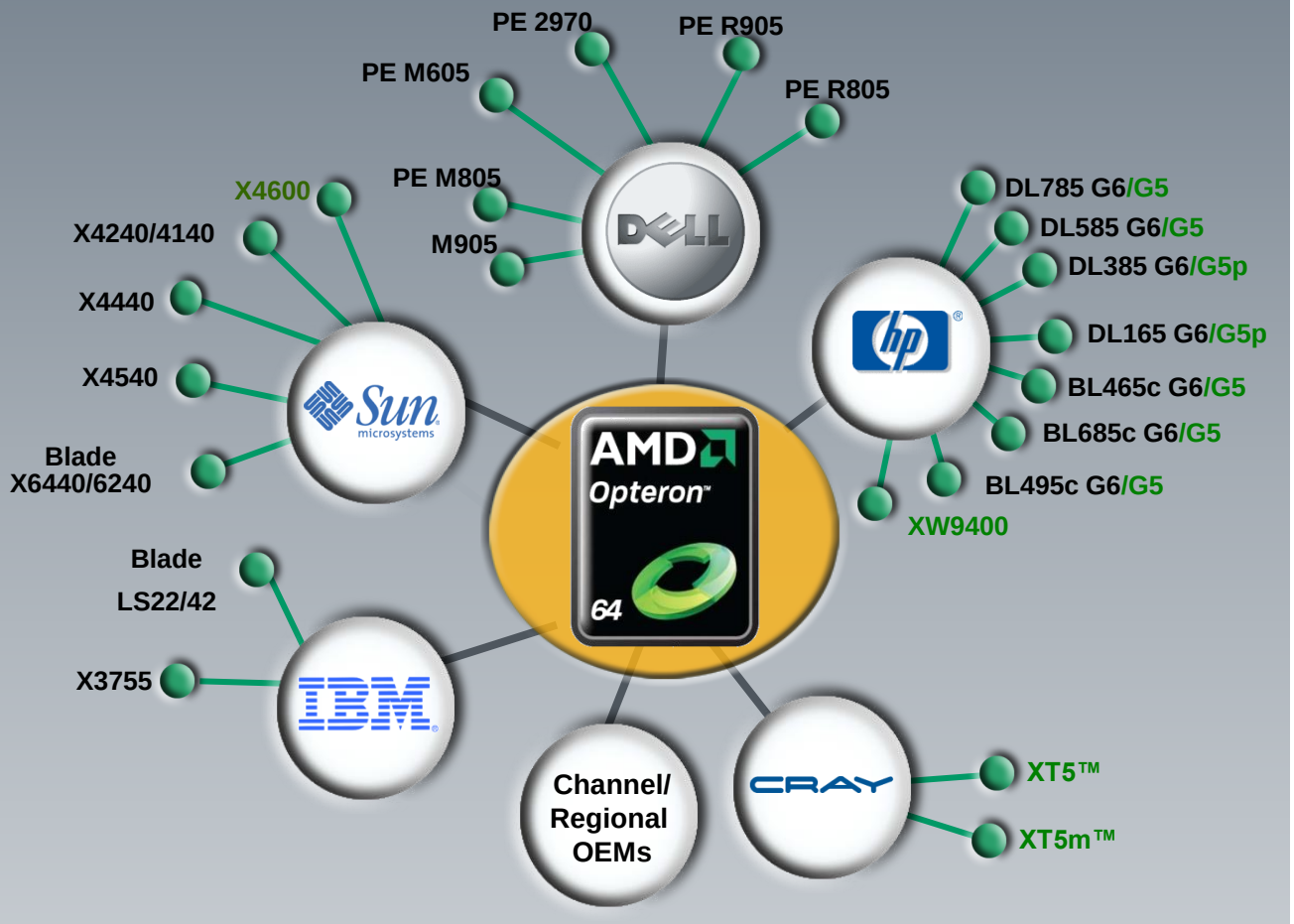
Exceptional Execution

- Processor frequencies exceeding original plan
- Product launching months ahead of original schedule
- Building on the "Shanghai" foundation
  - "Shanghai" had been the fastest AMD Opteron™ processor product development from first wafer to production
- In collaboration with GLOBALFOUNDRIES: first tapeout to production
- World's only six-core processor with Direct Connect Architecture

