Intel's Vision for Cloud Computing

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OPENFABRICS
A L L I A N C E

By 2015...

More Users

>1 Billion More
Netizen's

More Devices

15 Billion
Connected
Devices

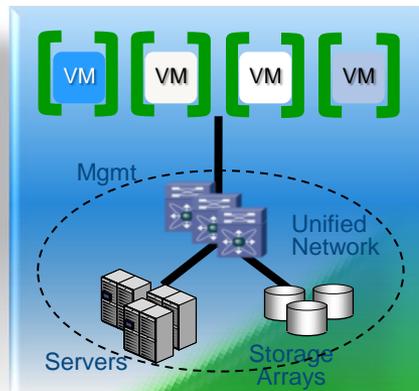## More Data

>1,000 Exabytes
Internet Traffic

1. IDC "Server Workloads Forecast" 2009. 2.IDC "The Internet Reaches Late Adolescence" Dec 2009, extrapolation by Intel for 2015 2.ECG "Worldwide Device Estimates Year 2020 - Intel One Smart Network Work" forecast 3. Source: http://www.cisco.com/assets/cdc_content_elements/networking_solutions/service_provider/visual_networking_ip_traffic_chart.html extrapolated to 2015

Evolution of the Datacenter

Cloud Datacenter

Virtualized Datacenter

Discrete Datacenter

VM VM VM VM

Mgmt

Unified Network

Servers

Storage Arrays

Cloud Infrastructure

Security

Network | Storage | Compute

Datacenter facilities (e.g. cooling, power)
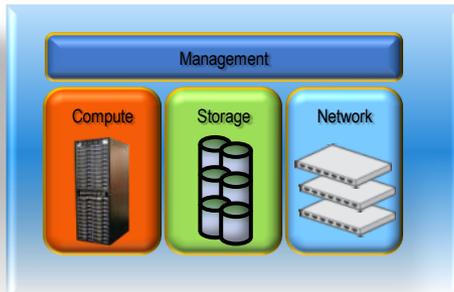
Consolidation

Discrete networks
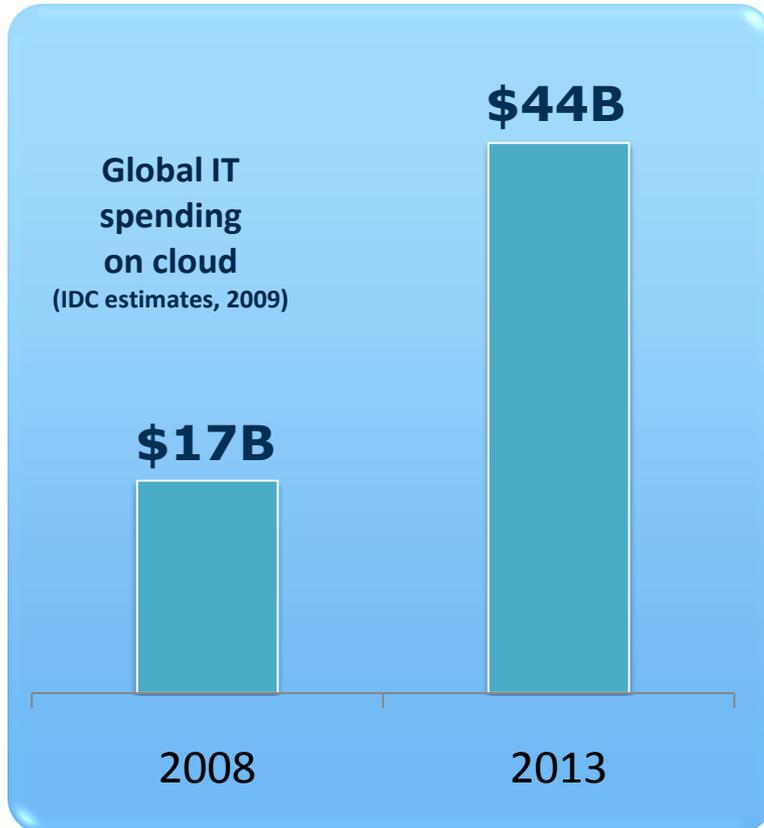
Flexible Management

10G Unified Network

Efficient and Secure

Open Architecture

Simplified Network

The foundation for Cloud Computing will be built on capabilities available in today's servers

Industry Talking About "Pervasive Growth of Cloud"

OPENFABRICS ALLIANCE

$44B

Global IT spending on cloud
(IDC estimates, 2009)

$17B

2008　　2013

"25%+ CAGR over the next 3 years"

