GET MORE VIRTUAL WITH DELL AND VMWARE vSPHERE 4

PowerEdge Virtualization-Optimized Servers

EqualLogic PS Series Virtualized iSCSI SANs

VMware vSphere

Andrew Gilman, Global Enterprise Solutions Marketing, Dell
DELL IN THE ENTERPRISE MARKET

- 24 Years of Growth
- #1 Partner of Intel, EMC, Microsoft, Oracle & VMware
- #1 in U.S. Servers¹
- #2 Worldwide in Servers¹
- #1 Worldwide provider of iSCSI SAN solutions²
- Best Overall Storage Provider for Virtual Environments*
- $6+ Billion in WW Services Business
- Power 99% of the Fortune 500
- Powering the Emerging Cloud

Source: ¹ IDC, ² Gartner Qstats
NEW CHALLENGES…

DATA EXPLOSION
10X GROWTH between
2006-2011*

* IDC: The Expanding Digital Universe, 2008

- Stove-Piped Data
- Poor Scalability
- Stranded Capacity
- Costly Management
- Data Vulnerability
...AND THE SAME IT DILEMMA

I am supposed to still do the same job, but with less budget and headcount?!!
SIMPLIFY IT

GET IT FASTER
- VALIDATED & TESTED
- READY OUT OF BOX
- BUILD TO ORDER

RUN IT BETTER
- EASIER MANAGEMENT
- IMAGE COMMONALITY
- LOWER ENERGY COSTS

GROW IT SMARTER
- PERFORMANCE LEADER
- MODULAR ARCHITECTURE
- NON-PROPRIETARY

RECLAIM TIME, MONEY AND PEOPLE
SIMPLE, COST EFFECTIVE VIRTUAL SERVER AND STORAGE INFRASTRUCTURES CAN HELP

Reducing OPEX While Planning for Growth

- Self monitoring
- Dynamically adaptable
- Heuristically self-tuning
- Self healing resiliency
- Seamless scalability
- Inherent data protection
- Cost-effective, energy-efficient
- Predictable performance and growth
- Automated & Integrated

Goal: As virtual infrastructure scales, operational costs stay low
EFFICIENT ENTERPRISE
KEY REQUIREMENTS

- Strategic alignment between technology suppliers
- Automated, intelligent, real-time management
- Advanced integration across multiple layers of infrastructure
- Virtualized server and storage resource pools
- Platforms optimized for virtualization
COST EFFECTIVE, EFFICIENT ENTERPRISE SOLUTIONS

- Server and Storage Consolidation
- Simple, Centralized Management
- Quick Resource Provisioning
- Flexible Resource Reallocation
- Unified IP-based Network
- Enterprise-class Infrastructure
- Advanced Data Management Tools
CREATED THROUGH THE DELL + VMWARE ALLIANCE

• #1 Global Partners
  – Deep Engineering and Customer Support Collaboration
  – ESXi embedded on PowerEdge Servers
  – Development Partners for:
    - vStorage APIs
    - iSCSI
    - Site Recovery Manager

DELL DELIVERS
HIGH IMPACT BUSINESS SOLUTIONS

• In-depth solutions, knowledge and expertise
  – Delivering 1000’s of virtualization assessments and implementations
  – Supporting organizations of all sizes across all industries
  – Helping to simplify your IT operations and create your Efficient Enterprise
DELL ALREADY HAS...

OVER 5,000+ SERVERS VIRTUALIZED.
OVER $29 MILLION SAVED.

When we examined our own infrastructure, we found servers working at less than 20% of their processing capacity. Virtualization enabled us to improve ROI and use servers more effectively to eliminate waste. Let us help you drive unnecessary cost and complexity out of your IT environment.

