



AMD OPTERON™ 4200 AND 6200 SERIES PROCESSORS

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April 2012



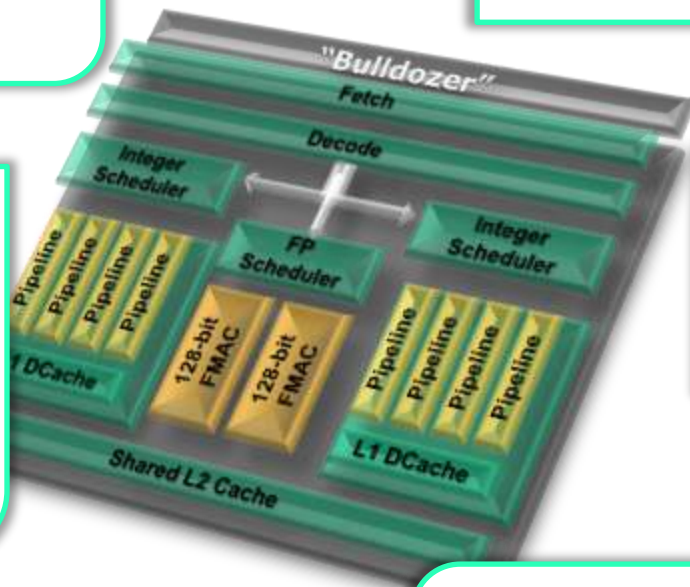
“BULLDOZER” TECHNOLOGY SOFTWARE VISIBLE FEATURES

**Optimizations for “Bulldozer”
Module Architecture:**
Identifies “Bulldozer”
architecture to OS or
hypervisor

New “Bulldozer” Instructions:
For data level parallelism and
hardware assist for encryption and
fused multiple-add operations

**Performance Monitoring
and Profiling:**
Provides info that can be
used to improve system
and application
performance

C6:
“Bulldozer” module goes
into a very low power sleep
state when both core pairs
are idle



**AMD Opteron™ 4200 and
6200 Series processors are
built on “Bulldozer”
technology**

New Virtualization Functions:
For use by hypervisors to help reduce
overhead and achieve near-native
application performance



Building a Modular Processor

Each processor die is composed of multiple “Bulldozer” modules

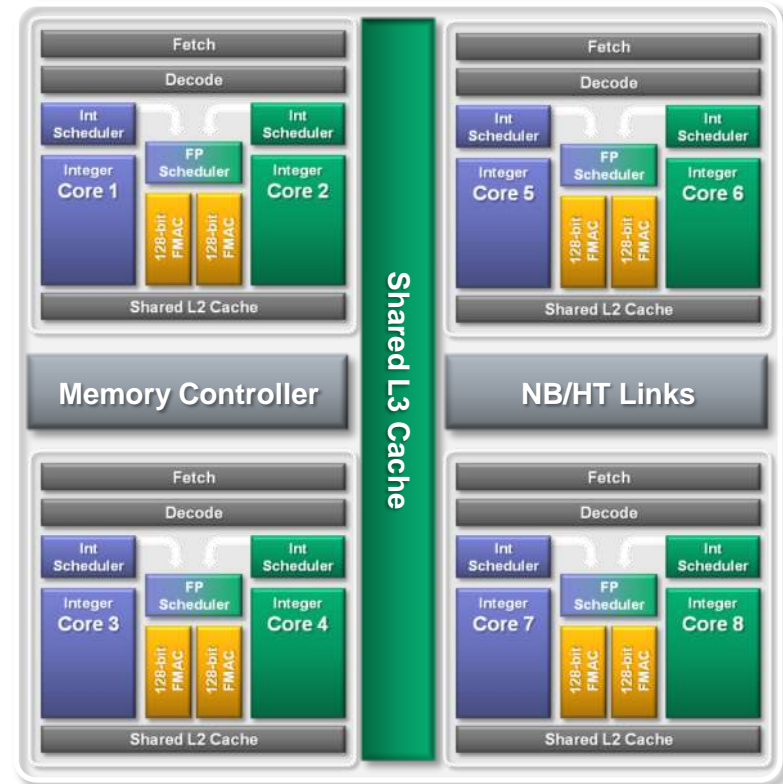
Module divisions are transparent to shared hardware, operating system or application

