

A Peek at the Future – Intel's Technology Roadmap

Jesse Treger – Datacenter Platform Planning
May 2012

Intel's Vision

This decade we will create and extend computing technology to connect and enrich the lives of every person on earth



The Three Pillars of Computing

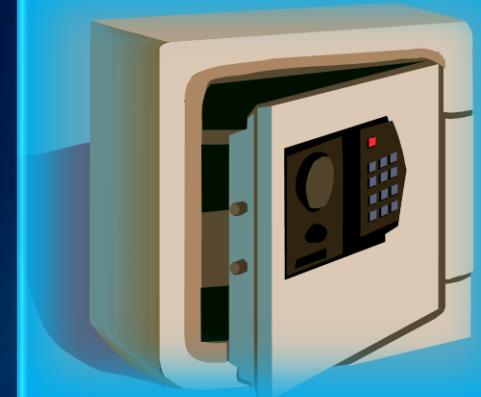
Energy Efficient
Performance



Internet
Connectivity

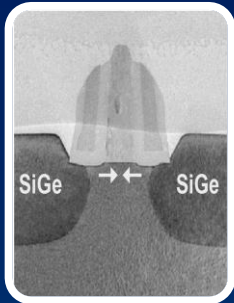


Security



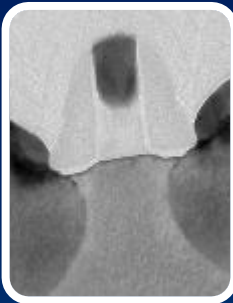
Relentless Pursuit of Moore's Law Opens the Door to Innovation...

2003
90 nm



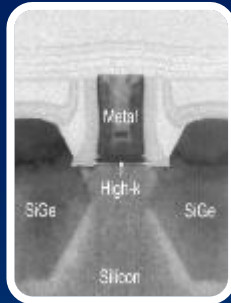
Invented
SiGe
Strained Silicon

2005
65 nm



2nd Gen.
SiGe
Strained Silicon

2007
45 nm



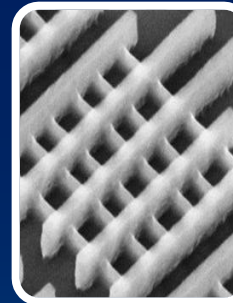
Invented
Gate-Last
High-k
Metal Gate

2009
32 nm



2nd Gen.
Gate-Last
High-k
Metal Gate

2011
22 nm



First to
Implement
Tri-Gate

STRAINED SILICON

HIGH-k METAL GATE

TRI-GATE

22nm

A Revolutionary
Leap in
Process
Technology

37%

Performance Gain at
Low Voltage*

>50%

Active Power
Reduction at Constant
Performance*

The foundation for all computing

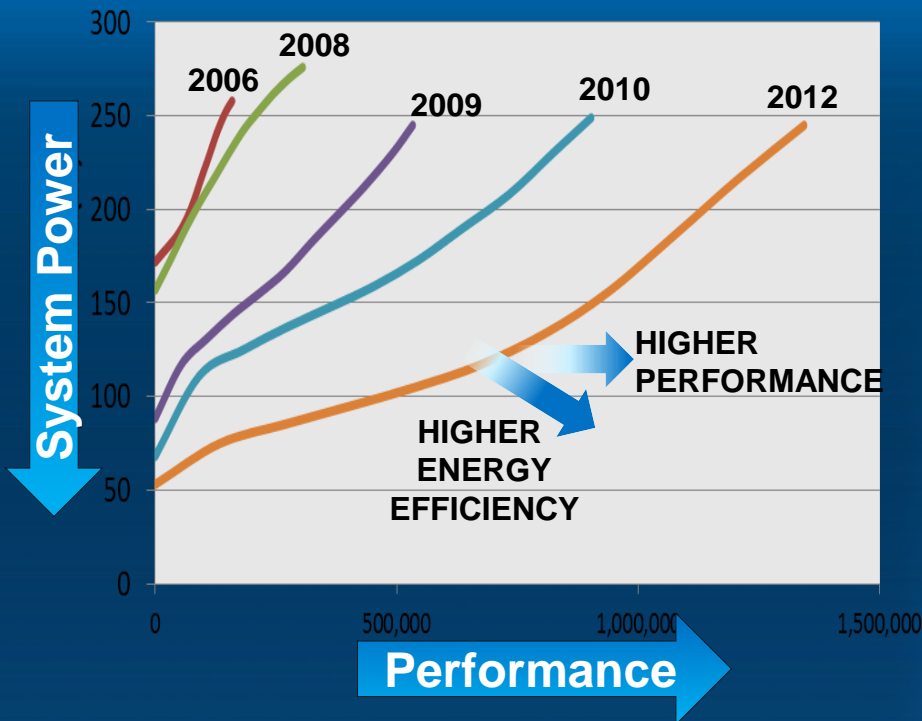


Source: Intel
*Compared to Intel 32nm Technology

Intel Confidential



Technology Leadership Provides:



