Intel Architecture Press Briefing

Stephen L. Smith
Vice President
Director, Digital Enterprise Group Operations

Ronak Singhal
Principal Engineer
Digital Enterprise Group

17 March, 2008

Today's News
Intel Technology: Delivering on the Promise

Mission Critical

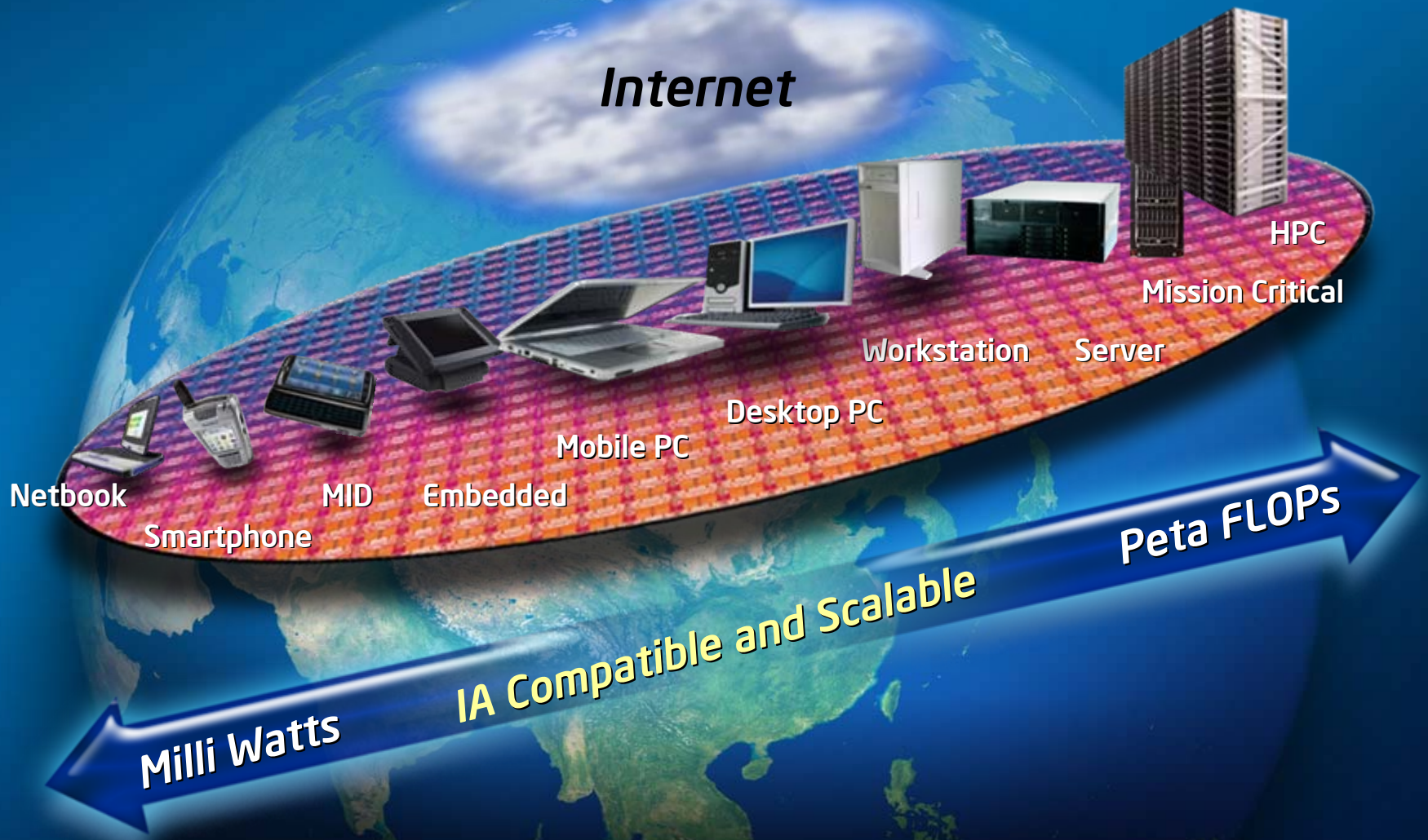
Tick-Tock

Expandable Server

Nehalem

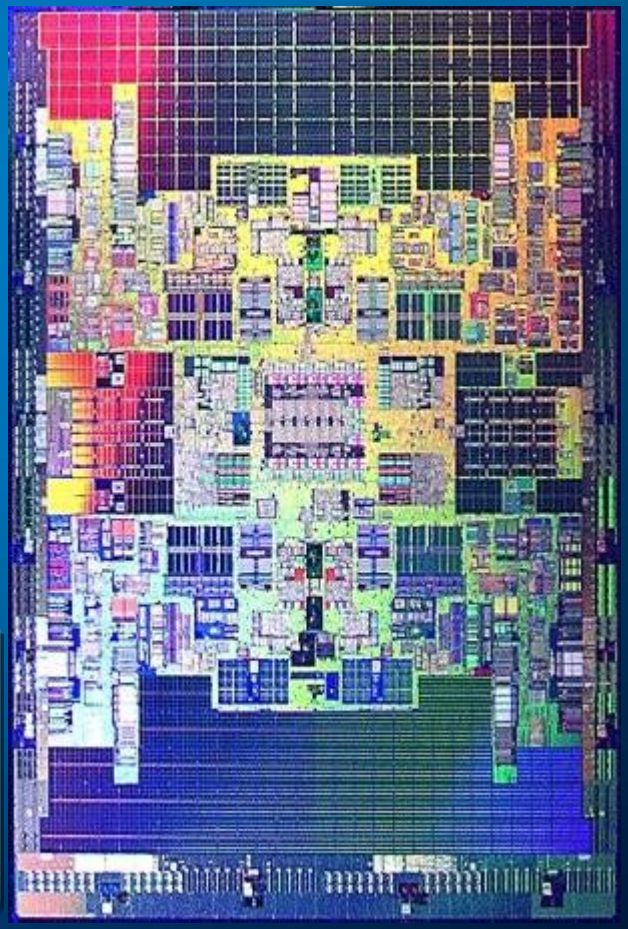
Larrabee

Intel: The Architecture for Life



Tukwila: Delivering Performance to World's Most Powerful Computers

- Quad-core with 30 MB cache
- 2 billion transistors
- Multi-Threading Technology
- Intel QuickPath interconnect
- Dual Integrated Memory Controllers
