



It's what's under the hood that counts.

 **The cloud, powered by Intel**
Visit Intel at: Intel.com/server


Sponsors of Tomorrow.

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Enterprise Cloud Computing

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Data Centre Group**

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Sponsors of Tomorrow:

Agenda

- **Fundamentals of Enterprise Cloud Computing**
 - **IT & Cloud Computing**
 - Requirements
 - Challenges
 - **Why Intel**

Intel + Cisco... Stronger Together

- **Shared Vision:** Intel shares a common vision of the need to evolve the data center.
- **Customer Options:** Intel wants to provide the customer base the best options to solve its data center challenges
- **Foster Innovation:** Intel desires to promote innovation in the data center and Cisco's UCS does just that





**Next Gen
Datacenter**

Unified
Computing
System

**Client
Mgmt/Security**

Network
Admission
Control

**Wireless
Connectivity**

Verified For Centrino	Business Class Wireless Suite	802.11n	WiMAX OPA & IOT
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**Ethernet
Evolution**

EtherChannel	Gigabit Ethernet	InterSwitch Link	Data Center Ethernet / FCOE
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1995

2000

2005

2009

A Rich History of Collaboration

Collaboration Across UCS



Intel brings



Cisco delivers



Memory

Xeon 5500 with integrated memory controller

Memory extender technology

Unified Fabric

DCE compliant 10GbE controller

10GbE Unified fabric solution

Virtualization

Xeon 5500 with enhanced VT-c and VTx2 virtualization capabilities

VN-Link solution and Hypervisor bypass

Power Management

Xeon 5500 with 5x low power states

Innovative chassis and system level power management



Data Center Trends: Paradigm Shift to the Enterprise Cloud



Enterprise Cloud: Virtualization 3.0

Automation and Resource Scalability



Flexible Resource Management: Virtualization 2.0

Dynamic Resource Allocation



Consolidation: Virtualization 1.0

Operational Expense Efficiency

A Fully Realized Cloud

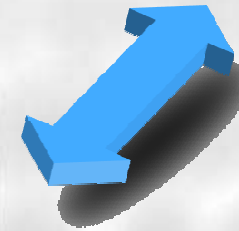
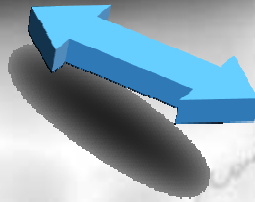
Federated
*Data and services
seamlessly and
securely span clouds*



Automated
*Dynamically allocates
resources to manage
service level and
optimize power*



