Disaster Recovery Simplified:  
EqualLogic iSCSI SAN and VMware Site  
Recovery Manager Deliver Results  

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**EqualLogic and VMware:**
Share the same Vision for Disaster Recovery

<table>
<thead>
<tr>
<th></th>
<th>Rapid</th>
<th>Reliable</th>
<th>Manageable</th>
<th>Affordable</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Automate recovery process</td>
<td>• Enable easier, more frequent testing</td>
<td>• Centralize and simplify management of recovery plans</td>
<td>• Eliminate idle recovery hardware</td>
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<td></td>
<td>• Eliminate failures due to hardware dependencies</td>
<td>• Turn manual, inconsistent processes into pre-programmed, repeatable processes</td>
<td>• Make disaster recovery protection a property of virtual infrastructure</td>
<td>• Eliminate dependencies on physical infrastructure</td>
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<td></td>
<td>• Integrate different components of recovery</td>
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# Virtual Servers + Virtual Storage

<table>
<thead>
<tr>
<th>Feature</th>
<th>VMware</th>
<th>EqualLogic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtualized resources on consolidated hardware</td>
<td>Virtual servers</td>
<td>Virtual volumes spanning multiple storage systems</td>
</tr>
<tr>
<td>Expansion of physical resources with no downtime</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Online workload migration to new/different hardware</td>
<td>VMotion</td>
<td>Load balancing &amp; Vacate</td>
</tr>
<tr>
<td>Fast deployment of virtual machines</td>
<td>Clone virtual machine images</td>
<td>Instant creation of volumes, snapshots, and clones</td>
</tr>
<tr>
<td>Automatic load-balancing</td>
<td>VMotion / DRS</td>
<td>Auto-load balancing and tiering</td>
</tr>
<tr>
<td>Partitioning of resources to specific groups and purposes</td>
<td>Resource pools</td>
<td>Storage pools</td>
</tr>
<tr>
<td>Highly available infrastructure</td>
<td>HA clustering</td>
<td>Full redundancy</td>
</tr>
<tr>
<td>Integrated DR Solution</td>
<td>Site Recovery Manager</td>
<td>Replication as standard feature</td>
</tr>
<tr>
<td>Low cost SAN infrastructure for server or blade support</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
Rapid Customer Adoption of EqualLogic, iSCSI and VMware Infrastructure 3

Cost Effectiveness

“If you are looking for a full-featured, enterprise SAN without the high cost, take a look at EqualLogic.”

Performance / Scalability

“The EqualLogic products outperform any of the other SANs we have baked off.”

Ease of Use

“The EqualLogic units practically jump out of the box and mount/configure themselves in your rack.”

Sample of EqualLogic / VMware Customers

- Arch Coal, Inc.
- VSR Financial Services, Inc.
- Carnegie Mellon
- Intermec
- Gordon Biersch
- STEEL & PIPE SUPPLY COMPANY
- HCC Insurance Holdings, Inc.
- Mount Saint Mary College
- Babson
- LifeLink
- PATHFIRE
- SHILOH
- HOMEBANC MORTGAGE CORPORATION
- GIOT
- PXP
- VMWARE CHINA VIRTUALIZATION FORUM 2007
Business Needs for Disaster Recovery

Minimize Downtime
93% of companies that lost their data center for ten days or more due to a disaster filed for bankruptcy within one year of the disaster.
--National Archives and Records Administration

Minimize Risk
92% of users surveyed acknowledged that their companies would face serious consequences if they had to implement their disaster recovery plans.
--Dynamic Markets Ltd.

Control Cost
73% of executives expressed concern with the costs associated with maintaining a secondary data centre.
--Beacon Technology Partners

Effective disaster recovery is a business imperative, but is very difficult to achieve.
Challenges of Traditional Recovery

Slow
- Bare-metal recovery of OS
- Restore of data process

Unreliable
- Dependencies on physical infrastructure
- Many manual and complex steps
- Testing is difficult and expensive

Expensive
- Require identical infrastructure
- Recovery infrastructure mostly idle
- Cost of every change doubled
IT Best Practice Trend: Consolidation of Servers

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

**Hardware Independence**
Run a virtual machine on any server without modification

**Isolation**
Each virtual machine is isolated from other virtual machines

**Encapsulation**
Turns servers into data

**Partitioning**
Safely run multiple virtual machines simultaneously on a single physical server

**Encapsulation**
System App Data = files in VFMS

**Partitioning**
% Utilization
Server Consolidation Prerequisite: Consolidation of Storage

- File Servers
- Backup Servers
- Mail Server
- DB Server
- Name Server
- Directory Server

Simplified provisioning
Fewer points of management
More efficient resource utilization

EqualLogic iSCSI SAN

Higher availability
Better backup and restore
Improved data protection
Key Features Enabled by Networked Storage (SAN)

VMotion
> Online migration of running virtual machines without interruption

DRS - Distributed Resource Scheduling
> Optimizes resource usage based on current workloads

VMware HA
> Automated rehosting and restart of virtual machine in case of server failure

VMware Consolidated Backup
> Server-less backups
Why is iSCSI Important?