\- IDC 2009

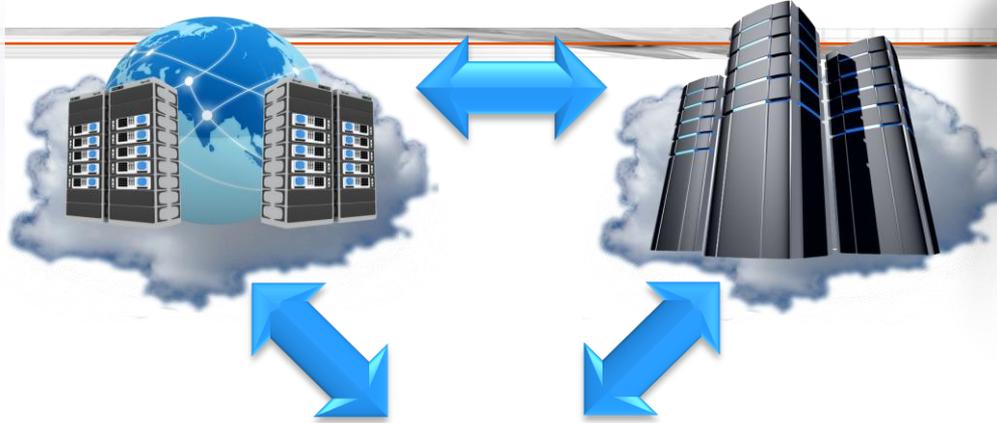**"#1 Technology Trend for 2010"**

\- Gartner

Cloud Computing is Here … But What is it?

Cloud 2015 Vision

FEDERATED
Share data securely across public and private clouds

AUTOMATED
IT can focus more on innovation and less on management

CLIENT AWARE
Optimizing services based on device capability

Desktops   Laptops   Netbooks   Personal Devices   Smartphones   Smart TVs   Embedded

Open & Interoperable Solutions Essential

Open Data Center Architecture Requirements

Simplified
Simplify data center operations to reduce cables, complexity and cost

Efficient
Optimizing technologies to decrease energy, human and physical asset consumption

Secure
Reduce the risk, increase the compliance and manage hybrid usage models

From Vision to Action

IT & Service Providers

Products & Technologies

Intel® Cloud Builders

Define and Prioritize IT Requirements

Take Advantage of New Capabilities In Intel Platforms

Utilize Proven Reference Solutions to Ease your Deployments

Helping IT on path to Cloud 2015
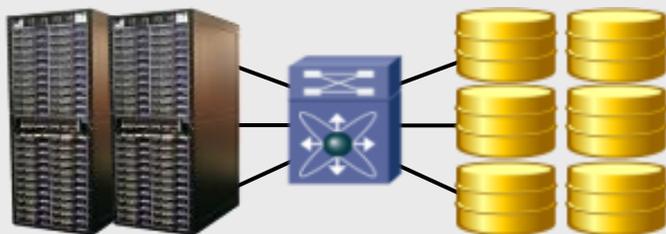
Future Cloud Data Center Architecture