Client-Aware
*Secure access and optimal
experience across a range of
devices*



Requires an Simplified, Efficient, Secure and Open Architecture

Requirements of a Cloud Architecture

Secure
Data protected at rest and in flight

Intel Trusted Execution and Virtualization Technologies

Simplified
Flexible IA infrastructure and a unified network

*Intel® Xeon® for servers & storage
Deploy 10GbE*

Efficient
World class energy efficiency

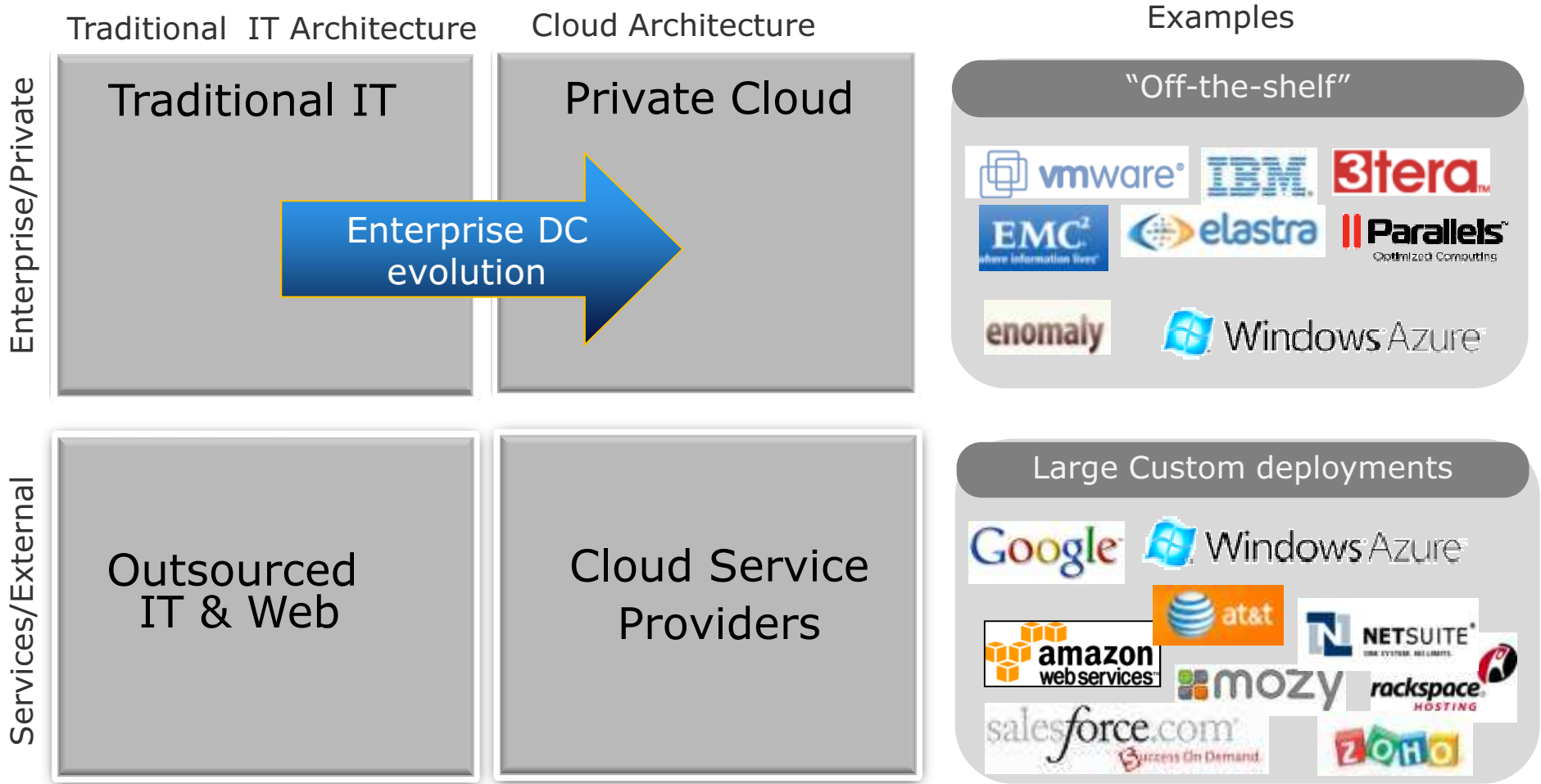
Refresh with Intel® Xeon® 5600 and Node Manager

Open
Multi-vendor innovation and solution compatibility

Deploy interoperable solutions and support standards

Driving Technology Leadership to Enable the Cloud

IT and Cloud Computing Transition



Virtualization – the core element between Legacy and Cloud



Considering Cloud Deployment Today

“Private Clouds”



Deployed behind firewall for an organization's internal use

Best for:

- Security
- Compliance and Governance
- Interoperability

Example: ERP, business intelligence

*Virtual Private
and Hybrid
clouds*



Cloud Brokers

“Public Clouds”



Services via public internet, multi-tenant

Best for:

- Rapid Deployment
- Reduced Capital Expenditure
- External vendor expertise

Example: batch jobs, HR apps

***Intel IT Strategy: develop private clouds
while adopting selective best of breed public cloud services***

Intel IT Findings on Cloud Computing

Benefits



Agility

- ▶ Biggest benefit
- ▶ Project acceleration SaaS & IaaS
- ▶ Outsourced expertise
- ▶ Flexibility; Scale up & down
- ▶ Temporary new capabilities to gather requirements

TCO

- ▶ Overall lower costs for SaaS
- ▶ Rent versus buy
- ▶ Pay based on consumption

