

Vitual Transformation in a New 64-bit Reality

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Agenda

- **x64 Processors**
- **Dual-Core and Licensing**
- **CPU Architecture (Intel vs AMD)**
- **HW Virtualization (VT and Pacifica)**
- **Questions**

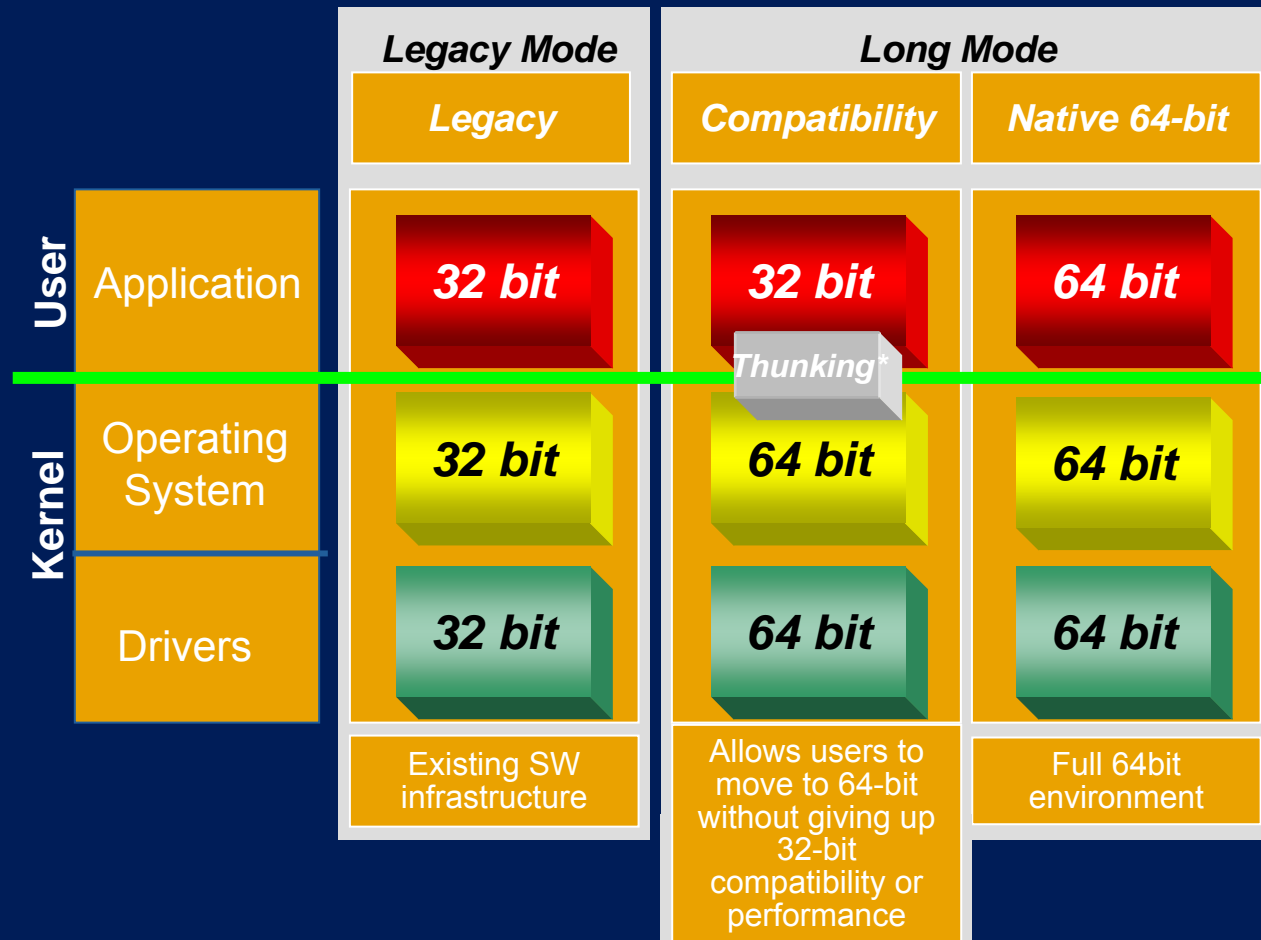
Intel vs AMD



Extending the x86 architecture to 64 bits

Common x86-64 architecture for AMD and Intel

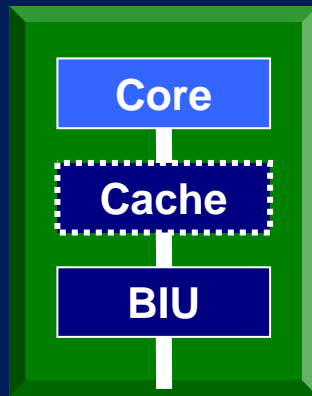
- Processor supports both x86 and x86-64 at full speed and performance
 - Larger data elements
 - Bigger address space