LEARN HOW TO SIMPLIFY & SAVE AT DELL.COM/Virtualization

...TAKE A SMARTER PATH TO VIRTUALIZATION
IT BEST PRACTICE TREND: CONSOLIDATION OF SERVERS THROUGH VIRTUALIZATION

- More efficient resource utilization
- Reduction in licensing/hardware costs
- Fewer points of management
- Reduced physical footprint
- Lower power and cooling costs

Lower TCO
Increased Flexibility
Reduced Complexity
COMMON VIRTUALIZATION SERVER CHALLENGES

- CPU utilization low due to **memory constraints**

  ![Diagram](image)

  - 5% processor utilization
    - Non-virtualized
  - 80-90% processor utilization
    - Virtualization Promise
  - 30% processor utilization
    - Virtualization Reality

- As you scale memory new constraints occurs on I/O and Network capacity

- Complex set-up when adding new or replacing failing physical hosts
DELL POWEREDGE SERVERS
VIRTUALIZATION OPTIMIZED

Best Performance at the Lowest Power Usage

Designed for Virtualization

Your Choice: Form factors, Hypervisors, I/O fabrics

100% commitment to standards
NATURAL BEST PRACTICE EXTENSION: STORAGE CONSOLIDATION

- More efficient resource utilization
- Fewer points of management
- Simplified provisioning

- Higher availability
- Better backup and restore
- Improved data protection
COMMON IT EXPERIENCES WITH TRADITIONAL SAN STORAGE DESIGNS IN A VIRTUAL ENVIRONMENT

• **Storage objects are bound to physical resources**
  – Statically configured and operated
  – Individual islands of storage within the SAN
  – Performance and capacity resources not easily reallocated

• **Can be difficult and costly to operate**
  – Specialized training and staff
  – Many planned outages for upgrades and migrations

• **Enterprise features can require additional software licenses**
  – High acquisition and software support costs
  – Costs continue to increase as the environment grows
SIMPLE, **COST-EFFECTIVE**

**VIRTUAL DATACENTER SOLUTIONS**

**KEY vSPHERE FEATURES ENABLED BY NETWORK STORAGE (SAN)**

- **Movement of workloads**
  - Migration of running virtual desktop without interruption

- **Balancing workloads**
  - Optimized resource usage given current workloads

- **High availability**
  - Re-hosting and restart of virtual desktop in case of server failure

- **Server-less backup**
  - Independent of production servers

- **Disaster recovery**
  - Integrated SAN-based replication

- **Scalable online backup and recovery**
  - SAN-based snapshots of virtual datasets
WHY iSCSI IS IMPORTANT TO VIRTUAL INFRASTRUCTURES

- **Simplifies Networked Storage**
  - Uses affordable hardware and existing infrastructure
  - Utilizes ubiquitous networking knowledge

- **Enhances Consolidation ROI**
  - Simplifies virtual server deployments
  - Reduces acquisition, deployment and ongoing management costs

- **Enables a Simple Virtualized Storage Architecture**
  - Natively supports virtualization primitives
  - Allows scalable, flexible networked storage grid implementations
  - Load balances across SAN resources

IDC's Top Storage Predictions:

**Virtual servers will emerge as the killer application for iSCSI**
## DELL SAN PORTFOLIO
**DESIGNED TO MEET YOUR NEEDS**

<table>
<thead>
<tr>
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<th>PS Series</th>
<th>CX Series</th>
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BEST OVERALL Storage for Virtual Environments*

STORAGE OPTIMIZED FOR VIRTUALIZED ENVIRONMENTS

SIMPLIFY YOUR STORAGE AT WWW.DELL.COM/PSseries

* Nemertes Research 2008 PilotHouse Virtualization Awards
• Mission Critical Hardware that Provide:
  – End-to-end reliability
  – On demand scalability

• Enterprise Software Features that Deliver:
  – Easy set-up
  – Single-view management
  – Rapid provisioning
  – Optimized performance
  – Seamless expansion
  – Comprehensive data protection
  – Flexible online tiering
SEAMLESS SAN EXPANSION
CONTINUOUS SOFTWARE ADVANCEMENTS AT NO ADDITIONAL COST
Single Multi-Generational SAN

Continuous Advancements of All-inclusive Firmware & Software

- VMware vStorage
- ASM/ME for Hyper-V
- SAN Headquarters
- Auto-Snapshot Manager/VMware Edition (ASM/VE)
- VMware Site Recovery Manager
- Core Data Protection
- Auto-Snapshot Manager/Microsoft Edition (ASM/ME)
- Thin Provisioning