The modular architecture speeds chip development and increases product flexibility

Server:

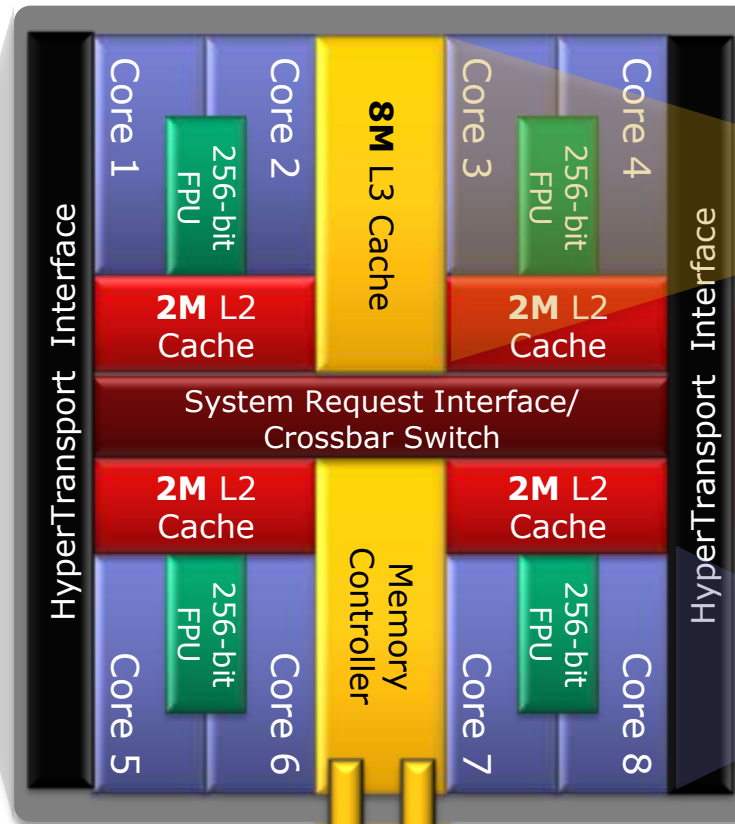
4200 – 8 cores (1 die)

6200 –16 cores (2 die)



AMD OPTERON™ 4200 SERIES PROCESSOR

Single Chip
Module (SCM)
Package



8M L3 cache
(Up to 16M
L2+L3 cache)

6 and 8 core
models

2 DDR3 memory channels
supporting LRDIMM,
ULV-DIMM, UDIMM, & RDIMM

Same platform as
AMD Opteron™ 4100
Series processor.