Fusion of AMD Opteron™ Processor with OEM Partners for Smooth Migration for customers

Only AMD delivers this level of generational consistency

- Helps OEMs bring product to market faster than ever before
- Common Core strategy can help reduce TCO and management complexity
- Easy transition for channel and infrastructure partners with same socket

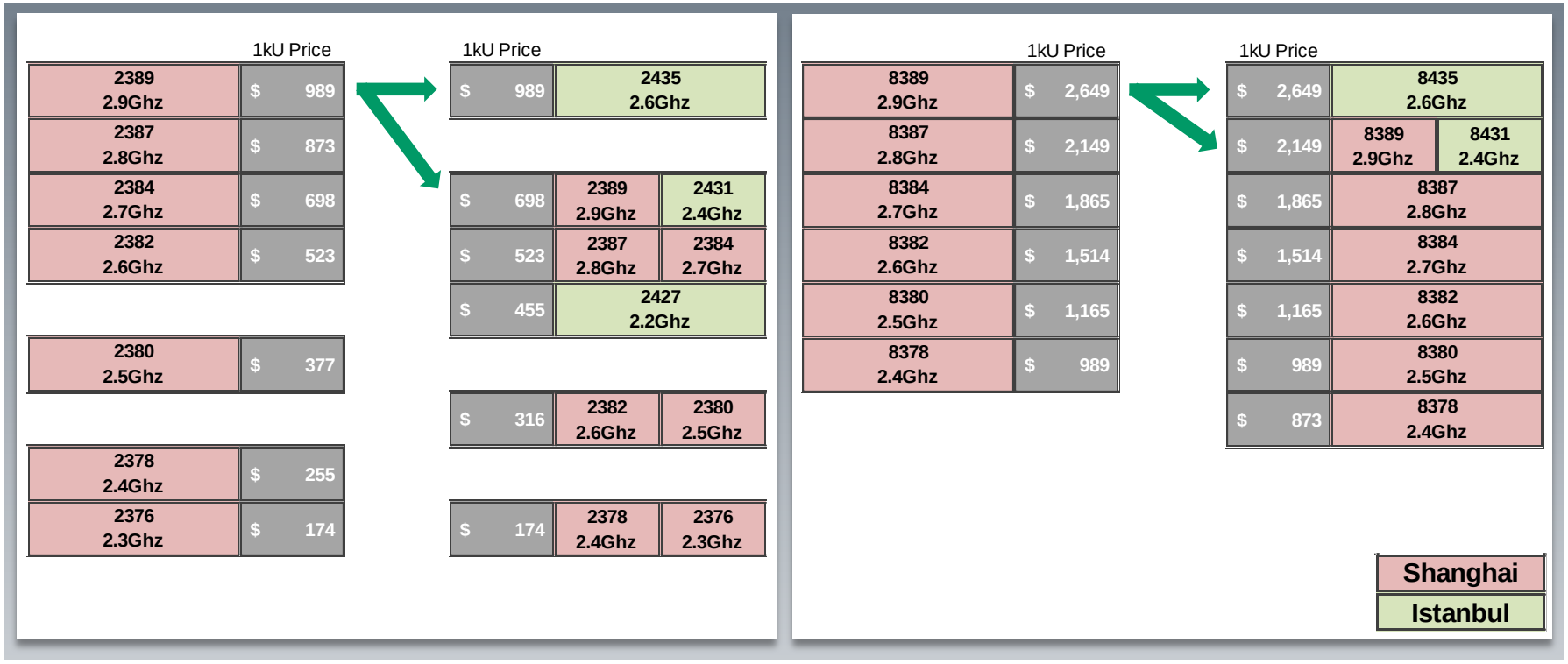


AMD The future is fusion

“Istanbul” Delivers More Performance/Dollar

Launch Products: Standard Power Six-Core AMD Opteron™ 8000 & 2000 Series processors