PS100 Series
PS3000 Series
PS5000 Series
PS5500E
PS6000 Series

2004 2009
### PS Series Comprehensive Data Management

**All-inclusive with No Additional Costs**

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<th>Base Software Features</th>
<th>Advanced Software Features</th>
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<td><strong>Management</strong></td>
<td><strong>Server Management Integration</strong></td>
</tr>
<tr>
<td>✓ Instant on ‘set-up’ manager</td>
<td>✓ VSS and VDS Providers</td>
</tr>
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<td>✓ Group manager</td>
<td>✓ Automatic MPIO Connection Management</td>
</tr>
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<td>✓ Rapid provisioning</td>
<td>✓ Auto-Snapshot Manager/ Microsoft Edition</td>
</tr>
<tr>
<td>✓ Roles-based management</td>
<td>- Exchange, SQL Server and Windows NTFS and Hyper-V virtual machines*</td>
</tr>
<tr>
<td><strong>Data Protection and Availability</strong></td>
<td>- Auto-Snapshot Manager/ VMware Edition</td>
</tr>
<tr>
<td>✓ RAID 5, 6, 10, and 50</td>
<td>- Hypervisor-aware SAN-based snapshots and rapid recovery</td>
</tr>
<tr>
<td>✓ Automatic RAID placement</td>
<td>- VMware SRM Storage Adapter</td>
</tr>
<tr>
<td>✓ Multi-path / IO support</td>
<td>- Automated DR for the virtual datacenter</td>
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<td><strong>Maintenance &amp; Monitoring</strong></td>
<td><strong>Data Protection and Recovery</strong></td>
</tr>
<tr>
<td>✓ Phone home</td>
<td>✓ Writeable snapshots</td>
</tr>
<tr>
<td>✓ Enclosure monitoring system</td>
<td>✓ Multi-volume snapshots</td>
</tr>
<tr>
<td>✓ SAN HQ multi-group event and performance monitoring</td>
<td>✓ Instant restore / cloning</td>
</tr>
<tr>
<td></td>
<td>✓ Multi-way replication for disaster recovery</td>
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*Expected availability by Q2 2009*
COMPREHENSIVE DISASTER RECOVERY & DATA PROTECTION WITH NO ADDITIONAL LICENSE COST

Dell EqualLogic PS Series

- Enterprise Class iSCSI SAN
- Designed for 99.999% Availability

Auto-Snapshot Manager/ Microsoft Edition

- Automated Protection for Windows Applications
  - SQL
  - Exchange
- Protection for Windows file system

Auto-Snapshot Manager/VMware Edition

- Automated Local Protection for VMware Virtual Machines
- Simplifies protection
- Fast Recovery of Virtual Machines
- Scalable Snapshots for VMware

Auto-Replication With VMware Site Recovery Manager

- Automated DR for the Virtual Datacenter
- Integrated with Auto-Replication
  - SRM Storage Adapters
YOUR INTERNAL CLOUD: VIRTUAL SERVERS MEET VIRTUAL STORAGE

A Cost Efficient, Scalable and Resilient Infrastructure for Both Servers and Storage
NON-DISRUPTIVE “PAY AS YOU GROW” SAN EXPANSION

Classic Storage Architecture

- Fixed storage expandability, performance and I/O
- Disk Drives configured in RAID sets

Frameless Storage Architecture

- Buy only resources needed for initial deployment
- Non-disruptively expand as capacity / performance needs arise
  - New resources automatically applied to pre-existing workloads
  - No downtime, no forklift upgrades
- Amortize costs over total system life

Purchaser must
- Estimate frame size to support requirements over the product life cycle

Results in
- Greater upfront cost due to over-provisioning and/or
- Disruptive and costly upgrades due to under-provisioning
HIGH STORAGE UTILIZATION VIA VIRTUALIZED VOLUMES

• In contrast to classic storage arrays, volumes are not mapped to RAID groups
  – Volumes are striped across all the disks in the array
  – Unallocated space is consolidated in a logical pool
HIGH AGGREGATE PERFORMANCE WITH NO TUNING EFFORTS