User Experience

- ▶ Good responsiveness & accessibility
- ▶ Natural extension of the enterprise
- ▶ On-demand, self service approach

Challenges



Security

- ▶ Up-front due diligence & contract
- ▶ Risk assessment based on data classification
- ▶ Identity and access management
- ▶ Resource isolation for multi-tenancy

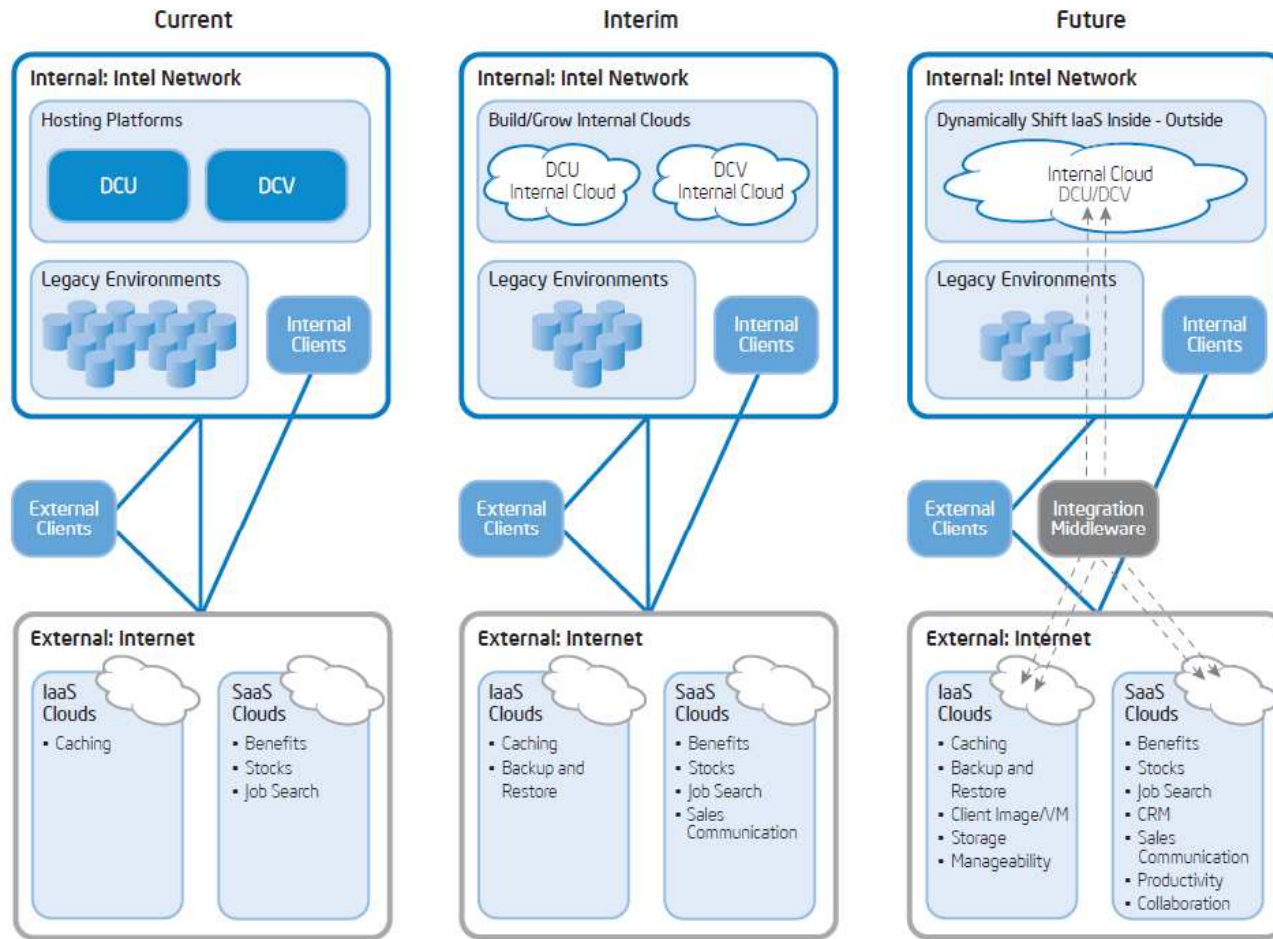
Manageability

- ▶ Systems monitoring & enforcing service level agreements
- ▶ Self-service provisioning
- ▶ Single sign-on