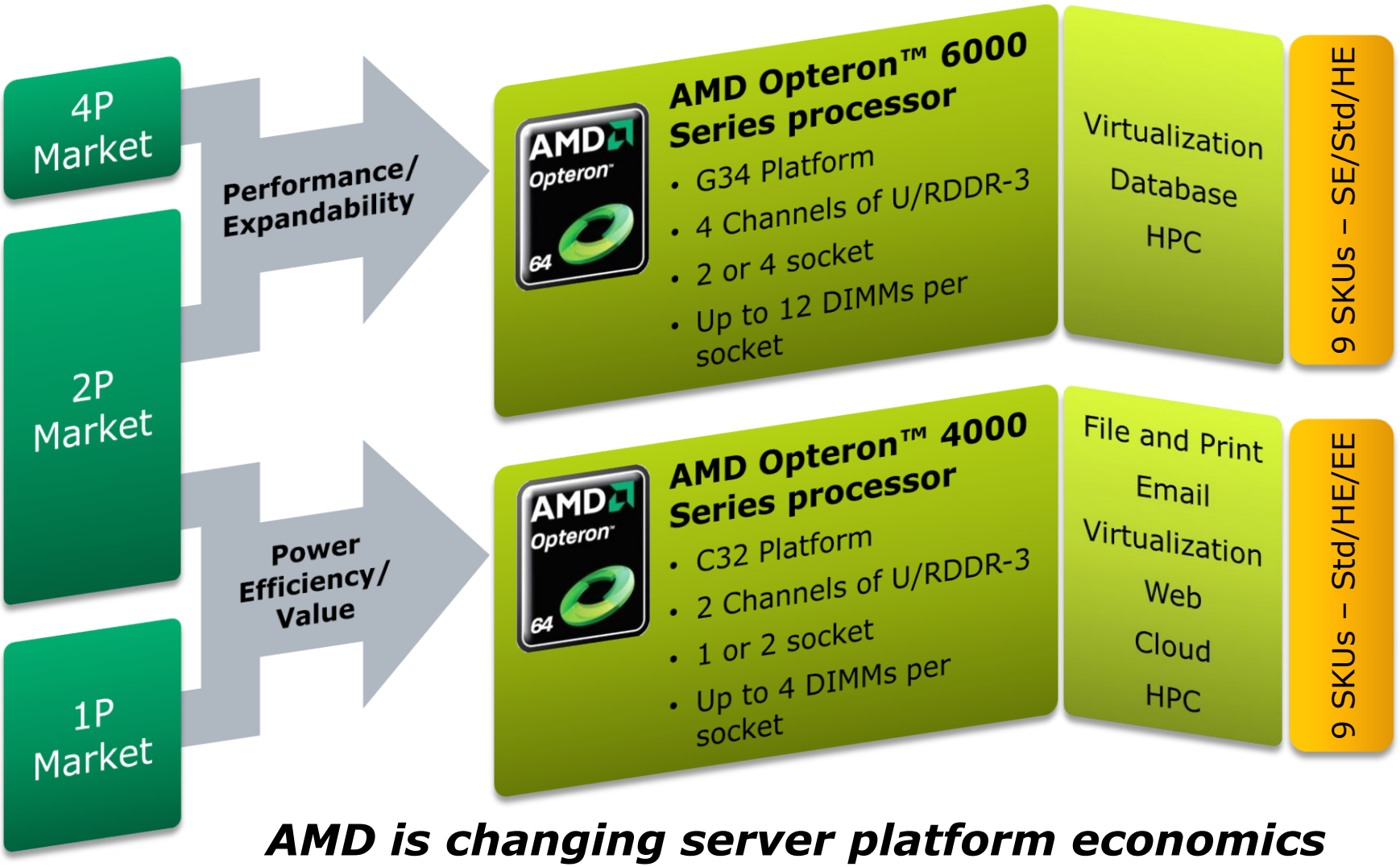
Pricing: More Performance-Per-Dollar*



*Compared to Quad-Core AMD Opteron processor codenamed “Shanghai.” “Istanbul” pricing based on expected 1ku pricing at launch.