- Allows users to move to 64-bit addressing and data types without giving up 32-bit compatibility or little-endian



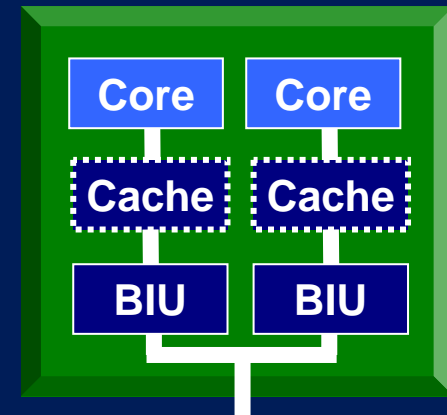
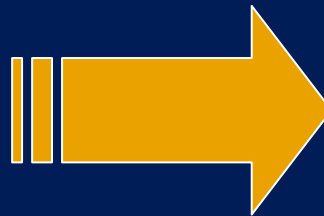
What Is Dual Core?

Two independent CPU cores in the same processor/package

- Implementations will vary with processor vendor and may vary over time
 - Driven by development effort, cost, TTM, etc
- Significant performance increase (60%+)



**Single Core
CPU**

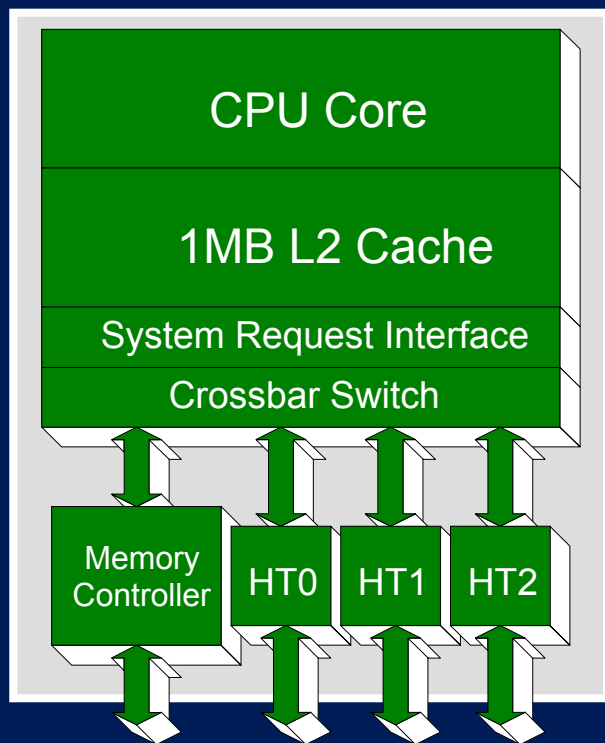


**Dual Core
CPU**

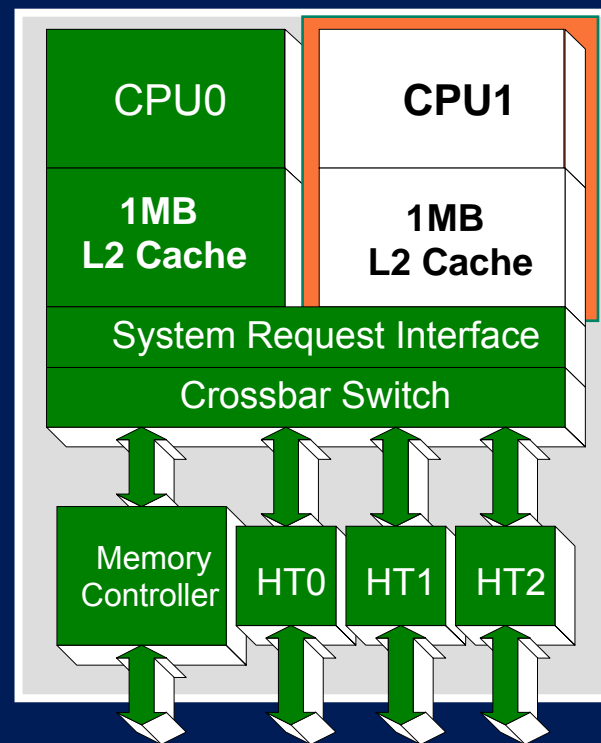
Where there was one core per die – there are now two