Data Exchange

- ▶ Biggest challenge cited by our project teams
- ▶ Highly structured data exchanges moving to real time
- ▶ Ownership, use and storage
- ▶ Clarification over Intel/Supplier roles

Intel IT Cloud Computing Strategy



- Current: Grow internal cloud
- Interim: Transform existing environment to internal cloud
- Future: Move between internal and external cloud

Grow the Cloud from the inside out

Why Enterprises Want Cloud Computing?

Requirements	Line of Business	Data Center Manager
Self-Service Provisioning	✓	✓
Application Functionality	✓	✓
Application Availability	✓	✓
CapEx and Operating Expense	✓	✓
Security	N/A	✓
Image Management	N/A	✓
Virtualized	N/A	✓
Resource Utilization	N/A	✓

Value of Cloud = OpEx + Self-Service = Data Center Efficiencies



Data Center Complexity Growing

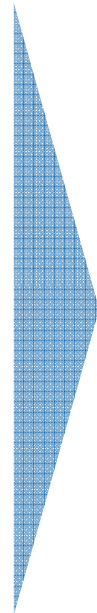



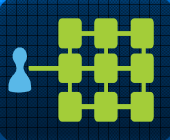

All Drive need for the Enterprise Data Center to evolve

Cloud Flexibility is a Game Changer

Internal Customers expect rapid service delivery today

- 1** They are in control
- 2** They get it fast
- 3** They use as much as they want



-  **New email account in less than a minute**
-  **Deploy new app in hours not days**
-  **Dynamically allocate storage capacity**

Driving New Expectations and Challenges for the Enterprise

Business Unit Expectations

- 1** Illusion of infinite resource
- 2** Sense of ownership & security
- 3** Self-service

