



# AMD Opteron™ 4000 Series Platform

The world's lowest power-per-core server processor<sup>1</sup>



# Today's Challenges

Aging server infrastructure – normal upgrade cycle delayed

Limited Budget



Difficult to maintain



Power Concerns



# AMD Opteron™ 4100 Series Processor

The world's lowest power-per-core server processor<sup>1</sup>

## Low Power Breakthrough



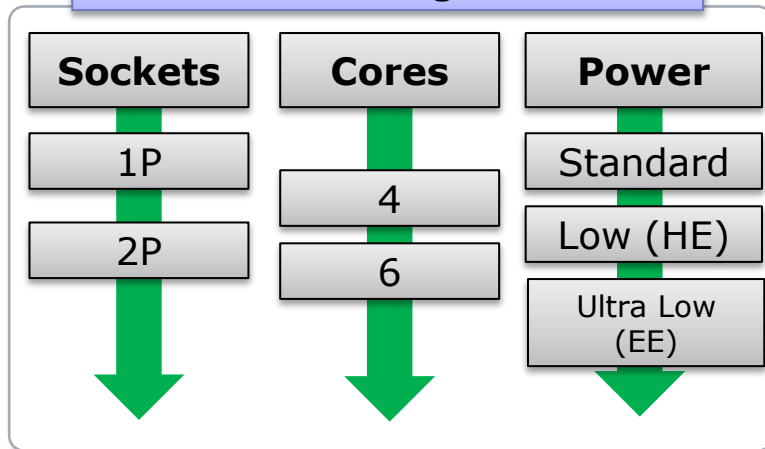
Below 6 Watts  
Per Core<sup>1</sup>



## Starting @ \$99<sup>2</sup>



## Flexible Configurations



## Easy to Purchase

	AMD	Intel
Full memory speed on all models	✓	✗ <sup>3</sup>
Full I/O speed on all models	✓	✗ <sup>3</sup>
Same chipset on all platforms	✓	✗ <sup>4</sup>



<sup>1</sup> As of March 15, 2010, AMD Opteron™ processor Models 4162 EE /4164 EE have the lowest known power per core of any server processor, at 5.83W (35W/6 = 5.83W/core). Intel's L5609 is 10W/core (40W/4 cores). See [http://www.intel.com/p/en\\_US/products/server/processor/xeon5000/specifications](http://www.intel.com/p/en_US/products/server/processor/xeon5000/specifications). <sup>2</sup> AMD Opteron™ processor Model 4122 planned \$99 1ku pricing at time of introduction. <sup>3</sup> [http://i.cmpnet.com/cn/graphics/web/embedded/xeon\\_roadmap.JPG](http://i.cmpnet.com/cn/graphics/web/embedded/xeon_roadmap.JPG). <sup>4</sup> [http://www.intel.com/products/server/chipsets/index.htm#s1=Server&s2=all&s3=all?iid=chipsets\\_body+server](http://www.intel.com/products/server/chipsets/index.htm#s1=Server&s2=all&s3=all?iid=chipsets_body+server)



# Superior Performance-Per-Watt

## Suite of Power Efficiency Features

**C1E Power State**

**Invoke Sleep State @ Idle**

**AMD CoolSpeed Technology**

**Reduce Energy @ Temp Threshold**

**Link Width PowerCap**

**Reduce HT bus power consumption**

**Advanced Platform Management Link (APML)<sup>1</sup>**

**Remote management of power states**

## AMD Opteron™ 4000 Series platform power savings



**Half the Power draw AND 19% more performance than Quad-Core AMD Opteron™ 2300 Series Processor<sup>3</sup>**

1 server  
**269W**  
1x 2P Server using  
Quad-Core AMD Opteron™  
2300 Series processor