- Estimate >2x* performance
- Mainframe-class RAS



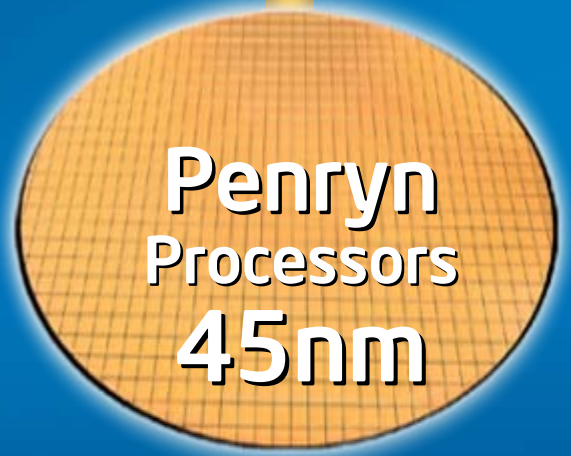
"With Intel's upcoming quad-core Tukwila processor, Windows Server solutions running on Itanium-based systems will provide an even more scalable, reliable, agile and dynamic datacenter foundation for our customers."

—Bill Laing, GM Windows Server & Solutions Division, Microsoft

* Compared to Dual-core Itanium® Processor 9100 series

Product Cadence for Sustained Leadership

2007-08



TICK ***TOCK***

Delivering Products on Schedule and Moore's Law

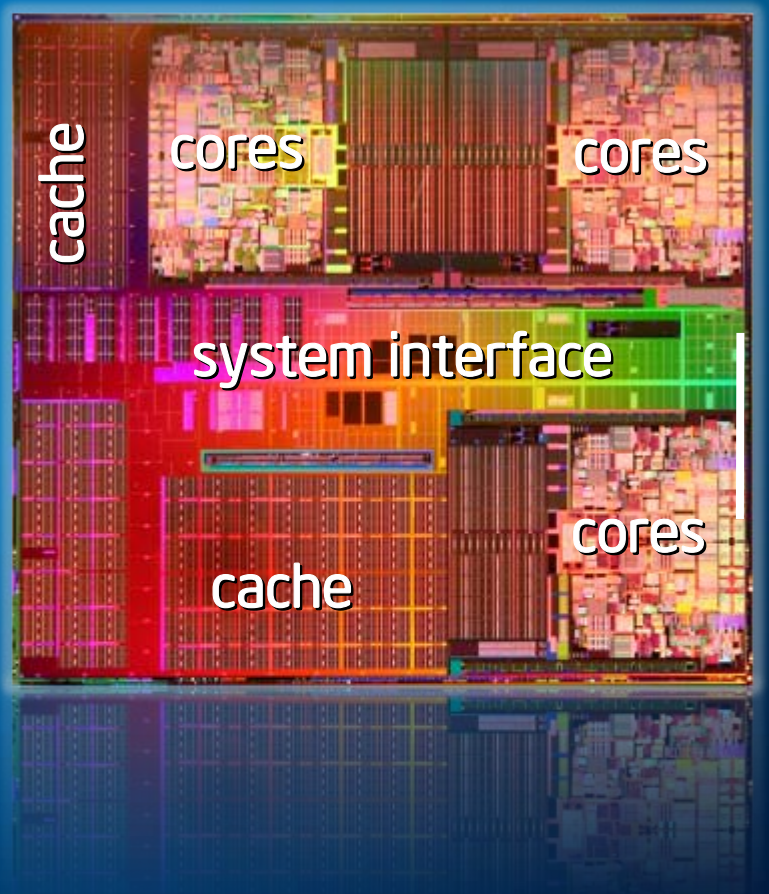
Expandable and Scalable: Quad-Core Intel® Xeon® processor 7300