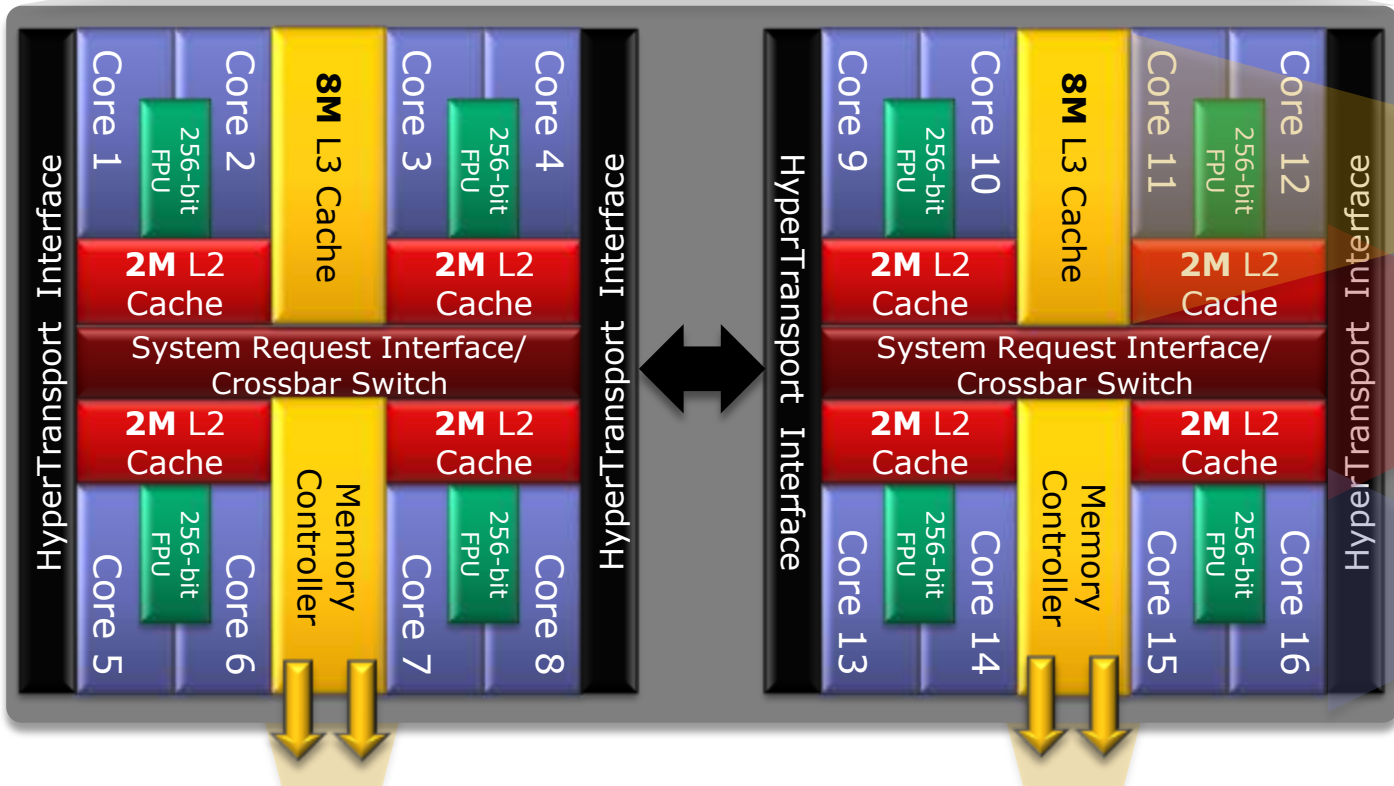
Available in standard,
HE and EE power
bands.



AMD OPTERON™ 6200 SERIES PROCESSOR

**Multi- Chip
Module (MCM)
Package**

**Same platform as
AMD Opteron™ 6200
Series processor.**



**16M L3 cache
(Up to 32M
L2+L3 cache)**

**4, 8, 12, & 16
core models**

**4 DDR3 memory channels supporting
LRDIMM, ULV-DIMM, UDIMM, & RDIMM**

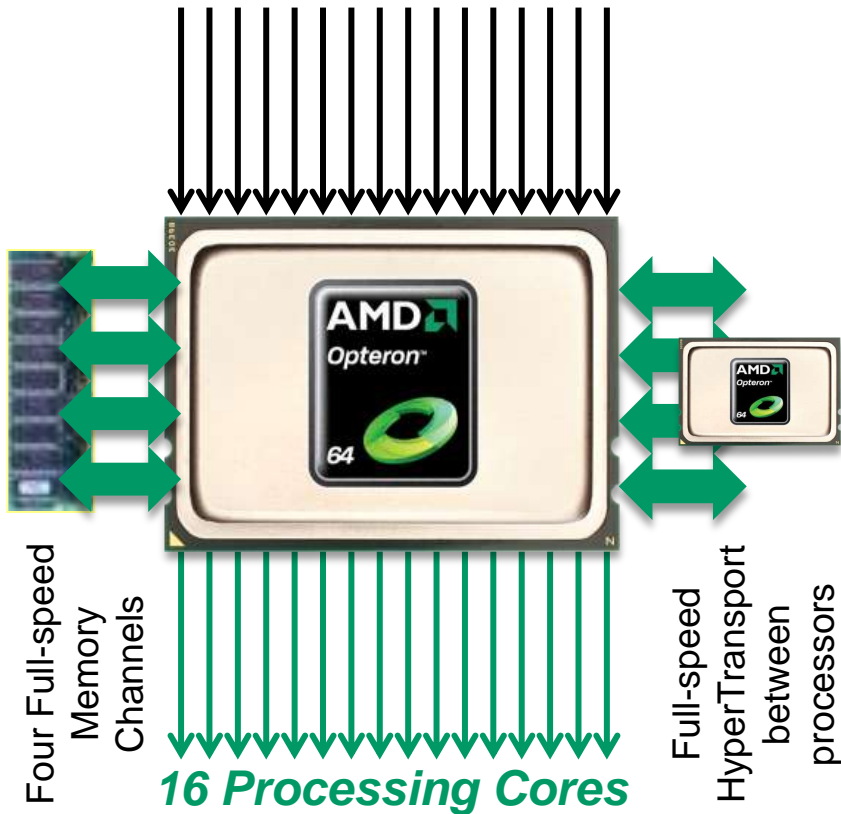
Note: Graphic may not be fully representative of actual layout