Cloud Operating Environment

Application Workloads & Data

App App App App

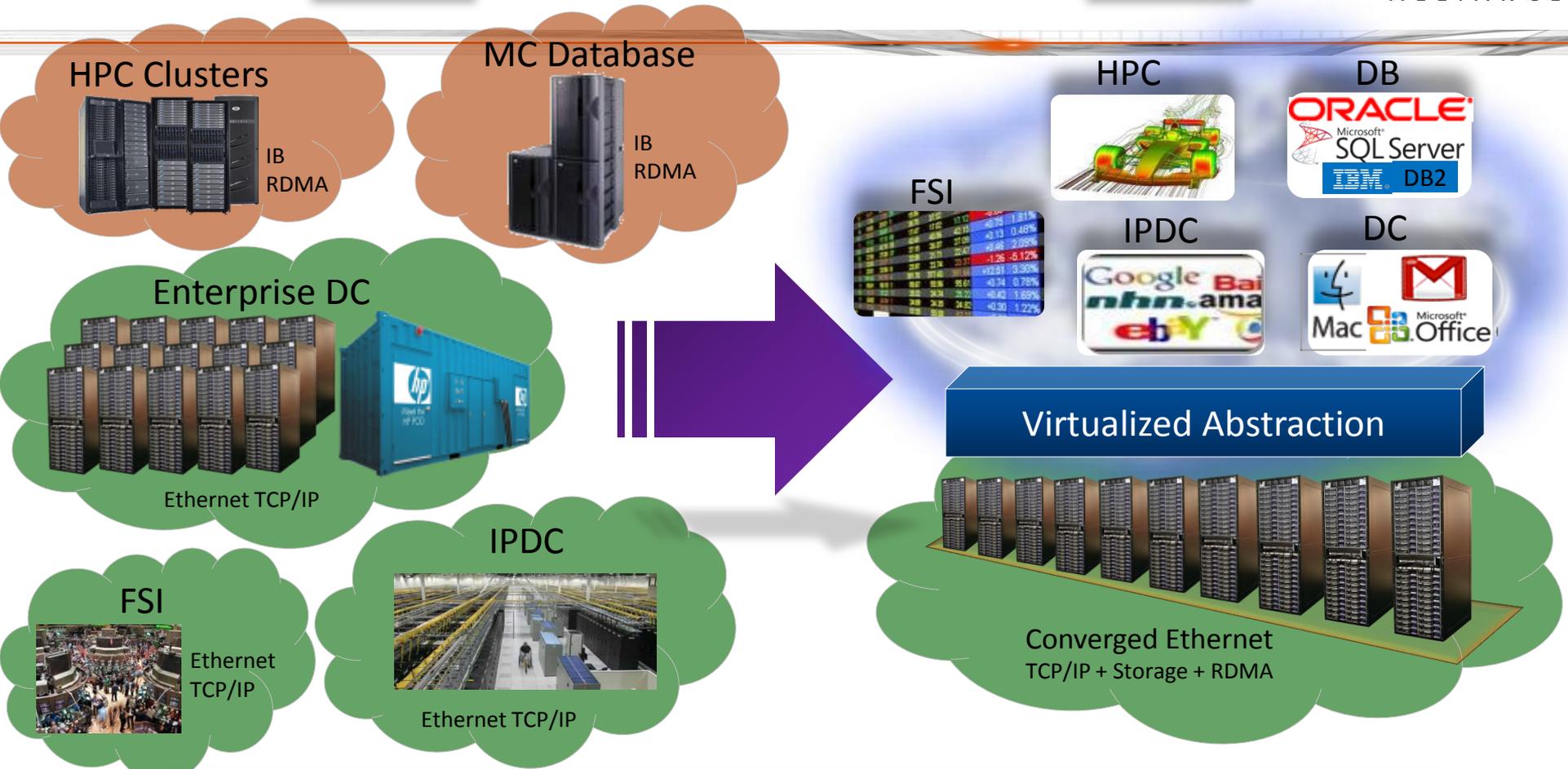**Data Center Infrastructure**

Compute   Network   Storage

- **Automation:** Dynamic workload placement, Common policy & asset management

- **Efficient Performance :** Better performance/$/Watt, Improved instrumentation & control

- **Trust and Compliance:** Trusted compute pools, Secure migration & federation

- **Networking :** Unified fabrics, Cost-effective network scaling

- **Storage:** Scale-out shared storage, Proximity based storage

Enable IT flexibility & choice

The Evolving Datacenter

2005

2015

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ALLIANCE

HPC Clusters

IB
RDMA

MC Database

IB
RDMA

HPC

DB

ORACLE
Microsoft SQL Server
IBM DB2

FSI

IPDC

DC

Google nhn ama eBay

Mac Microsoft Office

Enterprise DC

hp

Ethernet TCP/IP

FSI

Ethernet TCP/IP

IPDC

Ethernet TCP/IP

Virtualized Abstraction

Converged Ethernet
TCP/IP + Storage + RDMA

Are Servers & Network becoming abstracted?

Standards for the Unified Network

Intel® Ethernet -- iSCSI and Open FCoE

- **Open Architecture** integrates networking with the server allowing IT managers to reduce complexity and overhead while enabling a flexible and scalable datacenter network

- **Intelligent offloads** lower cost and power while delivering the application performance that customers expect

- **Proven Ethernet** Unified Networking is built on trusted Intel® Ethernet Technology enabling customers to deploy FCoE or iSCSI while maintaining the quality of their traditional Ethernet networks
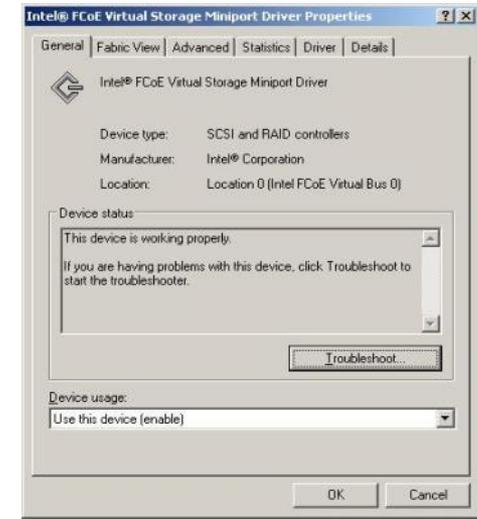
www.intel.com/technology/comms/unified_networking/

IEEE- DATA CENTER BRIDGING

Open-FCoE

Intel® Ethernet Server Adapter X520

iSCSI & Open FCoE Initiators

Microsoft · Enterprise Linux · redhat · suse

Switch & Storage Certifications

CISCO · NetApp · BROCADE · EMC²

Open Standards are a Critical Element of the Unified Fabric

Protocols are Key to Unlocking Cloud

- iWarp vs. RoCE
- iSCSI vs. FCOE
- SR-IOV vs. RDMA
- TCP-IP, EDGE, 3G, 4G, WiFI, WiMax, HSUPA

Protocols are the Key to Cloud Expansion