Servers Gain 60% Power Efficiency/yr



PCs get Ultra Thin and Light

Advancing toward a worry free computing experience

Anti-Malware



*Malware
finds nowhere
to run or hide*

Data



*Data stays
where it
belongs*

Identity



*Your identity
is safe and
trusted*

Recovery



*Back in action
even after
attack by
malware*

Hardware Assisted Security

Embedded encryption

Out-of-band management

Out-of-band recovery

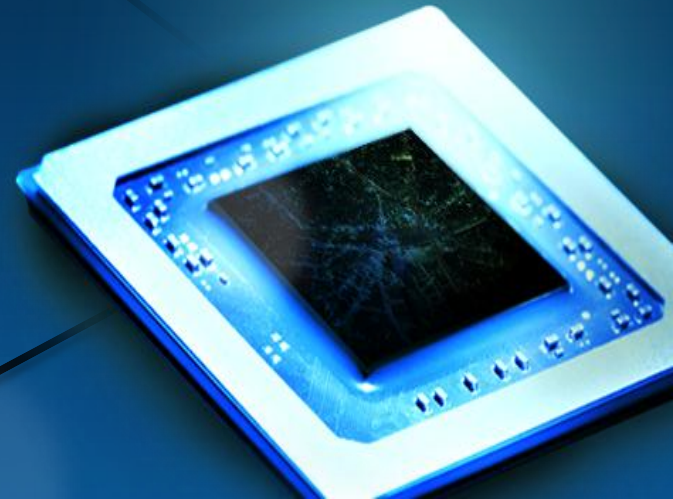
Identity Protection

Client Anti-theft

Server Trusted Execution

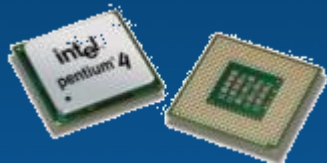


Management
Platform



Security Solutions from Intel

Intel has expanded up into the stack with a suite of security solutions



* Other names and brands may be claimed as the property of others.

Evolution of IT

Cloud



Consumerization



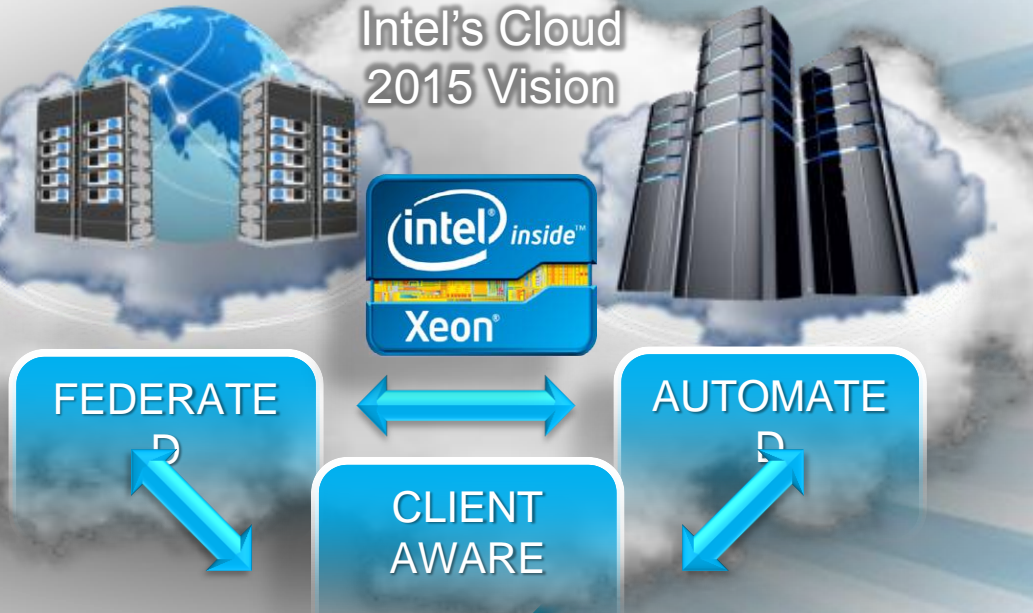
Big Data



Cloud Computing – Rise of “as a Service”

Private Clouds, Public Clouds, Hybrid Clouds –
delivering services to billions of connected devices

Intel's Cloud
2015 Vision



*The need to manage
Internet growth*

By 2015, we will need...