AMD Opteron™ Dual Core Overview

Single Core AMD Opteron™ Design



Dual Core AMD Opteron™ Design

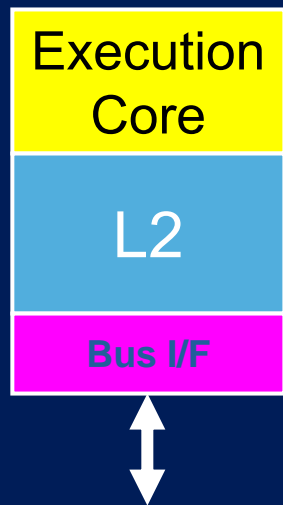


- AMD Opteron was architected from the start to support additional CPU cores
- 2 CPU cores share the same memory and HyperTransport™ technology resources found in single core AMD Opteron processor

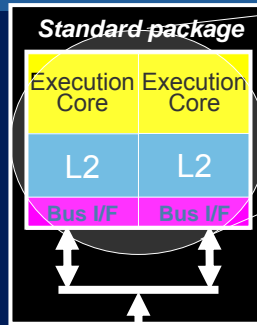


Intel single vs. dual core dies

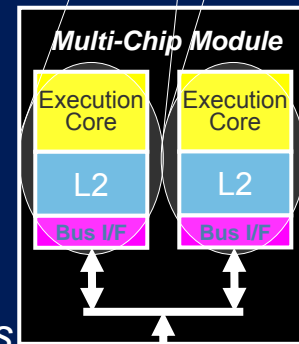
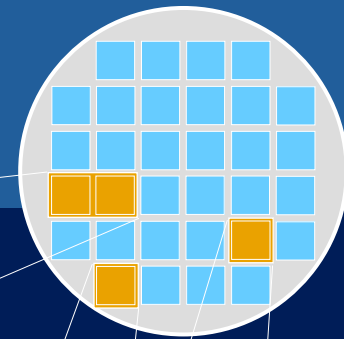
Single core