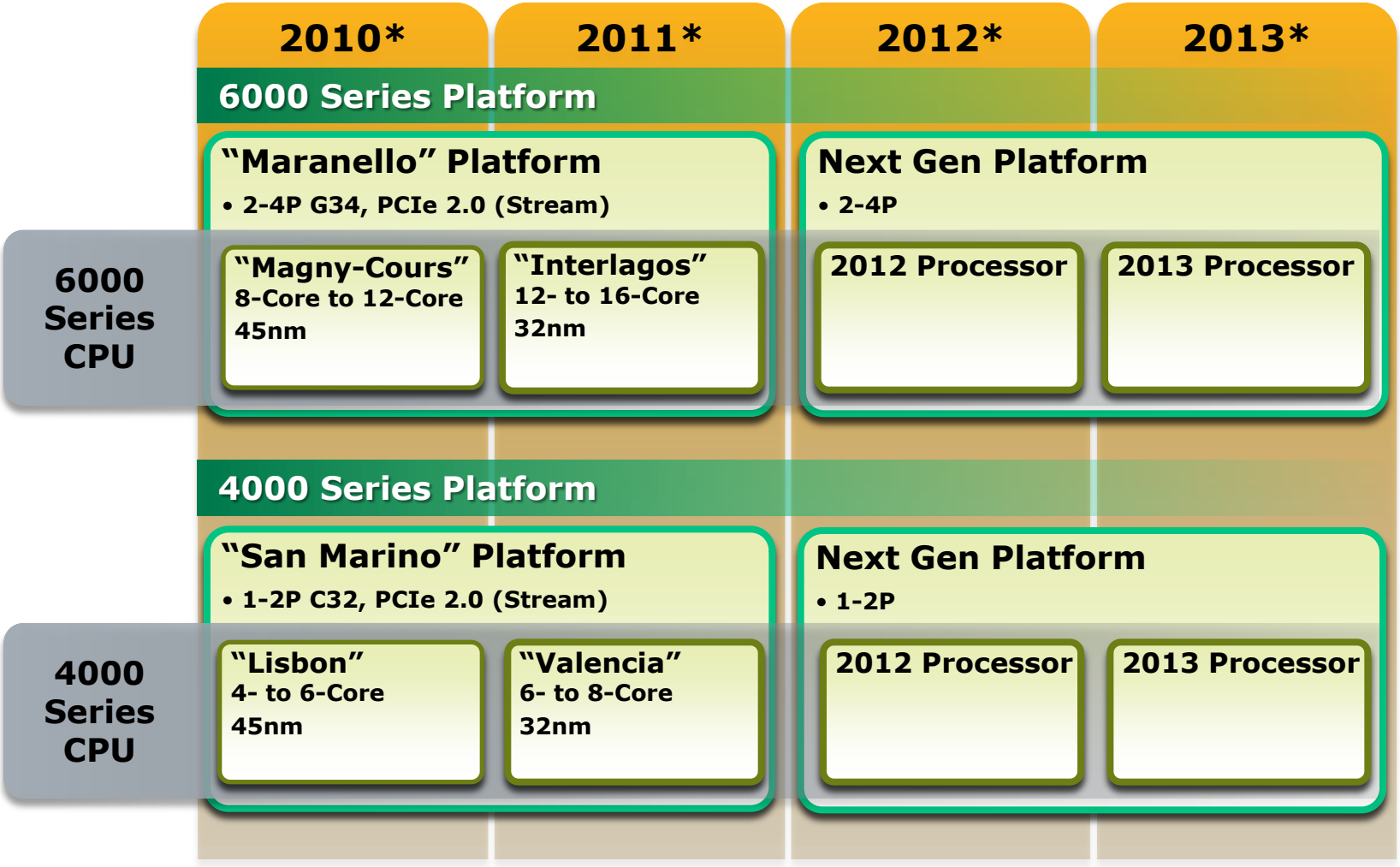
*As compared to “Barcelona”