- Caneland platform built for virtualization and consolidation
- Energy Efficient performance: Leading in benchmarks
- Scalable
- Enterprise proven reliability and investment protection
- Great customer acceptance

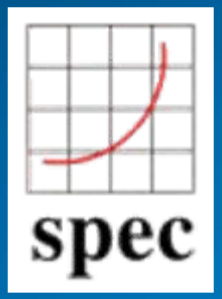
Industry's Virtualization Platform of Choice

Expandable and Scalable: Gets Better with Dunnington

- 6 core Processor
- 1.9 billion transistors
- 45nm Hi-K technology
- 16 MB L3 cache
- Latest Intel virtualization capabilities
- Socket compatible with Caneland platform
- Available 2H'08



Energy Efficiency: Top SPECpower* Results



Rank	Sponsor	SPECPower_ ssj2008 result	Platform	Processors
1	HP	778	DL180 G5	2x Intel® Xeon® E5450
2	Dell	719	PE 2950 III	2x Intel® Xeon® E5440
3	Dell	712	PE 1950 III	2x Intel® Xeon® E5440
4	HP	698	DL160 G5	2x Intel® Xeon® E5450
5	FSC	690	RX300 S4	2x Intel® Xeon® E5440
6	Dell	682	PE 2950	2x Intel® Xeon® E5440
7	FSC	667	TX150 S6	1x Intel® Xeon® X3220
8	HP	662	DL360 G5	2x Intel® Xeon® E5450
9	HP	546	DL580 G5	4x Intel® Xeon® L7345
10	Intel	468	SM 6025B	2x Intel® Xeon® L5335

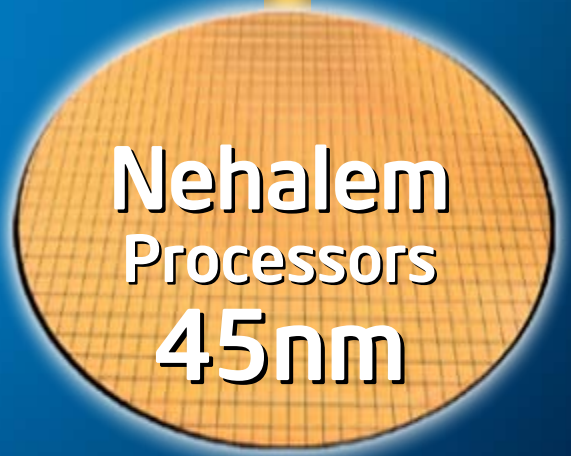
First industry standard Energy Efficiency benchmark

Public SPECpower results from http://www.spec.org/power_ssj2008/results/power_ssj2008.html as of Feb 28, 2008

SPECPower_ssj2008 results measured as ssj_ops/watt

Product Cadence for Sustained Leadership

2007-08



Penryn
Processors
45nm

TICK

Nehalem
Processors
45nm

TOCK

Driving Products to Deliver on Moore's Law

Nehalem Micro-architecture: Dynamically Scalable and Innovative New Design

Scalable from 2 to 8 cores

Micro-architecture enhancements (4 –wide)