single die independent processors



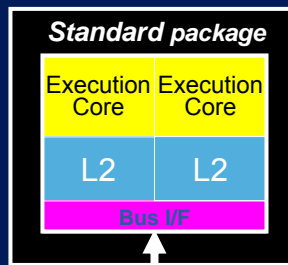
Smithfield Pentium D



Dual die in MCM

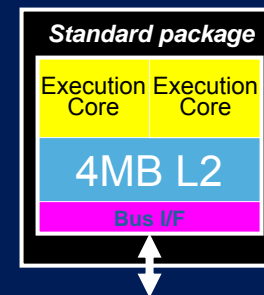
Presler Dempsey

Single die Single Bus I/F



Paxville Tulsa

Dual core



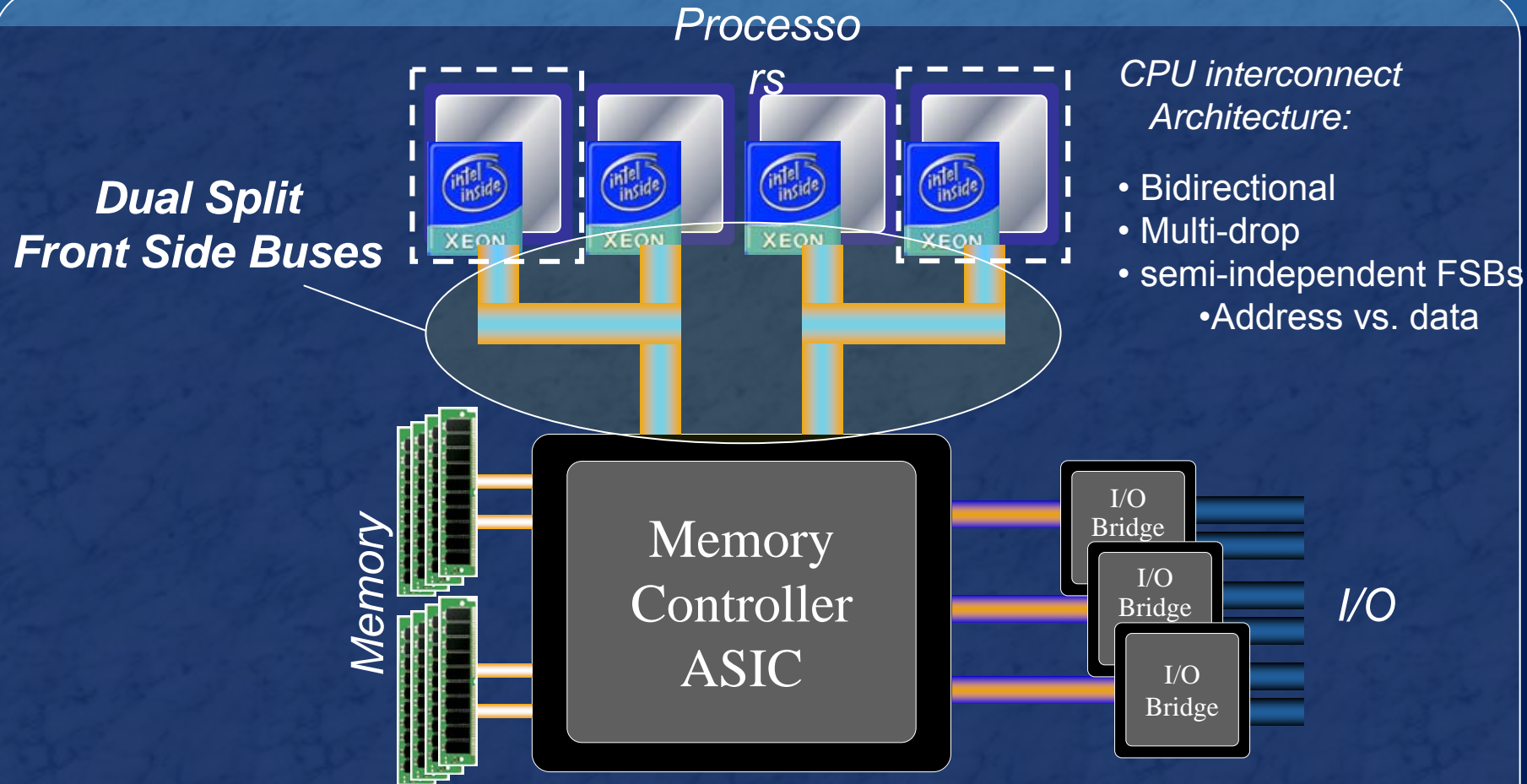
Single die Single Shared cache

Woodcrest Conroe

Dual Core Questions

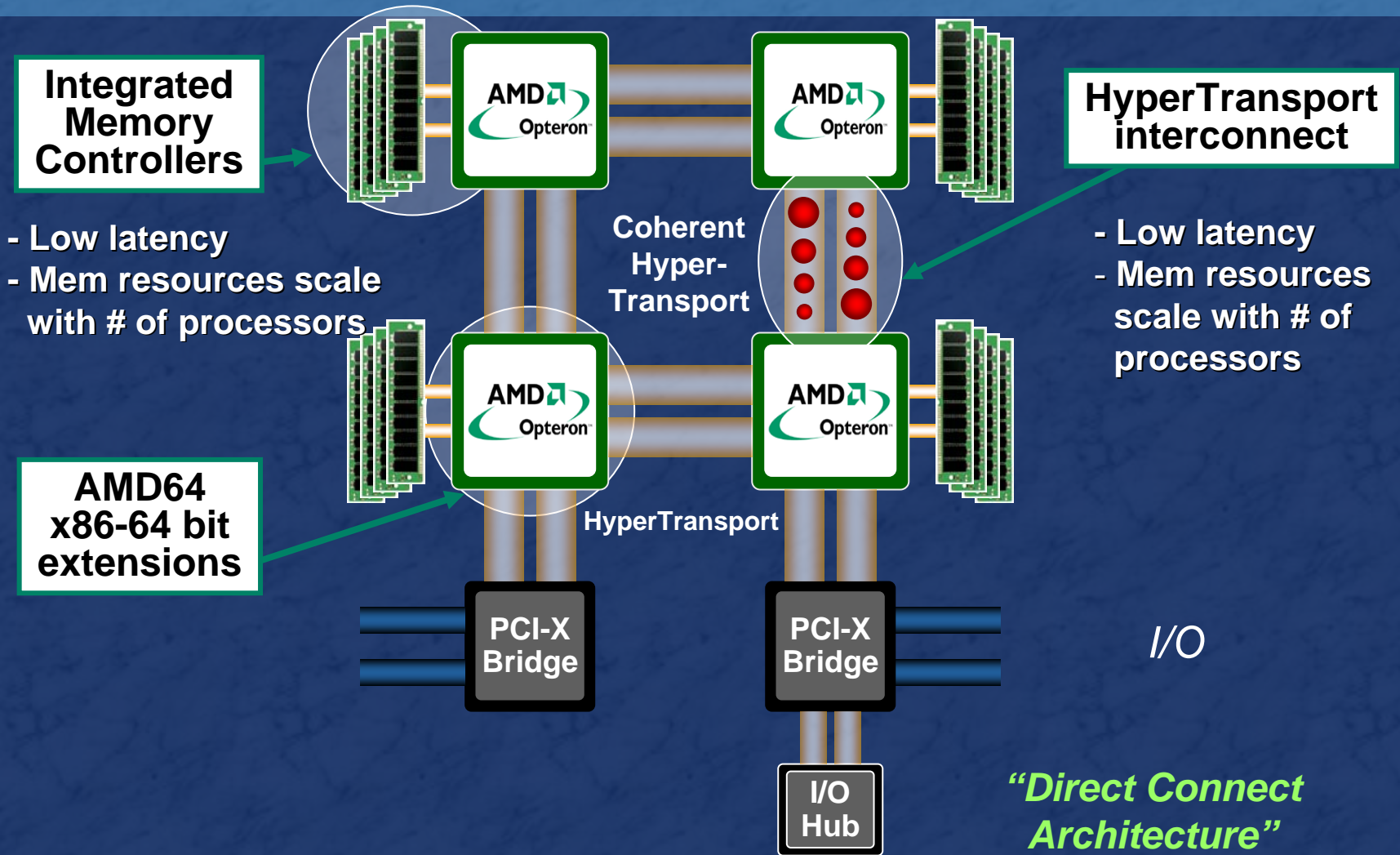
- Where does it fit best
 - Multi-threaded applications
- Advantages/dis-advantages?
 - Better performance for the watt
 - Better performance for the \$
 - But, only for multi-threaded apps. Single threaded apps will run slower
- Licensing?
 - Many major application vendors (Microsoft, VMware, Linux) are licensing by processors (socket) and not by core
 - Oracle is licensing by core (.5 license/core)

Intel MP FSB bus architecture (SMP)



New Dual FSB based architecture

AMD Opteron™ System Architecture (NUMA)



HW Virtualization (VT and Pacifica)

- What is HW Virtualization?
 - Vanderpool (Intel)
 - Pacifica (AMD)
 - Eliminates many of the “unnatural acts” (emulation, dynamic patching, and binary translation) that are used by today’s Virtual Machine Manager or Hypervisor to provide for the individual virtual machines
 - Improves performance, reliability, and simplifies the work of VMs
- Support in processors?
 - Intel DP – Dempsey and beyond
 - Intel MP – Paxville and beyond
 - AMD DP/MP – Rev F (2Q’06)

VT / Pacifica support

– VMware

- Tight lipped on what/when they plan to support the HW virtualization technologies – only that they are working closely with Intel and AMD to support these new technologies in upcoming products.
- Of course existing and future versions of ESX and GSX support the new processors – but present versions do not support VT and Pacifica technologies yet.
- Probably 2H'06

– Microsoft

- Equally tight lipped about their plan to support HW virtualization.