8X Network
16X Storage
20x Compute
Capacity

Agile, Flexible and Scalable Business Services



Consumerization Opportunity

End Users Want
Freedom, Flexibility

IT Pros Need
Security, Manageability



Form Factor Innovation

Universal Collaboration

Blended Computing

Business Assistant

Comprehensive Security

Automated Manageability

Compute Model Flexibility



Big Data

Volume, Velocity, Variety, Value

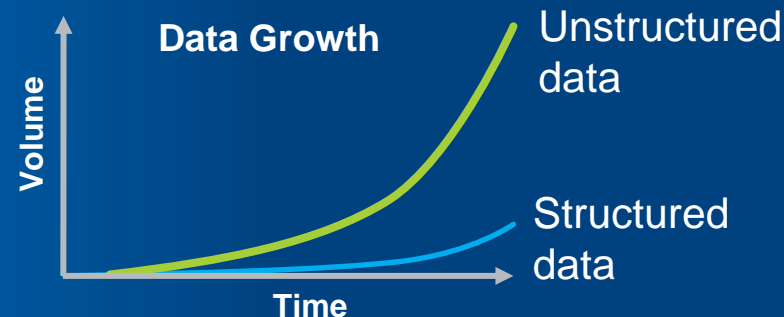
Big Corporate Data + Big Web Data + Big Sensor Data provides a potential gold mine that can be mined for value

20 PB = HDD capacity manufactured in **1995**

39,000 PB = Unstructured data in **2011**

226,000 PB = Forecast unstructured data by **2015**

Companies will need to deal with **50x** more data by 2020



Business Analytics will be a Competitive Differentiator

Datacenter Roadmap



Standard, flexible platform enables scale

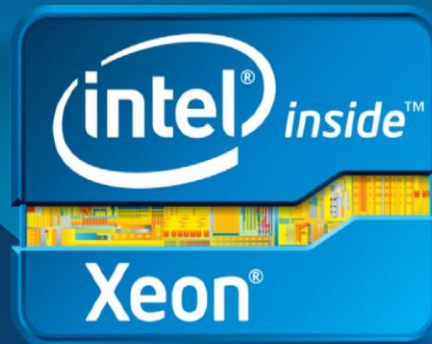
Server



Storage



Network



Introducing the Intel® Xeon® Processor E5 Family

80% Performance Gain¹

Breakthrough I/O Innovation

Trusted Security

Best Data Center Performance
per Watt²



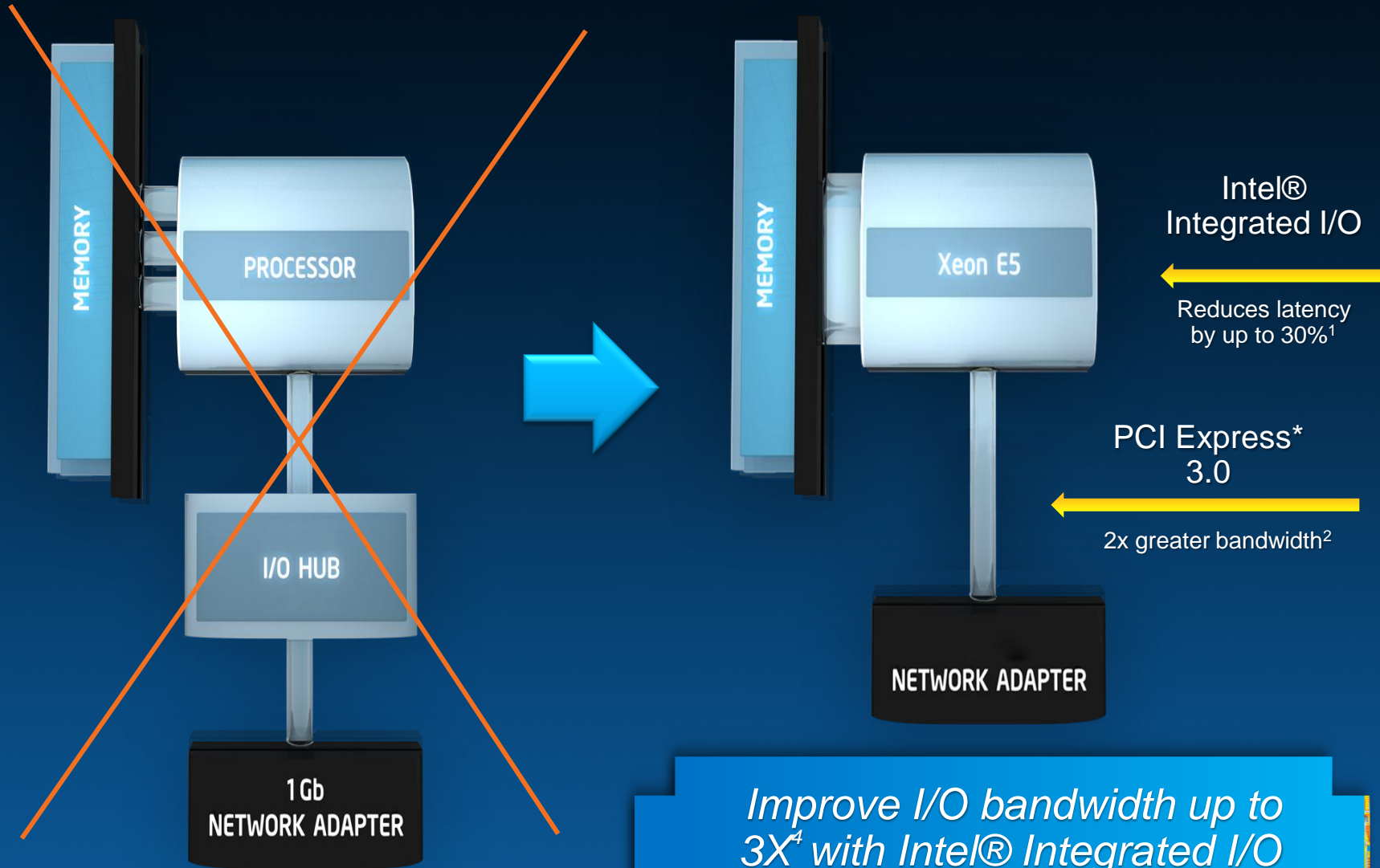
The Heart of a Flexible, Efficient Data Center Built to Scale