2-way simultaneous multi-threading

Integrated memory controller

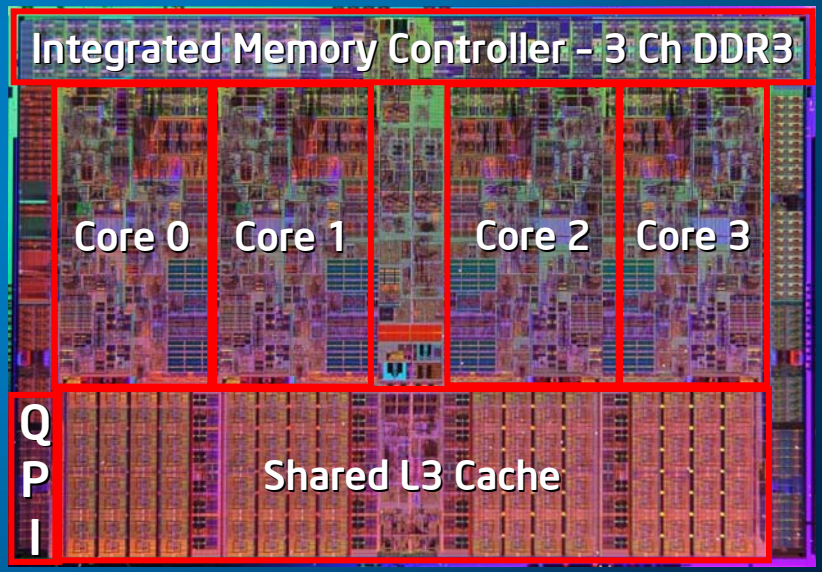
QuickPath interconnect

Shared and Inclusive Level-3 cache

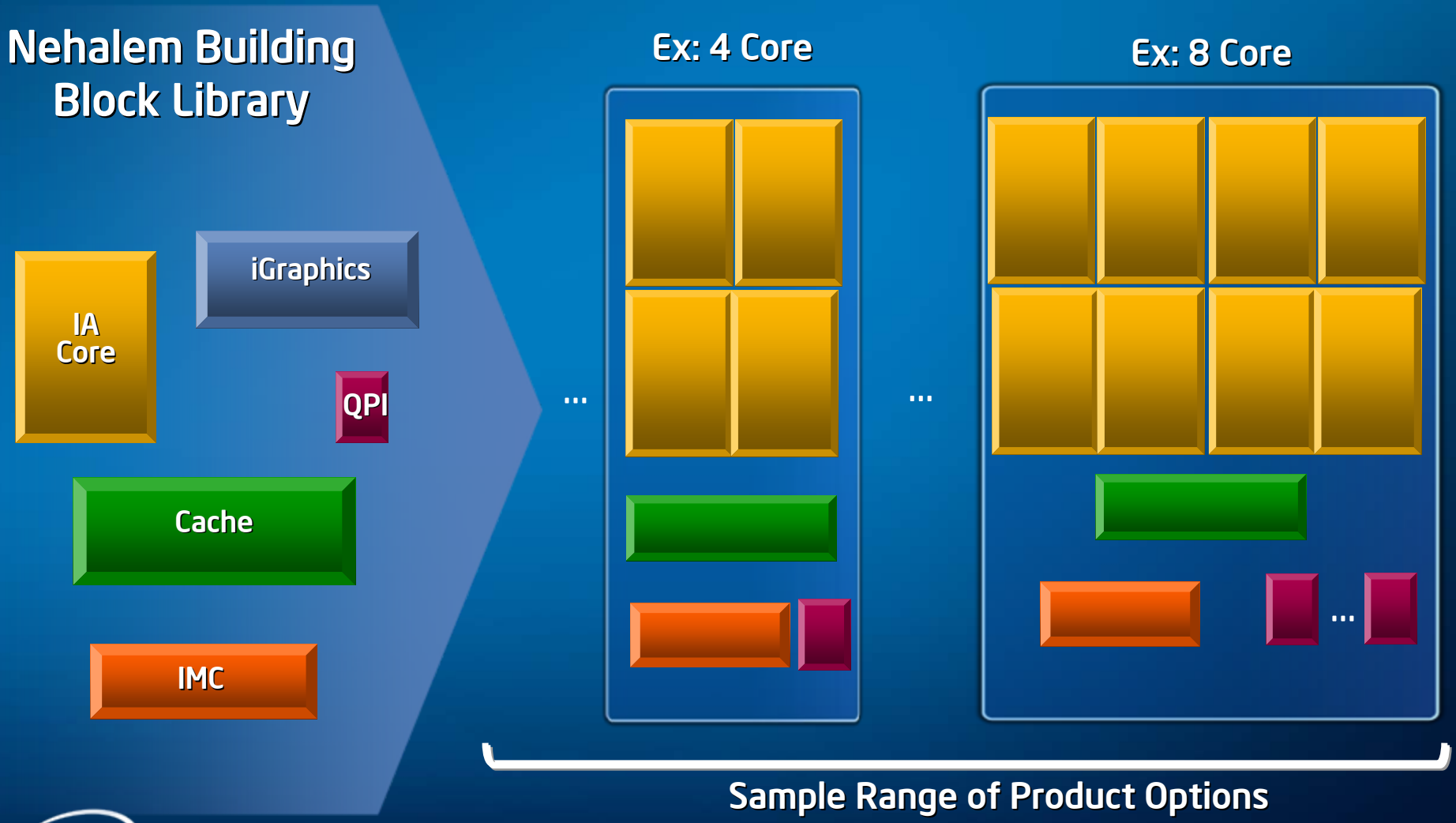
Dynamic power management

SSE 4.2

Production: Q4'08



Nehalem Design Scalable Via Modularity



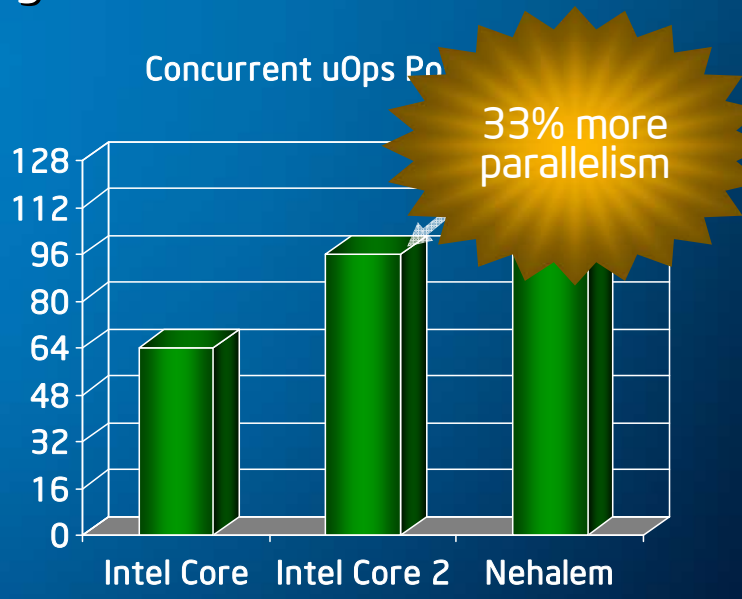
Block combinations are for illustration only and do not represent actual product plans. Block sizes are not indicative of die size contributions.

Nehalem: Core uArch Enhancements

Foundation: Intel® Core™ Microarchitecture

Significant Performance and Efficiency Enhancements

- Increased parallelism
