Software Defined Storage

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The CIO Dilemma

By 2020, the digital universe of data will go to **44 ZB**

Modern Apps
Outpacing IT by **5X**

By 2018 **1 PB** of data will be managed by each IT Pro

Build
Lower Costs

Buy
Faster-time-to-Market
CapEx and Capacity is Just The Tip of The Iceberg

- Storage planning
- Procurement
- Deployment
- Migration planning
- Capex
- Ongoing Operations
- Migrations
- Capacity
Storage infrastructure is changing

...But Requires IT & Business Transformation

- Source: ZDNet 2014
Software-Defined Infrastructure

Software Defined Networking
The Management of Traffic

Software Defined Compute
The Management of Workflows

Software Defined Storage
The Management of Data
IT standardization

Orchestration, Automation and Management
Scale-out software defined storage portfolio

- **SCALEIO**
  - HYPER-CONVERGED SAN
  - Server-Based
  - Scale-Out SAN
  - Block Storage, Structured Data

- **ECS**
  - CLOUD-SCALE OBJECT
  - Geo-Distributed Object
  - Data Lake
  - Cloud Native Apps, Deep Archive, Internet of Things

- **ISILON**
  - SCALE-OUT FILE
  - Enterprise File
  - Data Lake
  - Data Center Governance and Compliance
Scale-Out SAN

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SCALE-OUT FILE
Enterprise File Data Lake
Data Center Governance and Compliance
Dell EMC ScaleIO is the Modern Data Center

• Software-Defined, Block Storage

ALL-FLASH
• FASTEST Software-Defined block storage solution available.*
  
  Storage Review, 2016
  
  * Customers deploying all-flash at true data center scale with ScaleIO
  
  • Can achieve Petabytes of all-flash capacity with a highly disruptive TCO

SCALE-OUT
• Most Scalable Block storage product on the market
  
  • Start small and scale-out to 1000+ servers
  
  • Never a forklift upgrade!
  
  • Never a data migration! No SAN or cluster silos
  
  • Never a disruptive upgrade!

SOFTWARE-DEFINED
• Most Flexible SW defined storage product in the industry
  
  • KEY: Hyperconverged &/or storage-only deployment for greatest flexibility
  
  • HW Agnostic: Run an ANY x86 server and storage media
  
  • OS/Hypervisor Agnostic: ESX, Hyper-V, KVM, Bare Metal – ALL at the SAME TIME sharing the SAME RESOURCES!

TRUSTED
• The MOST Enterprise Class SW Defined Solution on the Market
  
  • Encryption
  
  • In-flight Checksums
  
  • LDAP
  
  • High Infrastructure Resiliency

CAPEX  OPEX  PERFORMANCE  AGILITY  TTM
The Software-Defined Era is Now....

Server Farms (DAS)
- Limited Scalability
- Inefficient Utilization
- Silos of Compute
- Silos of Storage

SAN & Virtualization Results:
- Simplified Management
- Increased Utilization
- Better TCO

Islands of Server & Storage (SAN)
- Dedicated SAN Hardware
- Server Consolidation
- Even Utilization
- Built for Traditional Enterprise Workloads

Hyper Convergence (SDS)
- Designed ➔ Commodity Hardware
- Scale Out, Block Performance
- Elasticity & Flexibility
- Enterprise Data Services
- Built for both Traditional & New-Era Workloads

Server Era
SAN & Virtualization Era
Software Defined Era
SYSTEMS DESIGN SHIFT — “HYPER-CONVERGED”
SYSTEMS DESIGN SHIFT – SOFTWARE-DEFINED

THEN

FAST NETWORK

NOW

VIRTUAL SAN
ScaleIO Benefits

MASSIVE SCALABILITY
EXTREME PERFORMANCE
SUPREME ELASTICITY
UNPARALLELED FLEXIBILITY
COMPELLING ECONOMICS

Choice of deployment

ScaleIO Benefits
ScaleIO → SDC & SDS

**ScaleIO Data Client**

- Lightweight device driver
- Allows ScaleIO block devices to be presented to application server

**ScaleIO Data Server**

Manages storage capacity on the application/storage server

Provides backend access of devices to the SDCs
STORAGE POOLS

• Storage Pool - set of storage devices in Protection Domain
  – Volume defined within a Storage Pool