Customer value shift is changing the market



AMD is changing server platform economics

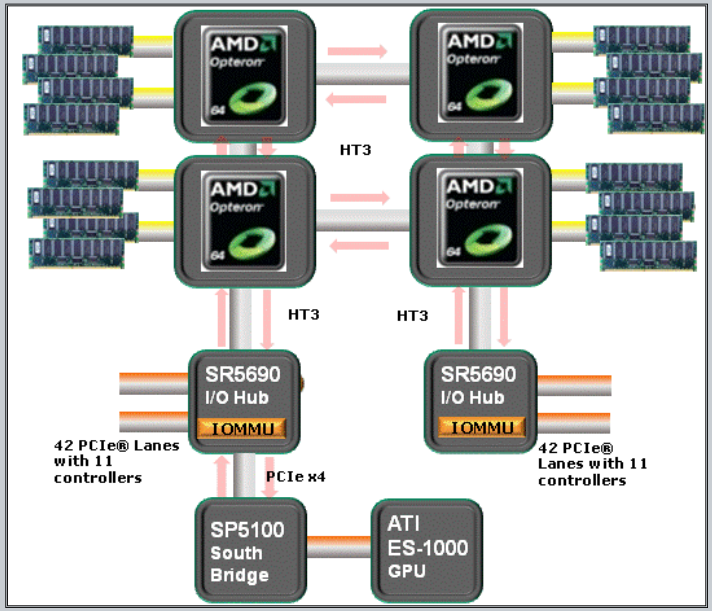
Multi year server platform strategy



* Planned product launch dates and features. Timeline is an approximation.

AMD “Fiorano” Platform

“Fiorano” is being designed to help improve I/O performance, virtualization performance, power efficiency, and RAS



Expected Platform Performance Enhancements

- PCI-E Gen 2
- Increased I/O Bandwidth
- I/O Virtualization

Power Efficiency

- Low-power logic design
- AMD CoolCore™ technology

Reliability and Availability

- Platform and processor RAS features
- “AMD on AMD” validation and support
- Enhanced server reliability

Summary

Top-line Performance that's bottom-line efficient

More Versatility

- *Flexibility for a wide range of data center deployments*

Workload Optimized

- *Evenly matched to address your application needs*

Total Cost Advantage

- *All with a low cost of ownership*

Widespread availability TODAY!

BACKUP AND CONFIGURATION INFORMATION

HT Assist

- HT Assist helps reduces memory latency and increase overall system performance in multi-socket systems
- HT Assist improves HyperTransport bus efficiency and increases performance by:
  - Reducing probe traffic
  - Resolving probes more quickly
- Probe “broadcasting” can be eliminated in 8 of 11 typical CPU-to-CPU transactions
- HT Assist can provide a significant benefit in 4-way and greater systems
  - 4-Way Stream memory bandwidth performance improves by ~60% (41.5GB/s with HT Assist vs. 25.5GB/s without HT Assist)
- HT Assist reserves 1MB portion of each CPU’s L3 cache to act as a directory. This directory tracks where that CPU’s cache lines are used elsewhere in the system
  - For 2-way systems this reduction in L3 cache size may eliminate any HT Assist benefit as probe traffic is already significantly less than in 4-way systems
- Each CPU is considered the “host” of the cache information contained in its L3 directory
- For many CPU-to-CPU transactions the host CPU knows exactly which CPU to probe for the information it needs, eliminating the need to “broadcast”.
- Reducing broadcasting cuts down considerably the amount of system probe traffic and helps resolve probes more quickly, resulting in reduced memory latency and improved system performance

Two-Socket SPECint®_rate2006

205 using 2 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 2435 in Supermicro A+ Server 1021M-UR+B motherboard, 32GB (8x4GB DDR2-800) memory, 250GB SATA disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit

136 using 2 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 2384 in Supermicro A+ Server 1021M-UR+B motherboard, 32GB (8x4GB DDR2-800) memory, 250GB SATA disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081024-05683.html