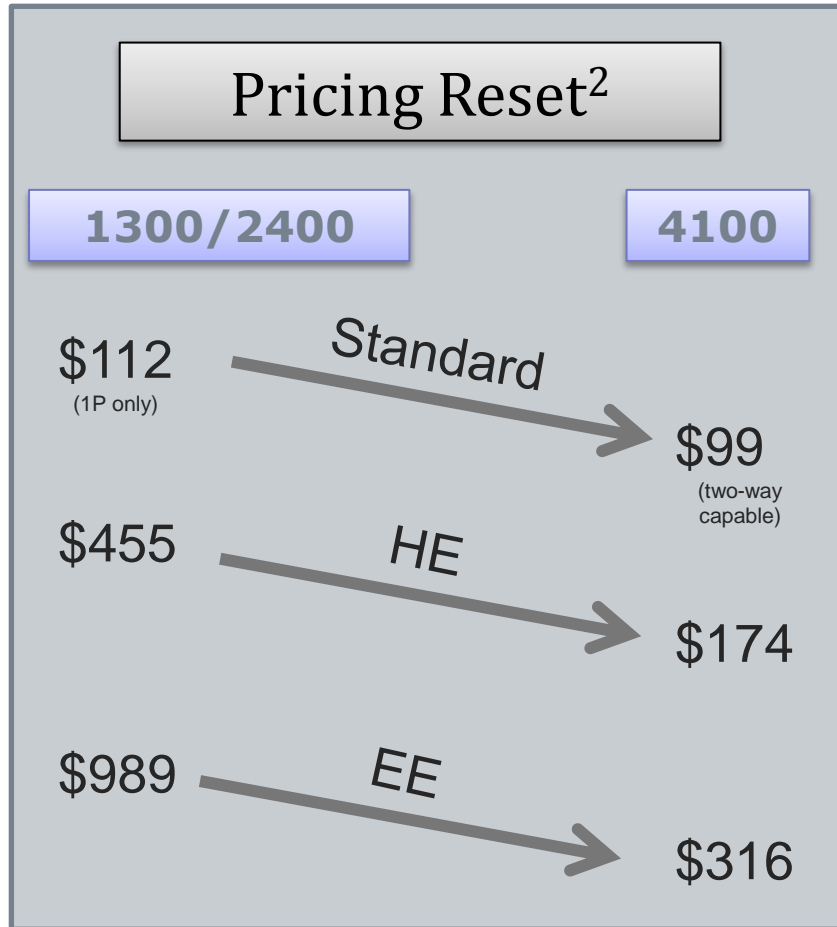
1 Server  
**131W**  
1x2P Server using  
AMD Opteron™ 4100  
4100 Series EE Processors



<sup>4</sup> 1 In APML-enabled systems 2 Internal measurements based on pre-production silicon. Source: AMD internal performance and power measurements @ the wall running a java-based workload @ 100% load-point For detailed configurations and assumptions refer to backup slide 9. 3 Internal measurement s of Supermicro 2021M-UR with Quad-Core AMD Opteron™ processor Model 2380 processors vs. Tyan 8228 with AMD Opteron™ processors Model 4162 EE running java-based workload @ 100% load-point. Power measurements taken at the wall. Any difference in system hardware or software design or configuration may affect actual performance. For detailed calculations, configurations and assumptions refer to backup slide 10, 11.

# Outstanding Value

## First 2P-Capable Server Processor at Sub-\$100 Price<sup>1</sup>



Supports up to **2x** more servers within the same power budget<sup>4</sup>



As little as \$10 per 42U rack<sup>3</sup>



**Low Overall Server Cost**

Enables simpler design for lower power consumption



Fans & Heatsinks



Mother board



Power Supply










1 AMD Opteron™ processor Model 4122 planned \$99 1ku pricing at time of introduction. 2 Based on 1Ku price for lowest-priced processor for each thermal band within AMD Opteron 2400 Series, and planned 1ku pricing for AMD Opteron 4100 Series, as of 3/15/10. 3 Source: AMD internal platform power measurements and estimates using a java-based workload. Assumes 20% load-point and \$0.11/KWh. Any difference in system hardware or software design or configuration may affect actual performance. For detailed calculations, configurations and assumptions refer to slides 11, 12. 4 Internal measurements of Supermicro 2021M-UR with Quad-Core AMD Opteron™ processor Model 2380 processors vs. Tyan 8228 with AMD Opteron™ processors Model 4162 EE running java-based workload @ 100% load-point. Power measurements taken at the wall. Any difference in system hardware or software design or configuration may affect actual performance. For detailed calculations, configurations and assumptions refer to backup slide 10.



