The Future of Storage
Ubiquitous storage for tomorrow’s data center

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Big Data Challenges

More **users**, more **devices**, more **data**, more **storage**, more **traffic**...

**240M**
Business users accessing cloud services via mobile devices by 2015

**670%**
Growth in storage capacity shipped

**>1000**
Exabytes of traffic

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Data Center Challenges

The Impact on Storage:

**Exponential Demand**

*IDC: Data will grow 50% to a total of 1.8 zettabytes*

**Rising Costs**

*Storage costs can account for >75% of a TPC-C workload*

**Data Durability**

*Data at constant risk of loss or corruption*

**Proprietary Interfaces**

*“We have seen lock-in return as a top concern...”*
Evolution of Storage:

Monolithic Storage
Evolution of Storage:

- **PAST**: Monolithic Storage
- **PRESENT**: Scale-Out Storage
Evolution of Storage:

PAST
Monolithic Storage

PRESENT
Scale-Out Storage

FUTURE
Ubiquitous
The Past: Monolithic Storage

Overview:
- Traditionally scale-up
- Suited for big database
- Transactional
- Data synchronicity

Limitations:
- Lack of flexibility
- High costs
- Difficult to scale
The Present: Scale-Out Storage
Built on Converged Storage Servers

Storage Technologies
- Power supply
- Backplane
- Enclosure
- HBA
- Hard disk
- Solid state disk

Benefits:
- Industry standard hardware
- Performance and efficiency
- Availability

Standard Server Technology Revolutionizing Storage
The Present: Scale-Up to Scale-Out

**Benefits:**
- Modular growth for demands over time
- More efficient with sharing across multiple usages
- Support for tiering to balance performance with cost

**Limitations:**
- No sharing between public and private data centers
- Limited capacity to petabytes
- Limited data management
- No data isolation for multi-tenancy
Cloud 2015 Vision - Why Storage Matters

**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

**Open and Interoperable Solutions Essential**
Future Storage Vision:

Ubiquitous storage offers greater modularity and flexibility to achieve distributed data for:

- Federation between public & private
- Automated tiering and scaled access
- Client aware via multi-tenancy on shared infrastructure
Intel Storage Vision:
Ubiquitous Storage

**Meets Exponential Demand**
Ubiquitous storage availability

**Controls Rising Costs**
Greater efficiency and simpler management

**Increases Data Durability**
24/7 secure access from anywhere, on any device

**Replaces Proprietary Interfaces**
Open standards support growth and innovation
Future Storage Vision: Key Elements

• Storage will become a service
• Scale-out architecture based upon converged storage servers will be the backbone of data center storage
• Non-volatile memory will proliferate
• The network continues to evolve
Ubiquitous Storage Will Be a Service

Amazon Simple Storage Service (Amazon S3)

“... a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web. It gives any developer access to the same highly scalable, reliable, secure, fast, inexpensive infrastructure that Amazon uses to run its own global network of web sites. The service aims to maximize benefits of scale and to pass those benefits on to developers.”

Source: Amazon.com (http://aws.amazon.com/s3/)

* Other names and brands may be claimed as the property of others.
Storage Backbone: Scale-Out Storage

Scale-out architecture based on converged storage servers

“By 2015, scale-out storage architectures will make up 80% of networked storage shipments on a revenue basis”

Non-Volatile Memory (NVM): The coming disruption

**Benefits:**

- High density, low leakage, non-volatile
- Dramatic improvement in read bandwidth
- Hybrid solutions overcome write latency and power requirements

**Take Advantage of New Memory Hierarchies**
The Network Continues to Evolve
Break Bottlenecks and Lower Latency

Benefits:
- Unify fabric in the data center to reduce complexity and costs
- Drive intelligence to edge of the data center
- Increase bandwidth with scale
- Simplify system architectures
Enabling the Future of Storage: Innovative Storage Technologies from Intel

- **Compute**: Cadence of compute following Moore’s Law

- **Networking**: Innovative performance and features

- **Storage**: Economical enterprise class non-volatile memory
Efficient Storage Technologies
Demand Compute Power

• Data Compression: up to 80% space reduction

• Data Deduplication: 95% smaller backups

• Regain 40-60% disk space with thin provisioning

1. IBM storage simulcast, November 9, 2011
2. IBM storage simulcast, November 9, 2011
3. Dell “Fluid Data Storage: Driving Flexibility in the Data Center”, February 2011
Standards Are Essential to Ubiquitous Storage

**Standards:**

- Unparalleled flexibility for “off-the-shelf” solutions
- Simpler, non-disruptive upgrades
- Drive down costs
Open Data Center Alliance

• 300+ IT leaders representing more than $100 billion+ in annual IT investment
• Aims to create industry alignment around the cloud
• Intel works closely with standards-bodies and the storage vendor community
Plan for the Future

• Support federation, automation, client aware capabilities
• Using scale-out based on converged storage servers
• Embrace NVM and next-generation networking to free data movement
• Use state of the art CPU compute to offset disk CapEX
The Future of Storage.

Ubiquitous, federated, automated, client aware.