- Automatically apply SAN resources where and when needed
  - Controller resources grow as storage grows
  - Automatic striping across entire pool of storage
  - Automatic load balancing across all SAN resources
AUTOMATIC TIERING ACROSS STORAGE TIERS

• Economic Benefits of Storage Tiering
  – Save $$$’s on capital investments
    – Buy the right storage tier for the application
  – Efficiently meet service level requirements
    – Data placed on the right storage tier to deliver optimal performance
  – Reduce environmental costs
    – Lower total expenditures on power and cooling
      by making use of lower RPM disk drives

15K HDDs
10K HDDs
7200 HDDs

Lower
• $/GB
• Power
GREATER EFFICIENCY THROUGH vSTORAGE API INTEGRATION

GOAL: Leverage the SAN to optimize storage functions

CHALLENGE: Coordinate between ESX and Storage Arrays

- Available today for Dell EqualLogic
  - Auto-Snapshot Manager/VMware Edition
  - VMware Site Recovery Manager Adapter
  - Multipathing Plug-in for vSphere
    - Optimally exploit scale-out, multi-controller EqualLogic architecture

- Advanced engineering
  - SAN accelerated provisioning
    - Create, Template, Clone, Linked Clone
  - Snapshot processing
    - Remove snapshot overhead from server
  - SAN accelerated Storage VMotion
    - Higher performance, lower overhead
  - Thin provisioning
    - Protect VM’s from running out of thinly provisioned space
AUTO-SNAPSHOT MANAGER /VMWARE EDITION

AUTOMATED, INTEGRATED, AND SCALABLE PROTECTION FOR VIRTUAL MACHINES

- Works with Virtual Center to Snapshot the VM and then take PS Series snapshot
- Allows for scheduling and automation of protection
- Works with VMware’s folder structure for scalability
- Allows for Rollback of VMs for fast recovery
- Automated Rollback of datastore or selective restore of individual VMs
HOW ASM/VE WORKS

To take a snapshot of all VM’s in a VMFS

• Query **VC** to identify all VMs in VMFS
• Query **VC** to identify SAN volume VMFS is based on

• For each VM, command **VC** to take a VM snapshot (i.e., put each VM in snapshot mode)
• Command **EQL** to take SAN-based snapshot of VMFS volume

• For each VM, command **VC** to delete VM snapshots
EQUALLOGIC-OPTMIZED MULTIPATHING FOR VMWARE ENVIRONMENTS

• Automated Connection Management
  – Easy configuration and management
  – End-to-end load balancing
    – Server and the PS Series Group decide the best mapping to maximize availability and performance
    – Automatically adapts to configuration changes on the Server, Network or PS Group
  – Ensures best-practice deployment

• Benefits
  – Scalable IO performance
  – Improve server bandwidth to SAN
  – Eliminate single point of failure between server and SAN
  – Affordable, easy to manage
DELL & VMWARE FOR THE EFFICIENT ENTERPRISE

- Automated, Policy-Driven Management Based on Real-time Intelligence
- Strategic Alignment Of Technology Partners
- Advanced Integration Across Multiple Layers of Infrastructure
- Virtualized Resource Pools
- Platforms Optimized for Virtualization

Dell’s Intelligent SANs and VMware vSphere
Dell & VMware
vStorage, SRM, ASM/VE Integration
PS Series Groups & VMware ESX Clusters
PowerEdge & EqualLogic Virtual SANs
NEXT STEPS TO **GET MORE VIRTUAL**
WITH DELL AND VMWARE **vSPHERE**...

- **LEARN** more about IT Consolidation & vStorage with VMware on EqualLogic.com
  - [Home](#) > [Partnerships](#) > [VMware](#) > vStorage
- **VIEW** in-depth online seminars and download solution briefs at EqualLogic.com
- **PARTICIPATE** in live interactive demonstrations on EqualLogic and Virtualization
  - [www.EqualLogic.Com/Demos](#)
- **Work with** you local Dell Representative or Channel Partner