# Easy to Purchase and Operate

## Same Features Across Power Bands

### Eliminate Forced Tradeoffs

	AMD 	Intel
Full memory speed on all models		 <sup>1</sup>
Full I/O speed on all models		 <sup>1</sup>
Same chipset on all platforms		 <sup>2</sup>

## Consistent Images and Software

### Same Die, Chipset and Memory enable:



**Same API**



**Same BIOS code**



**Same Drivers**

### Easy To Buy

No tradeoffs of performance & basic functionality

### Easier To Qualify

Full consistency across entire processor stack

### Easier To Manage

Seamlessly migrate VM's and software between systems



<sup>1</sup> [http://i.cmpnet.com/crn/graphics/web/embedded/xeon\\_roadmap.JPG](http://i.cmpnet.com/crn/graphics/web/embedded/xeon_roadmap.JPG)

<sup>2</sup> [http://www.intel.com/products/server/chipsets/index.htm#s1=Server&s2=all&s3=all?iid=chipsets\\_body+server](http://www.intel.com/products/server/chipsets/index.htm#s1=Server&s2=all&s3=all?iid=chipsets_body+server)

# Summary

## More Performance, Less Power, Low Cost<sup>1</sup>

### Up to 26% Reduction in Power<sup>3</sup>

- Full suite of energy efficiency innovations

### New Levels of Value

- Starting at \$99<sup>4</sup>
- Drives low overall server cost

### Fits in your environment

- Easy to buy, easier to qualify, easier to own



**The world's lowest  
power-per-core server  
processor<sup>2</sup>**



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<sup>1</sup> Compared to corresponding power band Six-Core AMD Opteron™ processor codenamed "Istanbul." Based on comparison of measured and estimated results running SPECint@\_rate2006 as measured in AMD performance labs as of 2/18/10. Configurations: 2 x AMD Opteron™ processors Model 4186 in "Pence" reference design kit, 32GB (4 x 8GB DDR3-1333) memory, SUSE Linux® Enterprise Server 10 SP2 64-bit vs. 2 x Six-Core AMD Opteron™ processors Model 2435 in Supermicro A+ Server 1021M-UR+B server, 32GB (8 x 4GB DDR2-800) memory, 250GB SATA disk drive, Red Hat Enterprise Linux® Server 5.3 64-bit. For the latest SPEC results, visit <http://www.spec.org/cpu2006/results>. SPEC and SPECint are registered trademarks of the Standard Performance Evaluation Corporation. <sup>2</sup> As of March 15, 2010, AMD Opteron™ processor Models 4162 EE /4164 EE have the lowest known power per core of any server processor, at 5.83W (35W/6 = 5.83W/core). Intel's L5609 is 10W/core (40W/4 cores) see [http://www.intel.com/b/en\\_US/products/server/processor/xeon5000/specifications](http://www.intel.com/b/en_US/products/server/processor/xeon5000/specifications). Compared to previous generation Six-Core AMD Opteron(tm) EE processor-based system. Source: AMD internal performance and power measurements using pre-production silicon running a java-based workload. For detailed configurations and assumptions refer to backup slide 10. <sup>4</sup> AMD Opteron™ processor Model 4122 planned \$99 1ku pricing at time of introduction.