Data Center Requirement

Massive Scale
Multi-tenancy
Low TCO



Driving New Expectations and Challenges for the Enterprise

Data Center Requirement

Massive Scale
Multi-tenancy
Low TCO



Virtualization

Security

Performance

Efficiency

**Technology Drivers
For the Enterprise Cloud**



Driving New Expectations and Challenges for the Enterprise

Data Center Requirement

Massive Scale
Multi-tenancy
Low TCO



Virtualization

Security

Performance

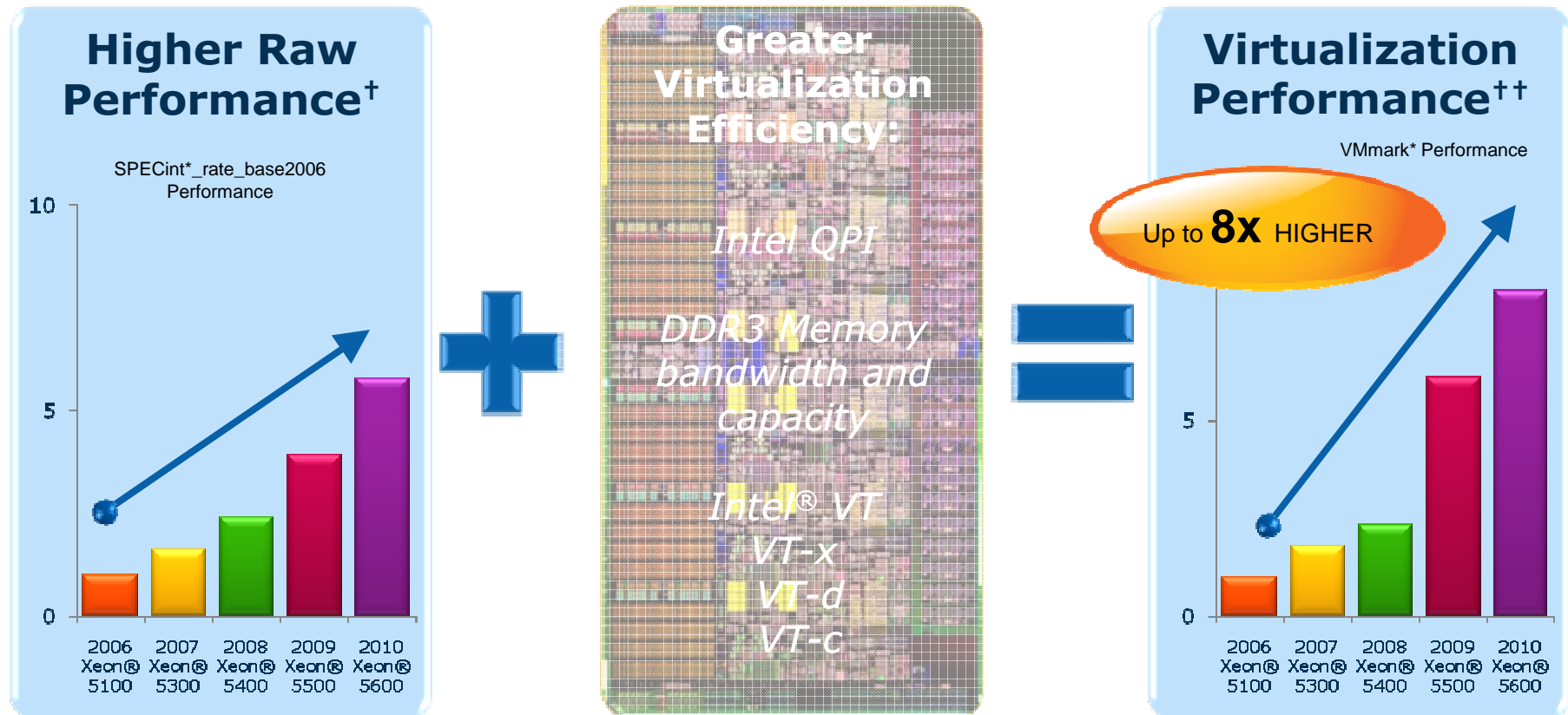
Efficiency

**Technology Drivers
For the Enterprise Cloud**



Intel® Xeon® Processor 5600 Series

Delivering on Virtualization Performance Needs




Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit <http://www.intel.com/performance/resources/limits.htm> Copyright © 2009, Intel Corporation. * Other names and brands may be claimed as the property of others.

[†] Source: Published/submitted/measured for SPEint*_rate_2006 as of Feb, 2010. See www.intel.com/performance/resources/limits.htm for more details. Xeon® 5600 performance based on internal Intel measurements.
^{††} Best published VMmark results as of 10/19/09 except Xeon® 5500 processor scores, which are Intel Measurements May 2009. Xeon® 5600 VMmark performance: Intel Xeon processors X5680 (12 M Cache, 3.33 GHz, 6.40 GT/s Intel® QPI), 96 GB memory (12x 8 GB DDR3-800 Reg ECC DIMMs), VMware ESX® V4.0 Update 1. Performance measured at 32.25@ 26 tiles.

See backup for detailed system configurations.



Xeon® 7500: Meeting the Highest Virtualization Needs


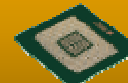



Xeon® 7500

- 8C/16 threads per socket
- 2-256 socket scaling
- 256GB memory per skt
- 2X I/O capacity
- Mission Critical RAS

+

Intel Platform Virtualization Technologies

<p>Intel® VT-x</p>  <p>Processor</p>	<p>Intel® VT For Directed I/O</p>  <p>Chipset</p>	<p>Intel® VT For Connectivity</p>  <p>Network</p>
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Intel® VT Flex Migration

Large Scale, Mission Critical Virtualization (>8GB)

Infrastructure Consolidation (of multi-tier Applications)