  - 33% more micro-ops in flight possible
- Enhanced algorithms
  - Faster "unaligned" cache accesses
  - Faster synchronization primitives
- Further branch prediction enhancements
  - New 2nd level branch predictor
  - Renamed Return Stack Buffer



Builds upon Industry Leading 4 Instruction issue Intel® Core micro-architecture

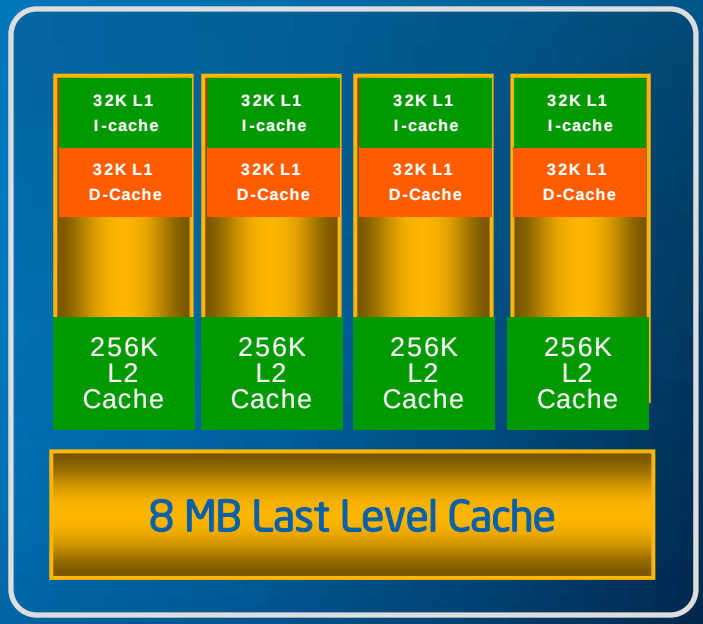
Simultaneous Multi-Threading (SMT)

- Each core able to execute two software threads simultaneously
- Extremely power efficient
- Enhanced with larger caches and more memory bandwidth
- Benefits
  - Highly threaded workloads (eg, multi-media apps, databases, search engines)
  - Multi-Tasking scenarios