Straight Through Computing

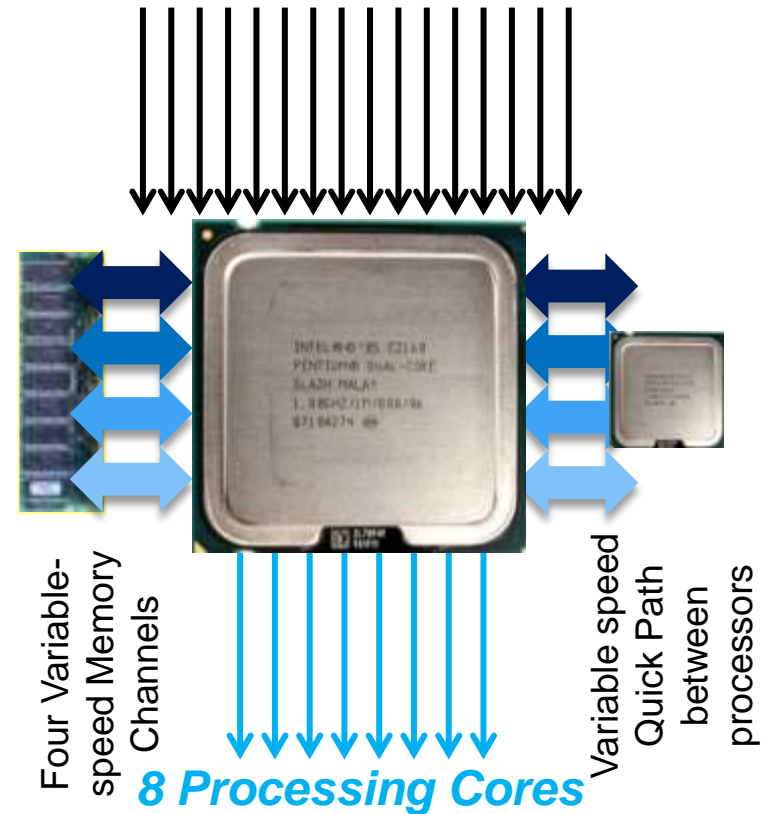
AMD 62xx

16 Threads In



Intel 26xx

16 Threads In



AMD approach gives you “straight through” computing with dedicated pipelines for each integer thread, full speed memory on all models and full speed between processors on all models



Computing Without Compromises

Same Features Across Power Bands

No artificially limited features



Full memory speed on all models



Full I/O speed on all models



Same chipset on all platforms



Consistent Images and Software

Same Die, Chipset and Memory enable:



Same API



**Same BIOS
Code**



Same Drivers

Easier To Buy

No tradeoffs of performance & core functionality

Easier To Qualify

Full consistency across the entire processor stack

Easier To Manage

Seamlessly move virtual machines, easily migrate software between systems



THE NEW “BULLDOZER” INSTRUCTIONS | A CLOSER LOOK

Instructions	Applications/Use Cases
SSSE3, SSE4.1, SSE4.2 (AMD and Intel)	<ul style="list-style-type: none">• Video encoding and transcoding• Biometrics algorithms• Text-intensive applications
AESNI PCLMULQDQ (AMD and Intel)	<ul style="list-style-type: none">• Application using AES encryption• Secure network transactions• Disk encryption (MSFT BitLocker)• Database encryption• Cloud security
AVX (AMD and Intel)	Floating point intensive applications: <ul style="list-style-type: none">• Signal processing / Seismic• Multimedia• Scientific simulations• Financial analytics• 3D modeling
FMA4 (AMD Unique)*	<ul style="list-style-type: none">• Vector and matrix multiplications• Polynomial evaluations• Chemistry, physics, quantum mechanics and digital signal processing
XOP (AMD Unique)*	<ul style="list-style-type: none">• Numeric applications• Multimedia applications• Algorithms used for audio/radio

XOP and FMA4 instruction set extensions are AMD unique 128-bit and 256-bit instructions designed to:

- Improve performance by increasing the work per instruction
- Reduce the need to copy and move around register operands
- Allow for some new cases of automatic vectorization by compilers

* <http://blogs.amd.com/developer/2009/05/06/striking-a-balance/>



AMD OPTERON™ 4200 AND 6200 SERIES PROCESSORS OS AND HYPERVISOR SUPPORT SUMMARY

ASSUMES latest updates/patches are installed*

Enabled

Optimized to support some or all of “Bulldozer’s” new features

Includes new instruction support:

- Linux kernel 2.6.37 + , 3.0 +
- Novell SLES 11 SP2 (includes Xen)
- RHEL 6.2 with KVM (with latest z-stream patches)
- Windows Server 2008 R2 SP1 (optional scheduler patch available)
- Windows Server 2012/Hyper-V (in development)
- Xen 4.1 +
- Ubuntu 11.04 (w/ KVM)
- VMware vSphere 5.0

Versions in this category also include latest software advances

Compatible

Will boot and run but not take advantage of “Bulldozer’s” new features outside of new instructions

Includes new instruction support:

- Linux kernel 2.6.32 – 2.6.36
- Novell SLES 11 SP1
- RHEL 6.1
- Ubuntu 10.10

Does not support new instructions for either Bulldozer or Sandy Bridge:

- Hyper-V R1
- Hyper-V R2, Hyper-V R2 SP1
- Novell SLES 10 SP4 and higher
- RHEL 5.7 (included KVM)
- Solaris 10u9, 11
- VMware vSphere 4.1u2
- Windows Server 2003 R2 SP2
- Windows Server 2008 R2
- Windows Server 2008 SP2
- Xen 3.4.2

Will run but not necessarily provide performance uplift

Not Supported

Will not run on “Bulldozer” platforms and/or will not be supported by OSV

- Linux kernel 2.6.31 or earlier
- Novell SLES 10 thru SP3
- Novell SLES 11
- RHEL 4.x
- RHEL 5.0 – 5.5
- RHEL 5.6 (can run with patches but is not supported by Red Hat)
- RHEL 6.0
- Solaris 10 – 10u8
- VMware ESX 3.5
- VMware ESX 4.0 – 4.1u1
- Windows Server 2003 versions prior to R2 SP2

* Please note: For proper support of available features/processors, the latest updates/patches always needs to be installed

REFERENCES

- **AMD APP SDK Documentation**
<http://developer.amd.com/sdks/AMDAPPSDK/documentation/Pages/default.aspx>
- **x86 Compiler Quick Reference Guide for “Bulldozer” processors**
<http://developer.amd.com/Assets/CompilerOptQuickRef-62004200.pdf>
- **Using the x86 Open64 Compiler Suite**
<http://developer.amd.com/tools/open64/Documents/open64.html>
- **x86 Open64 4.2.5.2 Release Notes**
<http://developer.amd.com/tools/open64/assets/ReleaseNotes.txt>
- **ACML 5.0 Information**
<http://developer.amd.com/libraries/acml/features/pages/default.aspx>
- **Software Optimization Guide for “Bulldozer” processors**
http://support.amd.com/us/Processor_TechDocs/47414.pdf
- **AMD64 Architecture Programmer’s Manual Volume 6: 128-Bit and 256-Bit XOP and FMA4 Instructions**
http://support.amd.com/us/Embedded_TechDocs/43479.pdf



