Intel® Xeon® Processor

Tick-Tock Development Model:
Sustained Microprocessor Leadership

Intel® Core™ Microarchitecture

Merom
65nm
New Micro-architecture

Penryn
45nm
New Process Technology

Nehalem
45nm
New Micro-architecture

Westmere
32nm
New Process Technology

Sandy Bridge
32nm
New Micro-architecture

Ivy Bridge
22nm
New Process Technology

Haswell
22nm
New Micro-architecture

Future
14nm
New Process Technology

TICK
TOCK
TICK
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TICK
TOCK
TICK
TICK
Intel in the Data Center

Intel’s Increasing Advantage

Leadership you can count on to fully deliver the benefits of Moore’s Law

Design & Ecosystem

Help Define and Prioritize
IT industry requirements

Create Building Blocks that
address requirements

Enable Widest Choice of
complete partner solutions

Manufacturing

Extend Process Leadership

2007 45 nm 2009 32 nm 2011 22 nm

High-k Metal Gate Tri Gate

Intel lead vs. Industry 3.5 years
Intel lead vs. Industry 4 years

$ Billions 2012 Est. Revenue from Semiconductor Shipments

Invest Big to deliver Moore’s Law
Semiconductor Revenue Required to Support One Leading Edge Fab

Intel Revenue Threshold: $3-$5B
TSMC* Revenue Threshold: $9-$12B
Texas Inst. Revenue Threshold: 2015+
Toshiba Fewer companies able to invest at the scale needed to sustain mfg leadership

$-$ $10 $20 $30 $40 $50

1. Semiconductor Revenue Required to Support One Leading Edge Fab
3. Intel estimate '12
## Product Line Descriptions

<table>
<thead>
<tr>
<th><strong>Intel® Itanium® processor 9500 product family</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted at large-scale databases, data warehouses, ERP, data analytics, and SMP deployments. Delivers uncompromised scalable performance and world-class RAS for the most demanding workloads, and provides uninterrupted real-time business processing and decision support.</td>
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<tr>
<th><strong>Intel® Xeon Phi™ product family</strong></th>
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<tr>
<td>Advanced performance for highly parallel workloads for breakthrough innovation and discovery. Based on Intel® MIC Architecture; Works synergistically with Intel® Xeon® processors. Increased developer productivity via programming models &amp; tools common with Intel® Xeon® processors.</td>
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<tr>
<th><strong>Intel® Xeon® processor E7 family</strong></th>
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<tr>
<td>Scalable (up to 256-way), reliable, powerful multi-core servers offering industry-leading performance, expanded memory &amp; I/O capacity, and advanced reliability ideal for the most demanding enterprise and mission critical workloads, large scale virtualization and large-node HPC applications.</td>
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<tr>
<th><strong>Intel® Xeon® processor E5 family</strong></th>
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<tr>
<td>Versatile (up to 4-way) servers for all your infrastructure, high-density, workstation and HPC applications with features that enable optimal performance and power efficiency for the data center.</td>
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<tr>
<th><strong>Intel® Xeon® processor E3 family</strong></th>
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<tr>
<td>Economical (1-way) dependable general purpose servers well-suited for small businesses and education with features that optimize performance, uptime, and security.</td>
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<tr>
<th><strong>Intel® Atom™ processor S1200 product family</strong></th>
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<tbody>
<tr>
<td>Designed for micro servers which have unique density, performance, and cost per rack requirements. Well-suited to highly parallel workloads including lightweight web tier, low-end dedicated web hosting, and basic content delivery.</td>
</tr>
</tbody>
</table>

*Other names and brands may be claimed as the property of others.*
Leading Performance
Up to 80% performance boost over Intel® Xeon® processor 5600 series-based servers

Flexible & Efficient
Advanced features automate power consumption across the platform

Best combination of performance, power efficiency, and cost

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

For more information go to intel.com/performance

1 Performance comparison using best submitted/published 2-socket server results on the SPECfp*_rate_base2006 benchmark as of 6 March 2012. Configuration details in backup
Intel® Xeon® Processor

More Capabilities for a Next-Generation Data Center

More Cores
More Memory
More Integration
More Bandwidth

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Intel® Xeon® Processor

Increase Performance up to 80%

Intel® Xeon® Processor E5-2690 (8C, 2.9 GHz)

Higher is better

Enterprise

1.58
1.62
1.75

Technical Computing

1.83
1.88
2.18

X5690 Baseline (3.46GHz, 6C)
Integer Throughput (SPECint*_base2006)
Middle-Tier Java (SPECjbb*_2005)
Virtualized Consolidation (SPECvirt_sc*_2010)
Floating Point Throughput (SPECfp*_rate_base2006)
Memory Bandwidth (STREAM_MP Triad)
Matrix Multiplication (Linpack)

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Linpack performance may vary based on thermal solution.
Source: Intel internal measurements and best published results as of 6 March 2012
Configuration Details: Please reference slide speaker notes and back up slides
For more information go to http://www.intel.com/performance

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Intel® Xeon® Processor

Xeon® Processor Energy Efficiency

**Up to 50%**

Improved Energy Efficiency

- Scale memory, cache, & I/O to match core needs
- Fine grained control across 23 power domains
- Improved efficiency reduces operating expenses

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**Exceptional Performance per Watt**