Simultaneous Multi-threading Enhances Performance and Energy Efficiency

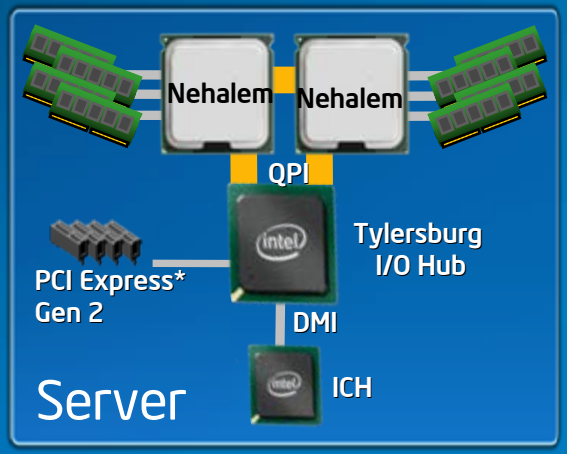
Enhanced Cache Subsystem

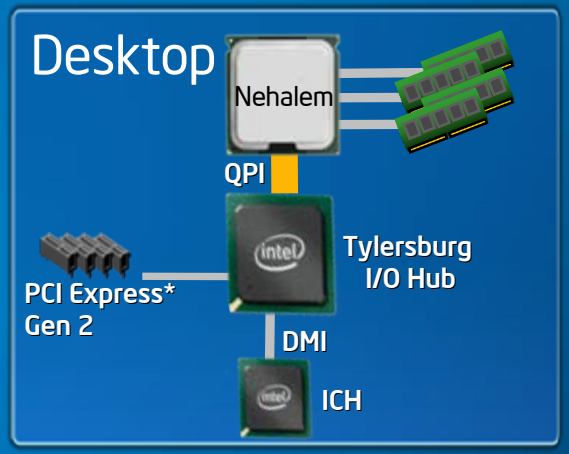
- New 3-level Cache Hierarchy
  - L1 cache same as Intel Core™ uArch
    - 32 KB Instruction/32 KB Data
  - New 256 KB/core, low latency L2 cache
  - New Large 8MB fully-shared L3 cache
    - Inclusive Cache Policy - minimize snoop traffic
- New 2-level TLB hierarchy
  - Adds 2nd level 512 entry Translation Look-aside Buffer



Superior multi-level shared cache extends Intel® Smart Cache technology

Nehalem/Tylersburg Platforms (High End Desktop and Server/Workstation)