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.

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
2: 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® Integrated I/O



Improve I/O bandwidth up to 3X⁴ with Intel® Integrated I/O

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¹ Source: Intel internal measurements of average time for an I/O device read to local system memory under idle conditions comparing Intel® Xeon® processor E5-2600 product family (230 ns) vs. Intel® Xeon® processor 5500 series (340 ns). See notes in backup for configuration details

² Source: www.Pcisig.Com/news_room/november_18_2010_press_release

³ Up to 2.3x I/O performance is 1S with a Xeon processor 5600 series vs. 1S Xeon Processor E5-2600 data for L2 forwarding test using 8x10GbE ports. See notes in backup for configuration details

⁴ Intel internal measurements of maximum achievable I/O R/W bandwidth (512B transactions, 50% reads, 50% writes) comparing Intel® Xeon® processor E5-2680 based platform with 64 lanes of PCIe* 3.0 (66 GB/s) vs. Intel® Xeon® processor X5670 based platform with 32 lanes of PCIe* 2.0 (18 GB/s).



Next Generation Storage

Performance and capacity storage require more compute power

Server



Storage workloads shifting to where data resides



Performance Storage

Content distribution network (CDN)

Business DB (OLTP, OLAP)

Application data store (e.g. Web, E/Vmail, VM/Boot)

Large Relational DB (e.g. NoSQL, non ACID)

Capacity Storage

Large analytics (e.g. Hadoop)

High performance compute (e.g. pNFS)

Large object storage (e.g. SharePoint, Haystack)

Backup and archive (server and client)

Workloads & Optimization

Data de-duplication

Encryption

Data mining

Analysis

Thin Provisioning

Storage Virtualization

Converged Storage Server (lowers storage costs)

Intel® Xeon® based storage Enables Converged Storage



Business Clients



The Evolution of vPro

Now Available on Intel® Xeon® processor



Gaming Machines



Point of Sale



Signage



Servers



Workstations



Enterprise Remote Management

2006



Enhanced Security Wireless

2007



Reach Beyond Firewall

2008



Data & Asset Security, HW-KVM Remote Control

2010



Host-Based Configuration AT 3.0**

2011



Identity Protection – PKI SCS 8.0

2012

vPro 1.0

vPro 2.0



Ultrabook™

Intel® Rapid Start Technology



5-6 seconds from hibernate

Intel® Smart Response Technology



SSD like performance with large HDD capacity

Intel® Smart Connect Technology



Faster application refresh



Summary

Technology leadership provides tremendous gains in:

- Energy efficient performance
- Internet connectivity
- Security

...and drops deployment barriers to cloud and big data

Intel Architecture across compute, storage and networking enables flexible scaling of IT infrastructure

vPro enables secure management of consumer devices in the enterprise

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For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

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