217 using 2 x Intel Xeon processors (“Gainestown”) Model E5540 in Supermicro SuperServer 6026T-NTR+ server, 24GB (12x2GB DDR3-1066) memory, 150GB SATA disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit
http://www.spec.org/cpu2006/results/res2009q1/cpu2006-20090316-06749.html

Two-Socket SPECjbb®2005

462189 score using 2 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 2435 in Supermicro A+ Server 1021M-UR+B server, 32GB (8x4GB DDR2-800) memory, 300GB SATA disk drive, Microsoft® Windows Server® 2003 Enterprise x64 Edition SP2

352700 score using 2 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 2384 in Supermicro A+ Server 1021M-UR+B server, 32GB (8x4GB DDR2-800) memory, 300GB SATA disk drive, Microsoft® Windows Server® 2003 Enterprise x64 Edition SP2
http://www.spec.org/osg/jbb2005/results/res2008q4/jbb2005-20081024-00551.html

468132 score using 2 x Intel Xeon processors (“Gainestown”) Model E5540 in Supermicro X8DTN+ motherboard, 12GB (6x2GB DDR3-1066) memory, 150GB SATA disk drive, Microsoft® Windows Server® 2008 R2 Enterprise x64 Edition SP1

Two-Socket SPECfp®_rate2006

143 using 2 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 2435 in Supermicro A+ Server 1021M-UR+B motherboard, 32GB (8x4GB DDR2-800) memory, 250GB SATA disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit

118 using 2 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 2384 in Supermicro A+ Server 1021M-UR+B motherboard, 32GB (8x4GB DDR2-800) memory, 250GB SATA disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081024-05684.html

Two-Socket STREAM

21GB/s using 2 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 2435 in Supermicro H8DMU+ motherboard, 16GB (8x2GB DDR2-800) memory, SuSE Linux® Enterprise Server 10 SP1 64-bit

21GB/s using 2 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 8384 in Supermicro H8DMU+ motherboard, 16GB (8x2GB DDR2-800) memory, SuSE Linux® Enterprise Server 10 SP1 64-bit

Four-Socket and Eight-Socket SPECint®_rate2006

402 using 4 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 8435 in Tyan Transport TX46 motherboard, 64GB (16x4GB DDR2-800) memory, 250GB SATA disk drive, Red Hat Enterprise Linux® Server release 5.2 64-bit

249 using 4 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 8384 in HP ProLiant DL585 G5 server, 64GB (16x4GB DDR2-800) memory, 146GB SAS disk drive, Red Hat Enterprise Linux® Server release 5.2 64-bit
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081027-05740.html

386 using 8 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 8384 in Sun Fire X4600 M2 server, 128GB (64x2GB DDR2-667) memory, 2x 72GB SAS disk drive, OpenSolaris 2008.05
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081208-06223.html

253 using 4 x Hex-Core Intel Xeon processors (“Dunnington”) Model E7450 in Intel Server System S7000FC4UR motherboard, 32GB (16x2GB DDR2-667 FB-DIMM) memory, 73GB SAS disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20080915-05347.html

Four-Socket SPECjbb®2005

866261 using 4 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 8435 in Tyan Transport TX46 server, 64GB (16x4GB DDR2-800) memory, 250GB SATA disk drive, Microsoft® Windows Server® 2008 Enterprise x64 Edition

721843 using 4 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 8384 in IBM Bladecenter LS42 server, 64GB (16x4GB DDR2-800) memory, 36GB SAS disk drive, Microsoft® Windows Server® 2008 Enterprise x64 Edition
http://www.spec.org/osg/jbb2005/results/res2008q4/jbb2005-20081112-00559.html

633897 using 4 x Hex-Core Intel Xeon processors (“Dunnington”) Model X7460 in Fujitsu PRIMERGY RX600 S4 server, 64GB (16x4GB DDR2-667 FB-DIMM) memory, 36GB SAS disk drive, Microsoft® Windows Server® 2003 Enterprise x64 Edition
http://www.spec.org/osg/jbb2005/results/res2009q1/jbb2005-20090305-00664.html