Headroom for Peak & Unpredictable Demand

Live Migration of Big Workloads

Optimized for the most demanding virtualization workloads

Driving New Expectations and Challenges for the Enterprise

Data Center Requirement

Massive Scale
Multi-tenancy
Low TCO



Virtualization

Security

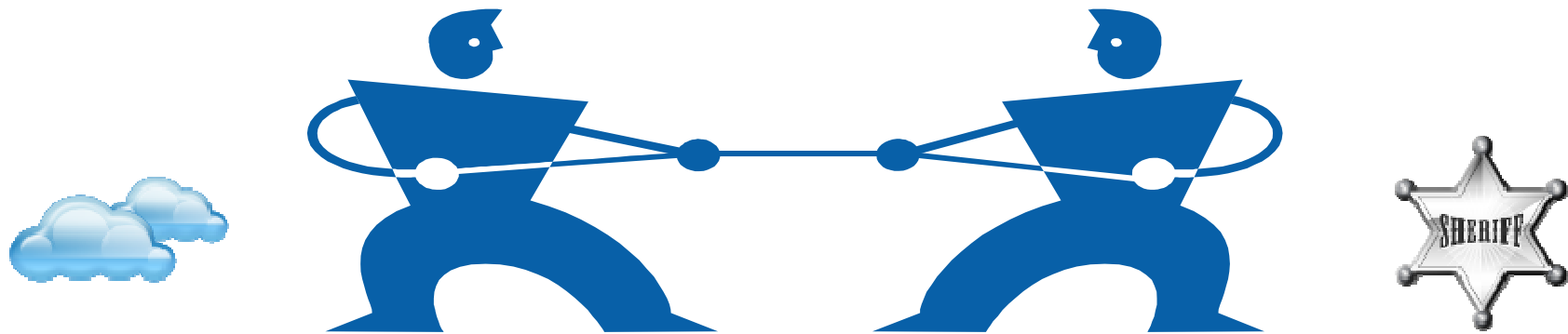
Performance

Efficiency

**Technology Drivers
For the Enterprise Cloud**



Security in the Enterprise Cloud



Cloud / Virtualization

- Higher Utilization
- Fast Provisioning
- Flexibility
- Consolidation
- Multi-Tenancy

Security

- Cost of Downtime / Data Loss
- Risk of Company Image
- Concentration of Assets
- Compliance, Regulatory

Cloud Deployment requires Balancing Security Tensions

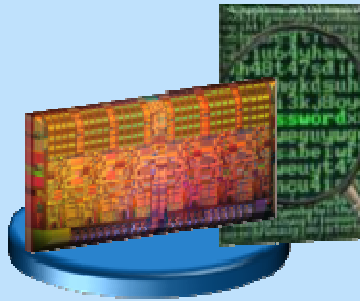
New Security Features with Intel® Xeon® Processor 5600

Advanced Encryption Standard New Instructions (AES-NI)

ORACLE®

Microsoft

McAfee®



Enables broad usage of encryption throughout the enterprise

Ready for Today

Intel® Trusted Execution Technology (TXT)

vmware®

Parallels

HyTrust



Prevents the insertion of malicious software prior to VMM launch

Prepared for Tomorrow

Intel® Virtualization & Security Technologies

Establishing the Foundation for More Secure IT Services

Isolate

Intel® VT & Intel® TXT
protects VM isolation and provides a more secure platform launch

Intel® TXT ensures platform launch with known configuration

Enforce

Intel® TXT
establishes "trusted" status to enable migration based on security policy

Encrypt

Intel® AES-NI
delivers built-in encryption acceleration for better data protection

Industry Leadership & Investment

Industry Initiatives

Open Virtual Machine Format
Data Center Manageability Interface
IEEE

climate savers
the green grid

Deep Technical & Biz Engagement

facebook Microsoft
Tencent 腾讯 Baidu 百度

Investments

intel capital

nirvanix GigaSpaces

VirtualIron Parallels

Collaboration with Leaders

YAHOO! ORACLE

Open Cirrus™
the Cloud Computing Testbed

vmware

*Intel engaged broadly across the emerging
Cloud Computing industry*