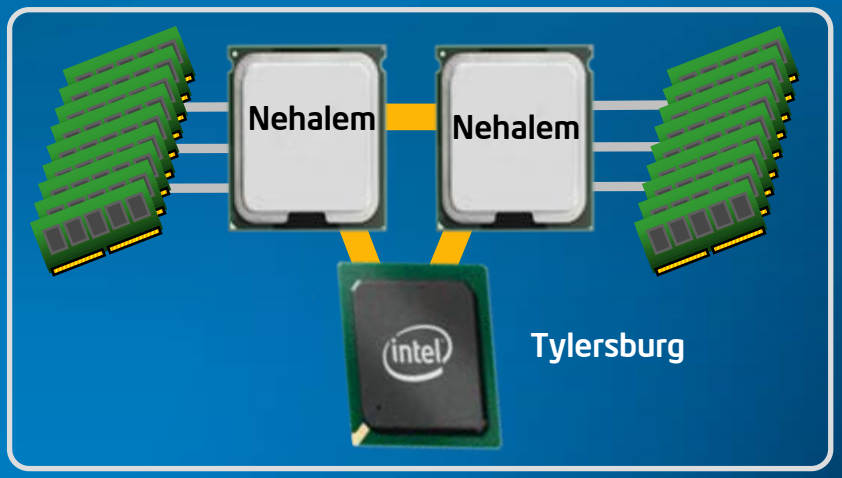


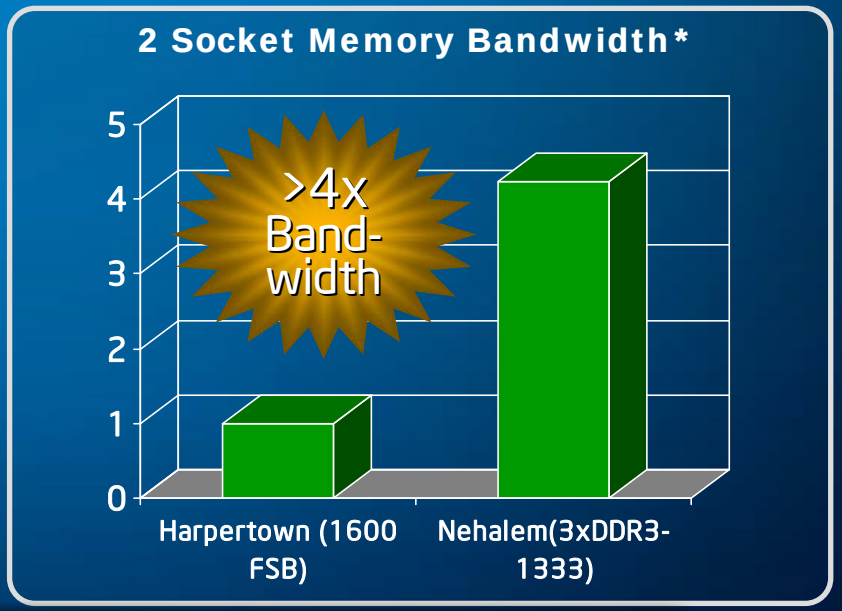
- Intel® QuickPath Interconnect
  - New point to point interconnect
  - 2 links per CPU socket
  - Up to 25.6 Gb/sec total bandwidth/link
- Integrated DDR3 Memory Controller
  - 3 channels per processor
  - Massive amounts of Bandwidth
  - Significant Memory Latency Reduction

Huge Latency Decrease and Bandwidth Increase over Prior Generation

Nehalem High End Desktop/Server IMC

- 3 channels per socket
- Up to 3 DIMMs/channel
- DDR3-800, 1066, 1333
  - Future scalability
- Supports RDIMM and UDIMM
- Very low latency
- Very high bandwidth
- Built-In RAS Features



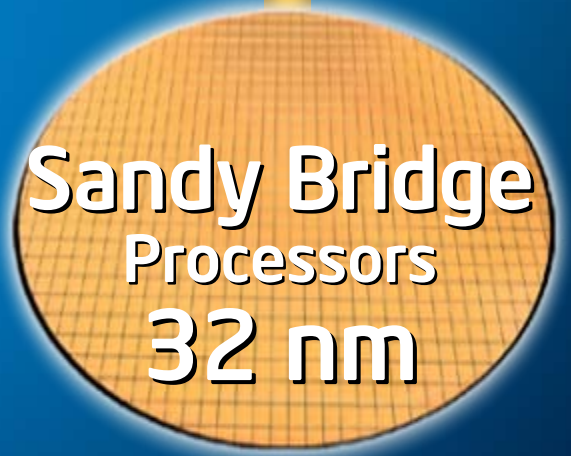


Leadership Memory Bandwidth

*Source: Intel internal measurement

Product Cadence for Sustained Leadership

2009-10



Westmere
Processors
32 nm

TICK

Sandy Bridge
Processors
32 nm

TOCK

Continuing the Pace of Innovation

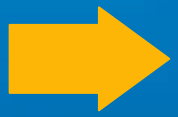
Intel® Advanced Vector Extension (AVX)

256-bit vector extension to SSE for FP intensive applications

KEY FEATURES	BENEFITS
Wider Vectors Increased from 128 bit to 256 bit	Up to 2x peak FLOPs output
Enhanced Data Rearrangement Use the new 256 bit primitives to broadcast, mask loads and do data permutes	Organize, access and pull only necessary data more quickly and efficiently
Three Operand, Non Destructive Syntax Designed for efficiency and future extensibility	Fewer register copies, better register use, more opportunities for parallel loads and compute operations, smaller code size

Visual Computing: Graphics Re-defined

Mainstream Graphics	*Visual Computing*
• Triangle / Rasterization	• New life-like Rendering e.g. Global illumination
• Rigid pipeline architecture	• Programmable, ubiquitous architecture
• Tools constrained by architecture	• High definition audio and video processing
• Inefficient for non-graphics computing	• Combines with model based computing (e.g. Physics)



Visual Computing

Acquiring, Analyzing, Modeling and Synthesizing Visual Workloads

Photorealistic 3D Rendering

Interactive User Interface

High Definition Audio, Video

Computational Modeling

Visual Computing: What Does it Take?