The Road Planned Ahead



More Cores

2, 4, 8

New Memory Support

DDR3, FBDIMM

Faster Input/Output

HyperTransport™

Faster FSB

Better Power Management

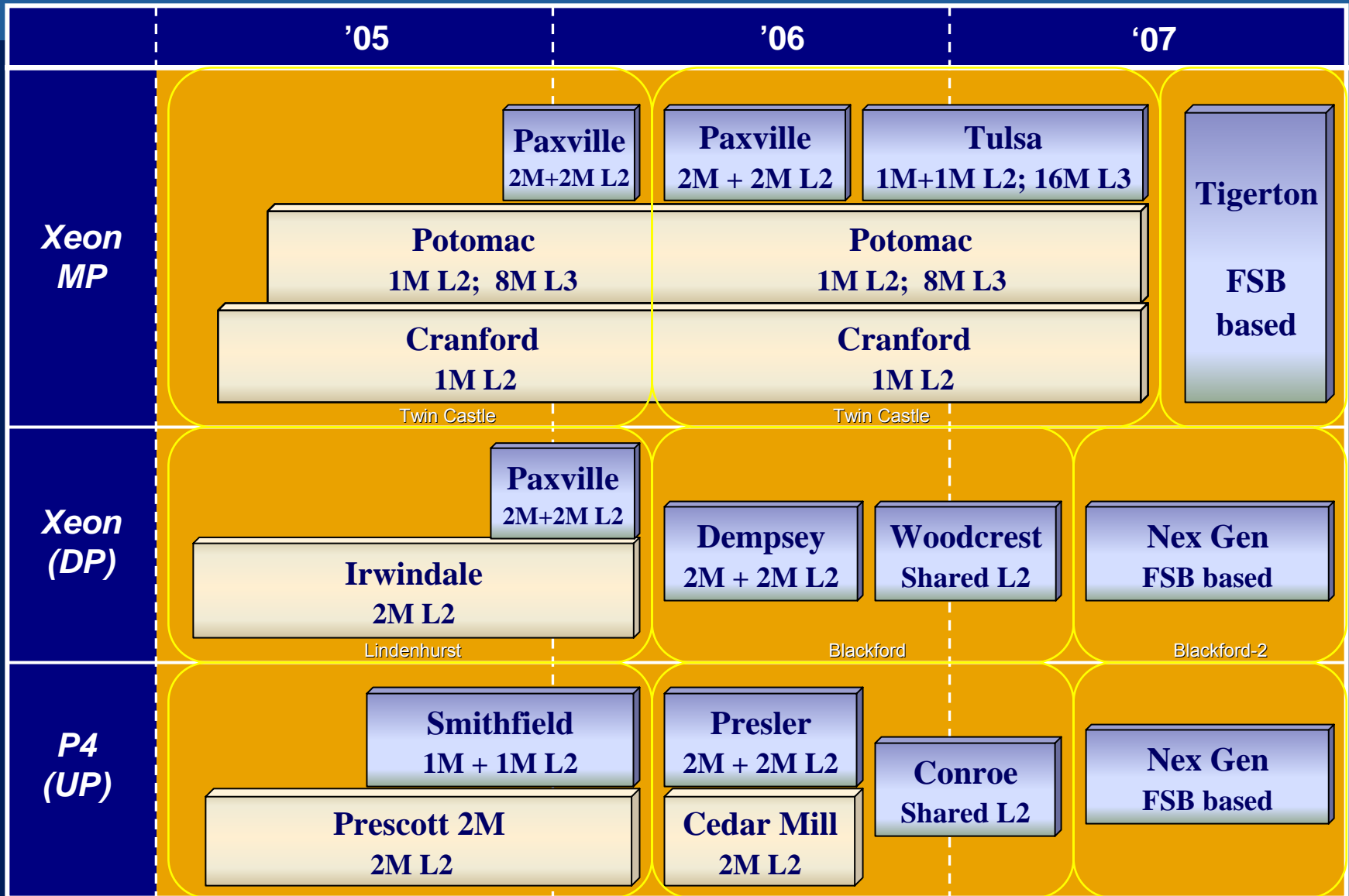
More flexibility in dynamically adjusting power in response to demand



Questions?