model numbers and frequency

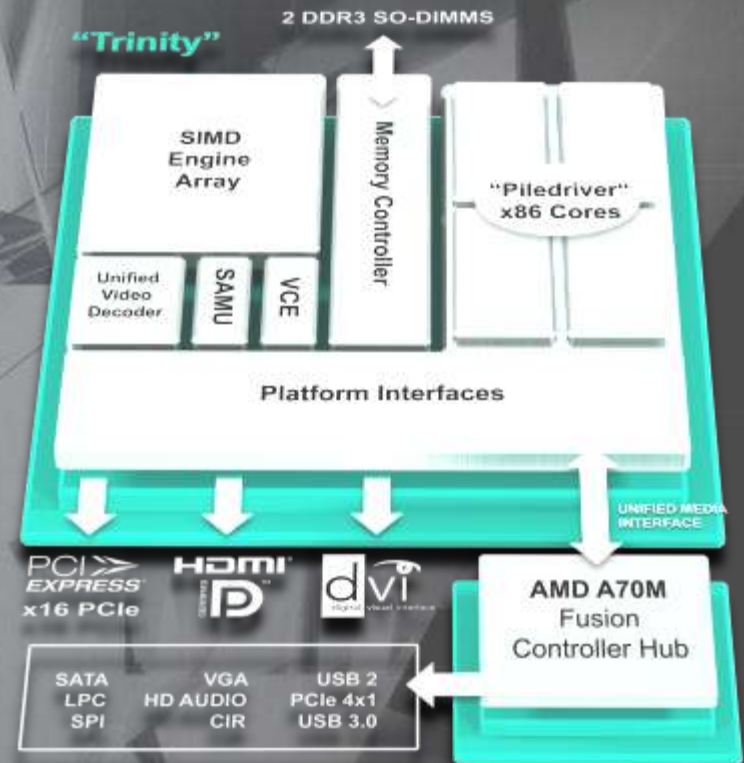
Model Number	Core Count	Core Speed	All-Core Turbo Frequency	Max Turbo Core Frequency
6282 SE	16	2.6GHz	3.0GHz	3.3GHz
6276	16	2.3GHz	2.6GHz	3.2GHz
6274	16	2.2GHz	2.5GHz	3.1GHz
6272	16	2.1GHz	2.4GHz	3.0GHz
6238	12	2.6GHz	2.9GHz	3.2GHz
6234	12	2.4GHz	2.7GHz	3.0GHz
6220	8	3.0GHz	3.3GHz	3.6GHz
6212	8	2.6GHz	2.9GHz	3.2GHz
6204	4	3.3GHz	N/A	N/A
6262 HE	16	1.6GHz	2.1GHz	2.9GHz
4284	8	3.0GHz	3.3GHz	3.7GHz
4280	8	2.8GHz	3.1GHz	3.5GHz
4238	6	3.3GHz	3.5GHz	3.7GHz
4234	6	3.1GHz	3.3GHz	3.5GHz
4226	6	2.7GHz	2.9GHz	3.1GHz
4274 HE	8	2.5GHz	2.8GHz	3.5GHz
4228 HE	6	2.8GHz	3.1GHz	3.6GHz
4256 EE	8	1.6GHz	1.9GHz	2.8GHz



201x Mainstream Socket with x86 and SIMD array

structure of the future

- **Compute core arrangement**
 - Future generational core
 - Improved x86 performance
 - Improved AMD Technology; -V, RAS, boost
- **Flexible Memory Support**
 - Speeds up to DDRx at time of delivery
 - Support for lower power and denser configurations
- **Multiple configurations**
 - Up to 20 core and 40 GB of L2
 - Multiple SIMD configurations
 - PCIe3 support at industry adoption
- **Enhanced Software infrastructure**
 - Next generation OpenCL, DirectCompute
 - Operating System and Hypervisor support
 - Open Compilers and Libraries
- **Enhanced display support**
 - Remote pixel streaming



Optimized for high performance at TDP

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