• Benefits
  – Multi-tiering: Fast vs. slower Storage Pools
  – Performance-isolation: Multiple Storage Pools of same media speed
  – Tenant isolation by physical media
Two-Copy “Mesh” Mirroring

Volume 1

SDS 1

SDS 2

SDS 3

SDS 4

Volume 2

SDS 5

SDS 6

...
AUTO-REBALANCE

- Add Nodes or Disks Dynamically—System Automatically Migrates and Rebalances Storage
ScaleIO

System wide visibility, cost effective management at scale

- Automated installation scripts and easy configuration
- Manage the entire data center stack from single UI
- Monitor HW/SW failure recovery—no administrative intervention required
- Options: CLI, UI, REST, ViPR Controller, ViPR SRM, vSphere, OpenStack
3 SCALEIO CONSUMPTION MODELS

ScaleIO SW

- Software Defined
- Maximum flexibility

Ultra Scale-Out SDS
- Software Only
- Complete flexibility
- End user supplies server
- End user supplies switch

ScaleIO Ready Node

- Scale-Out Block Storage Node
  - Dell PowerEdge Servers configured, optimized and validated for ScaleIO
  - Hyper-converged or Storage only
  - All-Flash configurations

VCE™ VxRack™ System 1000 with FLEX Nodes

- Turnkey Fully Engineered Solution
  - Fully productized platform
  - Factory integrated & logically configured
  - Support & lifecycle assurance
Cloud-Scale Object

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Object Storage Evolution

2001
- API (Proprietary)
- Single namespace
- Immutable Content
- Unstructured Content

2008
- Rest API
- Geo replication
- Global namespace
- Multi-tenant
- Unstructured Data

2014
- Universal API Support
- Supports Analytics
- Highly efficient Geo storage
- Unstructured Data
- Semi-structured Data
- Structured Data
- Hyperscale Economics
Typical application deployment

Unstructured content stored in local disks

Challenges:
- No HA
- Not scalable
- Expensive block storage
Typical application deployment

Unstructured content stored in a database

Challenges:
- Not scalable
- Very high cost (DB, backup, …)
- Expensive block storage
Typical application deployment

Unstructured content stored in NAS appliances

Challenges:
- Not developer friendly (manage FS, several shares, …)
- Must be provisioned
Typical application deployment

More users means more infrastructure needed

- Web servers
- DB servers
- NAS appliances
TYPICAL APPLICATION DEPLOYMENT AND INFRASTRUCTURE COST BECOMES PROHIBITIVE
How is object storage different?

Web servers are not in the data path, less infrastructure needed
HOW DOES IT WORK?

WEB SERVERS COMPUTE THE SIGNATURES FOR THE CLIENTS

The application server generates a shareable URL for each picture and send them to the web browser

And the Disaster Recovery site becomes another active site
Use Cases

Geo-Protected Archive
Global Content Repository
Video Surveillance
Storage for IoT
Modern Applications
Data Lake Foundation
Global Analytics/Data Protection

Scale Effortlessly - Store Efficiently - Access Globally
Multiple access methods
Multi-Protocol Support

Access the same data from any access method

Atmos: version 2.0 support for upgrade
CAS: SDK v3.1.54 or later support for upgrade

Swift: byte range update within an object
Retentions
Keystone integration: drop-in replacement for OpenStack Swift

Primary file system with native Ambari 2.2 integration

Byte range updates
Retentions
Metadata search extension

NFS v3
Global namespace with global locking
Storage engine
Box-Carting

High performance and low overhead for both small and large objects
Erasure Coding

ENHANCED DATA PROTECTION AND UTILIZATION

Better storage efficiency.

1. Data is fractioned into 12 data w/4 coding frags
2. Data is saved on storage nodes
3. Data is spread across different disks within grid
Geo Capabilities

High durability with a low overhead

PUT obj1 (1 MB)
PUT obj2
GET obj1
GET obj1

Replicate the 128 MB container
XOR reduction
Cache the 128 MB chunk
Read from the cache

GET obj1
Use Cases

Geo-Protected Archive  Global Content Repository  Video Surveillance  Storage for IoT  Modern Applications  Data Lake Foundation

Global Analytics/Data Protection

SITE 1  SITE 2  SITE 3

Scale Effortlessly - Store Efficiently - Access Globally