Four-Socket SPECfp®_rate2006

276 using 4 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 8435 in Tyan Transport TX46 motherboard, 64GB (16x4GB DDR2-800) memory, 250GB SATA disk drive, Red Hat Enterprise Linux® Server release 5.2 64-bit

212 using 4 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 8384 in Dell PowerEdge M905 server, 64GB (16x4GB DDR2-800) memory, 36GB SAS + 73GB SAS disk drives, SuSE Linux® Enterprise Server 10 SP2 64-bit
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20081110-05969.html

139 using 4 x Hex-Core Intel Xeon processors (“Dunnington”) Model E7450 in Fujitsu Siemens Computers PRIMERGY RX600 S4 server, 64GB (16x4GB DDR2-667 FB-DIMM) memory, 36GB SAS disk drive, SuSE Linux® Enterprise Server 10 SP2 64-bit
http://www.spec.org/cpu2006/results/res2008q4/cpu2006-20080922-05389.html

Four-Socket STREAM

42GB/s using 4 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 8435 in Tyan Thunder n4250QE (S4985-E) motherboard, 32GB (16x2GB DDR2-800) memory, SuSE Linux® Enterprise Server 10 SP1 64-bit (with HT Assist enabled)

25.5GB/s using 4 x Six-Core AMD Opteron™ processors (“Istanbul”) Model 8435 in Tyan Thunder n4250QE (S4985-E) motherboard, 32GB (16x2GB DDR2-800) memory, SuSE Linux® Enterprise Server 10 SP1 64-bit (with HT Assist disabled)

24GB/s using 4 x Quad-Core AMD Opteron™ processors (“Shanghai”) Model 8384 in Tyan Thunder n4250QE (S4985-E) motherboard, 32GB (16x2GB DDR2-800) memory, SuSE Linux® Enterprise Server 10 SP1 64-bit

9GB/s using 4 x Hex-Core Intel Xeon processors (“Dunnington”) Model E7450 in Supermicro X7QC3+ motherboard, 32GB (16x2GB DDR2-667 FB-DIMM) memory, SuSE Linux® Enterprise Server 10 SP1 64-bit

Reference material

Slide 6- *Up to 30% greater performance than prior generation*

Internal testing at AMD performance labs as of 3/27/09 showed the following performance gains for Six-Core AMD Opteron™ processor Model 2384 ("Istanbul") over Quad-Core AMD Opteron™ processor Model 2435 ("Shanghai"): SPECint®_rate2006 (estimate) 42%; SPECfp®_rate2006 (estimate) 19%; virtualization 41%. Configuration for SPECint_rate2006 & SPECfp_rate 2006 estimates: Supermicro A+ Server 1021M-UR+B server, 32GB (8x4GB DDR2-800) memory, 300GB SATA disk drive, SuSE Linux® Enterprise Server 10 SP1 64-bit. Configuration for virtualization: Dell R805 server, 64GB memory (8x8GB DDR2-533), VMware® ESX 3.5 Update 3.

SPEC, SPECint, and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation.

SPECpower Configurations

Shanghai 2382 vs. Istanbul 2435

"Shanghai"

SPECpower_ssj2008 Page 1 of 5

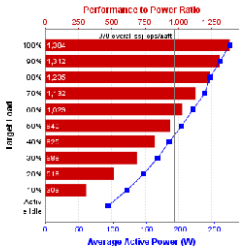
SPECpower_ssj2008

Copyright © 2007-2009 Standard Performance Evaluation Corporation

ZT Systems 1224Ri Datacenter Server				SPECpower_ssj2008 = 970 overall ssj_ops/watt	
Test Sponsor:	ZT Systems	SPEC License #:	49	Test Method:	Single Node
Tested By:	Advanced Micro Devices	Test Location:	Austin, TX, USA	Test Date:	May 8, 2009
Hardware Availability:	May-2009	Software Availability:	Dec-2008	Publication:	Unpublished
System Source:	Single Supplier	System Designation:	Server	Power Provisioning:	Line-powered