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1 Performance comparison using SPEC_Power results published as of March 6th, 2012. See back up for configuration details. For more information go to intel.com/performance
Intel in the Data Center
Control One of your Biggest Operating Expenses

Power Management at the Server, Rack and Data Center Level

Greater Workload Consolidation

Intel® Node Manager

Intel® Data Center Manager

Operational Costs of a Typical Large IPDC

Servers 50% (HW and SW)

Networking 6%

Labor 13%

Facilities 5%

Other IT 3%

Power 23%

Lower TCO

Manage Server Power

Manage Data Center Power

3. Over previous generation Intel® processors. Intel internal estimate. For more legal information on performance forecasts go to http://www.intel.com/performance
“DATACENTER AS A SYSTEM”

FACILITIES NETWORKING HARDWARE SOFTWARE OPERATIONS
Industry Trends

Cloud  Big Data  HPC
Big Data
A Foundation For Delivering Big Value
Big Data – A Foundation For Delivering Big Value

Virtuous Cycle of Data-Driven Innovation

40 Zettabytes of data will be generated WW in 2020

2.8 Zettabytes of data will be generated WW in 2012

Cloud

Richer data to analyze

Clients

Richer user experiences

Intelligent Systems

Richer data from devices

(1) IDC Digital Universe 2020, (2) IDC
Big Data – A Foundation For Delivering Big Value

Big Data Building Blocks

**Compute**
- Intel® Xeon® Product Family E3-E5-E7
- Intel® Atom™
- Intel® Xeon Phi™

**Network**
- Intel® Ethernet Controllers
- Intel® Ethernet Adapters
- Intel® Ethernet Switch Silicon
- Intel® True Scale Fabric
- InfiniBand

**Storage**
- Intelligent Storage
- Scale-out Storage
- Scale-up Storage
- Intel® SSD 710 series, DC S3700 (SATA)
- Intel® SSD 910 series (PCIe)

**Software & Technologies**
- Intel® Distribution for Apache Hadoop
- Intel® Data Center Manager
- Intel® Node Manager
- Intel® Expressway Service Gateway
- Intel® Cache Acceleration Software
- Intel’s Lustre
- Intel® VT and Intel® TXT
- Intel® AES-NI

Intel’s Foundational Technologies Offer Advanced Solutions for Big data Analytics

Xeon-based storage systems are available in a wide range of configuration options from the industry's leading storage vendors.
Big Data – A Foundation For Delivering Big Value

Unleash the power of platform

TeraSort for 1TB sort: >4 hour process time

Nearly 50x increase in your ability to discover insights

Intel® Xeon®
5600
HDD
1GbE

Upgrade processor

~50% reduction

Upgrade to SSD

~80% reduction

Upgrade to 10GbE

~50% reduction

Hadoop processing time: <10 minutes with complete Intel-based solution

Intel distribution

~40% reduction

Source: Intel Internal testing

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HPC Capability = Competitiveness
In order to compete, you must compute

- Big Data
- Energy Exploration
- New Products
- Security
- Imaging
The power of parallel processing realized

- Climate/weather modeling
- Energy exploration
- Digital content creation
- Medical imaging
- Financial analyses
- CAD/manufacturing
Intel® High-performance Computing

Architecture for Discovery
Seamlessly solve your most important problems of any scale

Intel® Xeon® processor

• Ground-breaking real-world application performance
• Industry-leading energy efficiency
• Meet HPC challenges and scale for growth

Intel® Xeon Phi™ product family

• Based on Intel® Many Integrated Core (MIC) architecture
• Leading performance for highly parallel workloads
• Common Intel Xeon programming model
• Seamlessly increases developer productivity
**Server**
Deploying the latest generation of Intel® Xeon® servers can reduce your total cost of ownership by up to 66%¹

**Intelligent Storage**
Use Intel® Xeon®-based storage to reduce storage footprints up to 50%²

**Network**
Replace older 1GbE with Intel® 10GbE to reduce power cost by up to 45% and cabling by up to 80% while doubling the bandwidth³

**Security**
Create a hardened foundation for computing with Intel® and McAfee security technologies

**Orchestration**
Manage server power usage and see power savings up to 30%⁴

**Cloud**
Get help implementing a flexible and scalable cloud infrastructure
[IT Center: Data Center Cloud Design](#)

**Big Data**
Learn about new solutions that help turn big data into intelligence
[Intel IT Center: Big Data Analytics](#)

**Ecosystem Choice**
The broadest range of solutions from the widest choice of vendors

**Manufacturing Leadership**
Intel’s lead means you can count on Intel to deliver the innovations you need
[Intel Manufacturing Innovation](#)

**Learn More**
Your main source for exclusive, real-world tested information and advice from Intel® and Industry experts
For more information go to [http://www.intel.com/performance](http://www.intel.com/performance)

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1. TCO reduction versus older generation Intel® processors. See slide speaker notes for details. Go to [www.intel.com/go/xeonestimator](http://www.intel.com/go/xeonestimator) to learn more.
2. Sourced from IT@Intel Whitepaper, “Solving Intel IT’s Data Storage Challenges,” Published December 2011.
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Requires a system with Intel® Turbo Boost Technology. Intel Turbo Boost Technology and Intel Turbo Boost Technology 2.0 are only available on select Intel® processors. Consult your PC manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit http://www.intel.com/go/turbo

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Intel® Xeon® Processor

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