Intel x86 Roadmap

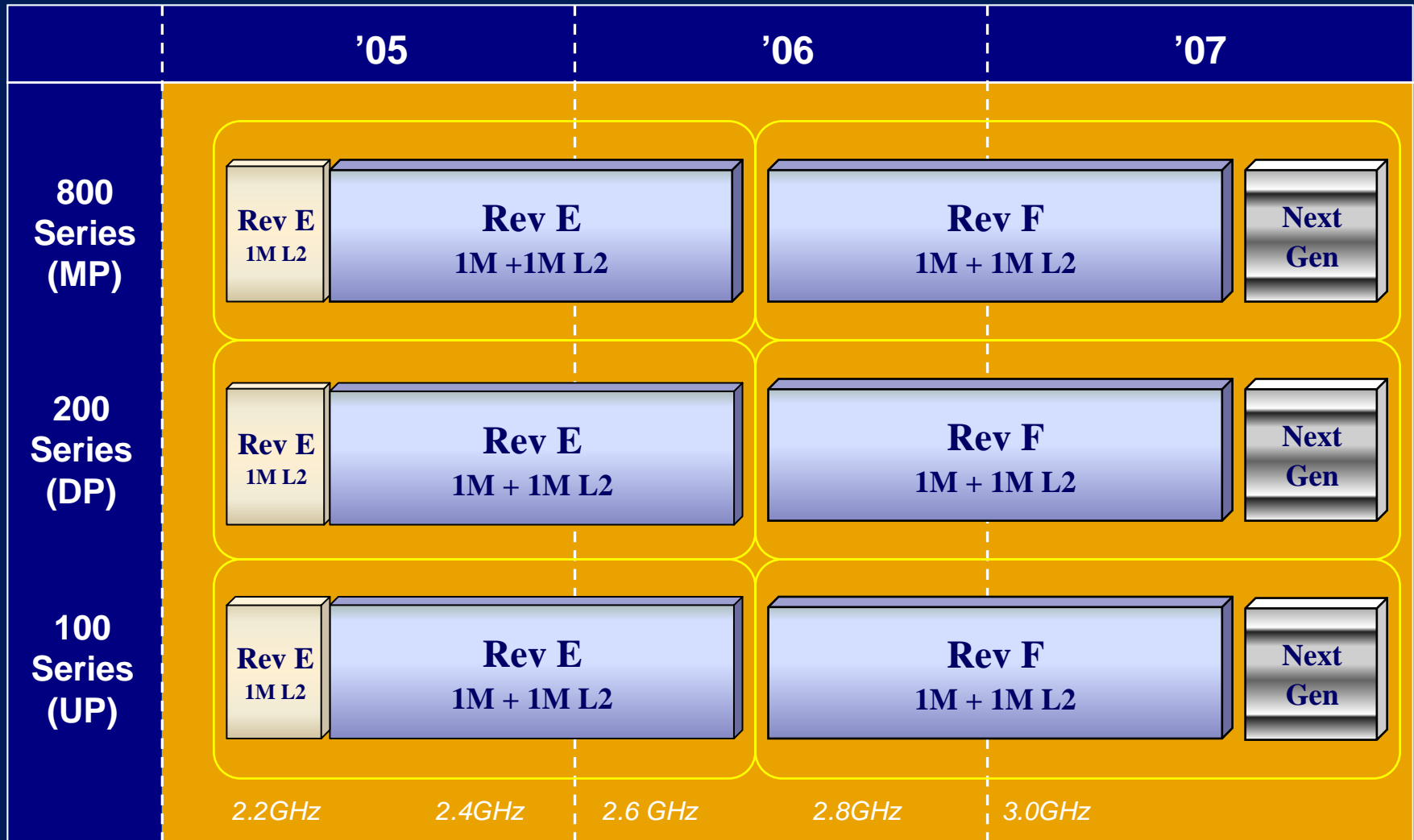
DP and MP dual cores support HW Virtualization



Single Core Dual Core

AMD Opteron Roadmap

Major change for Rev F
is DDR-2 + HW
Virtualization support



Quels sont les problèmes actuellement...