Benchmark Results Summary

Performance			Power	
Target Load	Actual Load	ssj_ops	Average Active Power (W)	Performance to Power Ratio
100%	99.8%	376,878	272	1,384
90%	89.7%	338,701	258	1,312
80%	79.7%	301,237	244	1,235
70%	70.5%	266,381	235	1,132
60%	59.7%	225,528	219	1,029
50%	50.2%	189,641	202	940
40%	40.0%	151,086	183	825
30%	30.1%	113,791	165	688
20%	20.0%	75,573	146	518
10%	9.9%	37,436	121	309
Active Idle		0	93.0	0
		Σssj_ops / Σpower =		970



System Under Test

Set: 'sut'	
Set Identifier:	sut
Set Description:	ZT Systems 1224Ri Datacenter Server 1U
# of Identical Nodes:	1
Comment:	None

Hardware	
Hardware Vendor:	ZT Systems
Model:	1224Ri Datacenter Server

5/8/2009

Click on individual report for Full .PDF version

"Istanbul"

SPECpower_ssj2008 Page 1 of 5

SPECpower_ssj2008

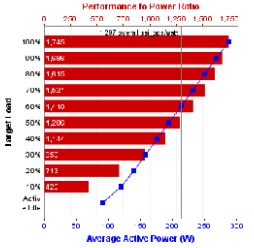
Copyright © 2007-2009 Standard Performance Evaluation Corporation

ZT Systems 1224Ri Datacenter Server				SPECpower_ssj2008 = 1,297 overall ssj_ops/watt	
Test Sponsor:	ZT Systems	SPEC License #:	49	Test Method:	Single Node
Tested By:	Advanced Micro Devices	Test Location:	Austin, TX, USA	Test Date:	May 4, 2009
Hardware Availability:	May-2009	Software Availability:	Dec-2008	Publication:	Unpublished
System Source:	Single Supplier	System Designation:	Server	Power Provisioning:	Line-powered

Set sut WARNING: For point 1, elapsed nanoTime=240119638560 ms, elapsed currentTimeMillis=240007 ms

Benchmark Results Summary

Performance			Power	
Target Load	Actual Load	ssj_ops	Average Active Power (W)	Performance to Power Ratio
100%	99.6%	501,246	287	1,745
90%	89.9%	452,631	269	1,686
80%	80.2%	403,862	250	1,615
70%	70.1%	353,109	232	1,521
60%	60.0%	301,874	214	1,410
50%	49.7%	250,072	194	1,286
40%	40.1%	202,074	177	1,144
30%	29.9%	150,463	158	950
20%	19.8%	99,832	140	713
10%	9.9%	49,968	119	420
Active Idle		0	91.5	0
		Σssj_ops / Σpower =		1,297



System Under Test

Set: 'sut'	
Set Identifier:	sut
Set Description:	ZT Systems 1224Ri Datacenter Server 1U
# of Identical Nodes:	1
Comment:	None

Hardware	

5/6/2009

AMD The future is fusion

Disclaimer & Attribution

DISCLAIMER

The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions and typographical errors.

The information contained herein is subject to change and may be rendered inaccurate for many reasons, including but not limited to product and roadmap changes, component and motherboard version changes, new model and/or product releases, product differences between differing manufacturers, software changes, BIOS flashes, firmware upgrades, or the like. AMD assumes no obligation to update or otherwise correct or revise this information. However, AMD reserves the right to revise this information and to make changes from time to time to the content hereof without obligation of AMD to notify any person of such revisions or changes.

AMD MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE CONTENTS HEREOF AND ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES, ERRORS OR OMISSIONS THAT MAY APPEAR IN THIS INFORMATION.

AMD SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT WILL AMD BE LIABLE TO ANY PERSON FOR ANY DIRECT, INDIRECT, SPECIAL OR OTHER CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF ANY INFORMATION CONTAINED HEREIN, EVEN IF AMD IS EXPRESSLY ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

ATTRIBUTION

SPEC, SPECint, SPECfp, and SPECjbb, and SPECpower_ssj are registered trademarks of the Standard Performance Evaluation Corporation.