Reduces the Barrier to Networked Storage
- Uses more affordable hardware
- Extends existing infrastructure
- Leverages ubiquitous networking knowledge
- Helps simplify SAN deployments

Enhances Consolidation ROI
- Reduces TCO for servers
- Lowers cost of VMware deployment
- Improves scaling of VMware infrastructure
Industry Trend: Virtual Servers Meet Virtual Storage

Extendable, Scalable, and Resilient Infrastructure for Both Servers and Storage

Path Virtualization
Port Virtualization
Capacity Virtualization

Physical Infrastructure
Virtualized Assets
Key SAN Features for Data Protection and Recovery

Redundant and Hot Swap Hardware

Data copy facilities – in SAN Hardware
- Snapshots
- Clones
- Replicas

Integration of SAN data copy with servers and applications
- Backup / Restore
- Quick Recovery
- Disaster protection and recovery
Server-less Backup
SAN Offloads Servers From Backup Tasks

Step 1: Create a snapshot of the application volume
Step 2: Backup server mounts the snapshot
Step 3: Backup server copies the snapshot to tape
Recovery Process in a Virtualized Environment

Example recovery process comparison

P-P
Configure hardware
Install OS
Configure OS
Install backup agent
Start “Single-step automatic recovery”

V-V
Restore VM
Power on VM

< 4+ hrs

RTO of a few hours, not days to weeks!
Customer Case Study Using VMware and EqualLogic
LifeLink Foundation

Challenges
– Need cost-effective disaster recovery for 7x24 access to critical organ donor databases
– Duplicating existing production environment at DR site too costly and complex

Solution
– Virtualized environment based on EqualLogic SAN and ESX Server
– SAN-based replication of server images / data sets across 3 sites for quick disaster recovery

Benefits
– Physical servers reduced from 12 to 2
– Simple and cost effective disaster recovery

IT environment
– SQL Server-based clinical and operational databases, Exchange, SharePoint, Citrix

“Traditional disaster recovery would have added much more complexity to our environment – the EqualLogic/VMware solution gave us DR along with simplicity.”

John Rohn
VP Information Technology
LifeLink Foundation
What it is:
> Site Recovery Manager is a new VMware product for disaster recovery

What it does:
> Automates disaster recovery processes:
  - Setup
  - Failover
  - Failback
  - Test

By combining disaster recovery automation with the capabilities of VMware Infrastructure, we further reduce RTO, cost, and risk.
Key Components

Site Recovery Manager service
- Manages and monitors recovery plans
- Tightly integrated with VirtualCenter

SAN Replication
- Integrated via replication adapters
- Replication adapters certified and supported by EqualLogic
Key Components

Production

Disaster Recovery

VMware Infrastructure

VirtualCenter

Site Recovery Manager service

Protected virtual machines

SAN Replication

Servers

Storage
Disaster recovery management is another view of your environment

- Viewed from VirtualCenter management client
- Central point of management for virtual infrastructure
Setup and Build Recovery Plans

Turn manual runbook into automated process

- Specify steps of recovery process in VirtualCenter

Extensible framework
- Scripts for specialized tasks
- Checkpoints for manual steps
- Enables integration with physical recovery
Replication with VMware: Array-Based Replication

PRIMARY

Site Failure

WAN / LAN

Array-Based Replication

DR SITE

EqualLogic SAN

EqualLogic SAN

VMWARE CHINA VIRTUALIZATION FORUM 2007
Failover Automation

- Detect site failures
  - Raise alert when heartbeat lost
- Initiate failover
  - User confirmation of outage
  - Granular failover initiation
- Manage replication failover
  - Break replication
  - Make replica visible to recovery hosts
- Execute recovery process
  - Use pre-programmed plan
  - Provide visibility into progress
Failback

No big red button--process enablement instead

Promote secondary site to primary
- For one or more VMs

Add VMs to DR profile
- Protect them at another site

Manual failover
- Short downtime (minutes)
- Likely to be individual VMs/applications
Testing

Replication Management

- Snapshot replicated LUNs before test
- Delete snapshots of replicated LUNs after test

Network Management

- Change all virtual machines to a test port group before powering them on

Customization/extensibility

- Same breakpoints and callouts as failover sequence
- Extra breakpoints and callouts around the test bubble
Summary

EqualLogic + VMware Simplified Disaster Recovery

> Rapid
  - Automate disaster recovery setup, failover, failback, and testing
  - Eliminate complexities of traditional recovery

> Reliable
  - Ensure proper execution of recovery plan
  - Enable easier, more frequent tests

> Manageable
  - Centrally manage recovery plans
  - Make plans dynamic to match environment

> Affordable
  - Utilize recovery site infrastructure
  - Reduce management costs