DL360 G1

204 W per Server
8568 W per Rack
42 servers

DL360 G2

268 W per Server
8640 W per Rack (capped)
32 servers

DL360 G3

417 W per Server
8640 W per Rack (capped)
20 servers

DL360 G4

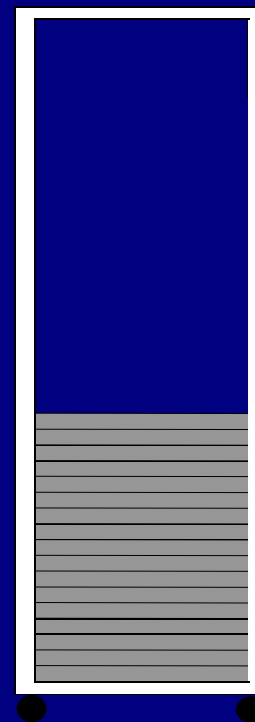
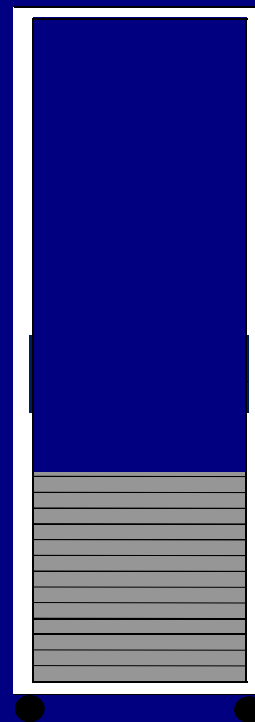
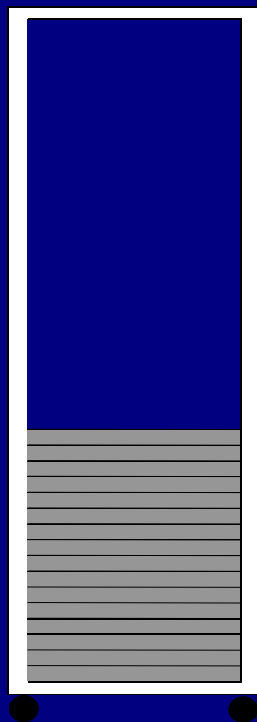
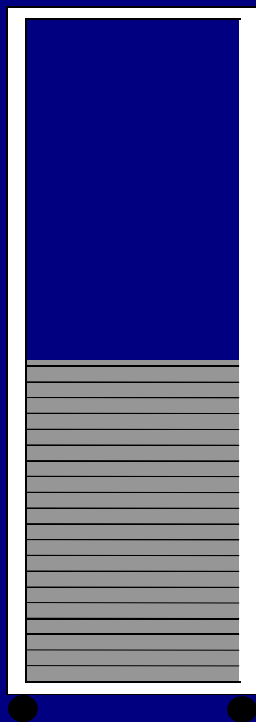
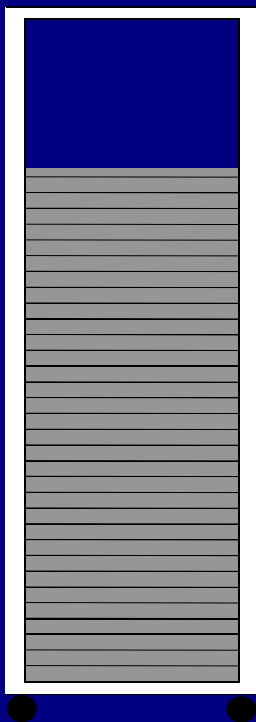
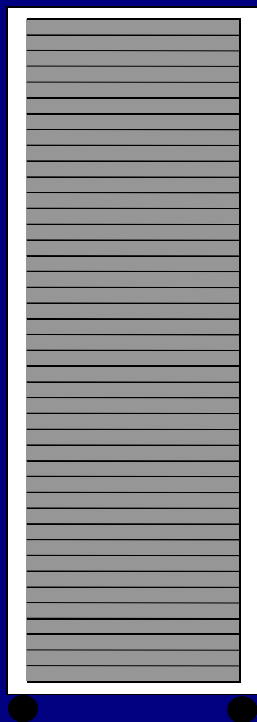
577 W per Server
8640 W per Rack (capped)
15 servers

DL360 G5

622 W per Server
8640 W per Rack (capped)
13 servers

DL360 G??

500 W per Server
8640 W per Rack (capped)
17 servers



AMD vs Intel architectures today