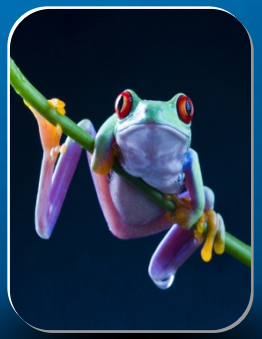
Intel Leadership

- Platforms: Client, Workstation, Server
- CPU, Graphics, Media Architecture
- Process and Technology Leadership
- Software, Tools & Developer Support

Photorealistic
3D Rendering

Computational
Modeling

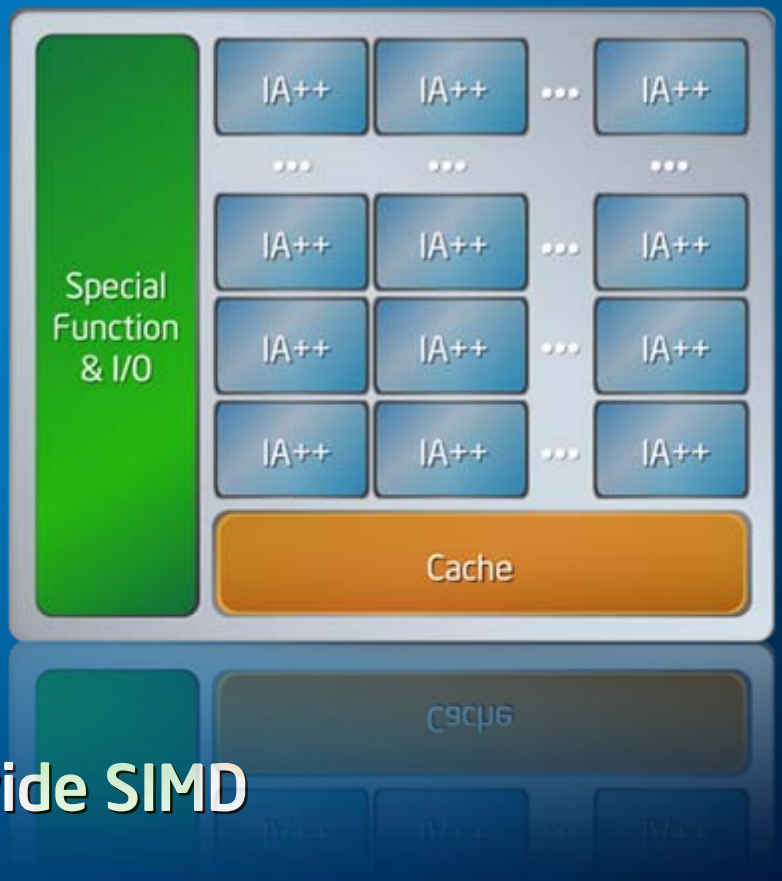
Interactive
User Interface



High Definition
Audio, Video

Larrabee: Visual Computing Architecture

- Many IA cores
  - Scalable to TeraFLOPS
- New cache architecture
- New vector instruction set
  - Vector memory operations
  - Conditionals
  - Integer and FP arithmetic
- New vector processing unit / wide SIMD



Intel Software: Unleashes Developer Freedom

Industry Leading Intel® Software Tools

Addresses development and performance tuning needs

Visual Computing Tools & Resources

Extending Intel® Software for Larrabee Architecture

Supports industry standard APIs (DirectX* & OpenGL*)

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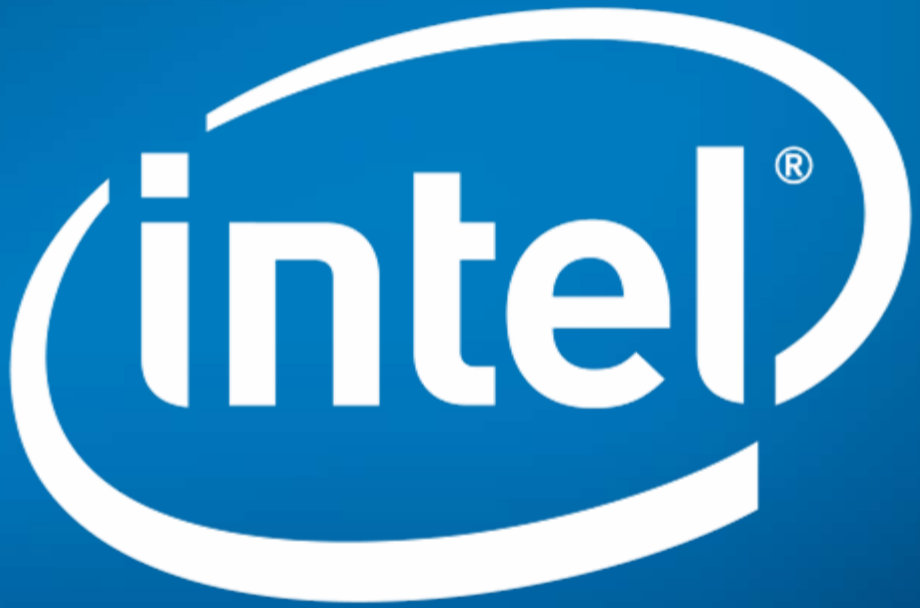
Q & A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Rev. 2/26/08

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