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**Backup**



# Configuration Information: “Lisbon” Power Comparison

Six-Core AMD Opteron™ processor Model 2419 EE based platform: Processor - 2x AMD Opteron™ processor Model 2419 EE; Motherboard - Tyan 8208 (R05), BIOS v.12; Memory - 6x 4GB RDDR2 667 DIMMs; Power Supply - 3Y Power Technology YM-2415C

AMD Opteron™ processor Model 4162 EE based platform: Processor - 2x AMD Opteron™ processor Model 4162 EE (pre-production EVT); Motherboard - Tyan 8228 (R01), BIOS v0.05 0212b; Memory - 6x 4GB PC3-8500 CL7 1.35v LV RDDR3 1066 DIMMs; Power Supply - 3Y Power Technology YM-2415C

**Workload:** Server-side java, 100% load-point, (Microsoft® Windows Server® 2008 R2 Enterprise Edition (64-bit), Balanced Profile Enabled

**Power Measurement:** Yokogawa Electric International Pte. Ltd. Model WT210, Power data captured every 1 second over duration of workload

**Thermal Environment:** Digi International Inc. Model Watchport/H temperature sensor, Power data captured at an ambient temperature of 22.6C



# Configuration Information (“Lisbon” Power Comparison\*)

## Quad-Core AMD Opteron™ processor Model 2380 based platform

### Performance:

308809 ssj\_ops (269W) @ 100% load point

### Processor:

2x AMD Opteron™ processor Model 2380

### System:

Supermicro 2021M-UR+, 500GB WD5000ABPS

### Memory:

8x 2GB RDDR2 667 DIMMs

### Power Supply:

700W (Ablecom PWS-702A-1R)

## AMD Opteron™ processor Model 4162 EE based platform

### Performance:

380714 ssj\_ops (131W) @ 100% load point

### Processor:

2x AMD Opteron™ processor Model 4162 EE (pre-production EVT)

### System:

Tyan 8228, 128GB MMCRE28G5MXP-0VB SATA SSD

### Memory:

4x 4GB 1.5v RDDR3 1066 DIMMs

### Power Supply:

3Y Power Technology YM-2415C

### Workload:

Server-side java business operations (100% load point)  
Microsoft® Windows Server® 2008 R2 Enterprise Edition (64-bit)  
Balanced Profile Enabled

### Power Measurement:

Yokogawa Electric International Pte. Ltd. Model WT210  
Power data captured every 1 second over duration of workload

### Thermal Environment:

Digi International Inc. Model Watchport/H temperature sensor  
Power data captured at an ambient temperature of 20C



# Configuration Information (“Lisbon” Power Cost)

## AMD Opteron™ processor Model 4162 EE based platform

### Processor:

2x AMD Opteron™ processor Model 4162 EE (pre-production EVT)

### System:

Tyan 8228 (R02)

### Memory:

4x 4GB 1.5v LV RDDR3 1066 DIMMs

### Power Supply:

3Y Power Technology YM-2415C

### Workload:

Server-side java business operations (20% load point)  
Microsoft® Windows Server® 2008 R2 Enterprise Edition (64-bit)  
Balanced Profile Enabled

### Power Measurement:

Yokogawa Electric International Pte. Ltd. Model WT210  
Power data captured every 1 second over duration of workload

### Thermal Environment:

Digi International Inc. Model Watchport/H temperature sensor  
Power data captured at an ambient temperature of ~20C



# Calculations for daily power cost estimates ("Lisbon" daily power cost)

## Workload & Power:

Server-side java

20% load point= 87.7W

Calculation assumes servers were operating at a constant 20% load point throughout the duration of the day.

KWh rate used was \$0.11 (US)

# of Servers	42
KWh \$	0.11
Percentage of time @20% Load Point	100%
Server Power @ 20% Load Point	87.7w
Estimated Annual Total Server Power Cost @ 20% load per server	\$ 84.51
Estimate Daily Total Server Power Cost @ 20% load per server	\$ 0.23
Estimated Annual Total Server Power Cost @ 20% load point based on 42 servers	\$ 3,549.32
Estimated Daily Total Server Power Cost @ 20% load point based on 42 servers	\$ 9.72

