Using Dell VIS Creator with Dell vStart

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Using Dell VIS Creator with Dell vStart

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November 2011 | Rev 1.0
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Overview

As the use of virtualization grows in IT datacenters, so too does the need for advanced capabilities to manage virtualized resources. The aggregate of these capabilities is typically considered a “private cloud.” Today, Dell provides the foundation of a private cloud via the vStart solution, a pre-designed, pre-validated, and preconfigured set of virtualized resources that can be deployed inside an IT environment within days. With the addition of Dell VIS Creator to a vStart solution, IT organizations are able to elevate their vStart from a virtualization platform to a self-service enabled private cloud.

In this whitepaper, we provide a sample reference architecture for installing and configuring VIS Creator on a VMware®-based Dell vStart. Several use cases, such as VMware Clone deployment, Enterprise Group Administration, and Self-Service, are demonstrated. This architecture paper should be used along with existing VIS Creator and vStart documentation to understand the entire step-by-step process.

Dell Global Services offers both planning and implementation support for VIS and virtualization environments. They can design a solution that maps your specific IT and business policies, procedures, and standards into VIS Creator, which is a critical process for a successful implementation. For additional details on Dell Global Services offerings, refer to Dell.com/Services.
vStart Architecture

Dell vStart is a pre-engineered, pre-configured, pre-cabled virtualization platform built with PowerEdge™ servers, PowerConnect™ networking, and EqualLogic™ PS storage. Three vStart solutions are available - 50, 100, and 200. The solutions vary based upon the amount of server and storage resources. Each vStart ships from the Dell factory, in a full or half-height rack, ready to be integrated with the customer’s environment by Dell Services. This whitepaper focuses on vStarts built on VMware vSphere™. vStarts built on Microsoft® Hyper-V R2 are also available. For more information about vStart, see Dell.com/us/Enterprise/p/Virtualization-Infrastructure.

Cluster Configuration

Typically, a single vStart rack is deployed as a single VMware cluster containing all hosts, while the EqualLogic storage is typically configured as a single EqualLogic storage group with a single storage pool containing all EqualLogic members.

Figure 1. vStart Solution Connectivity Overview

As need for virtualized compute and storage resources grow, additional vStart racks may be interconnected to expand the base vStart virtualization environment. Figure 1 illustrates an overview of the typical interconnection of multiple vStarts. Each individual vStart is configured as a single
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VMware Cluster (A, B, and C) within a single VMware Virtual Center server instance. Additional EqualLogic storage arrays are configured as additional storage pools within a single EqualLogic Group. The net result is a single vCenter instance with three vSphere clusters and a single EqualLogic storage group with three EqualLogic storage pools.

By adding each additional vStart as a new cluster and new storage pool, IT organizations are able to scale-out the vStart environment with rack-level virtualized infrastructure blocks with minimal impact to existing workloads. Additionally, by keeping storage traffic local to the rack, optimal storage I/O performance is ensured. Virtualization management tools may then aggregate and manage the environment as a single virtualized infrastructure pool.

LAN Interconnection

For the purposes of management, vCenter™ connectivity, and workload connectivity, each vStart should have network connectivity to the other vStarts. The single vCenter instance needs to have network access to each host for management and operations.

As illustrated in Figure 1, connectivity is typically aggregated through stacking or high-speed uplinks to a network distribution layer or network core. Uplinks connect from each LAN switch to a redundant pair of network distribution switches or core switches. Workload traffic, VMware vCenter, and other management traffic will flow from vStart to vStart through the distribution layer. Since vSphere clusters do not span multiple racks, standard vMotion traffic will remain local. Care must be taken to ensure that network loops are prevented and redundancy is provided.

SAN Interconnection

SAN connectivity is also aggregated through high-speed uplinks to a network distribution layer or by stacking the existing vStart SAN switches. This aggregation ensures that all EqualLogic group members are accessible by all hosts, and that EqualLogic intra-group communication functions properly.

For optimal performance, hosts should only utilize arrays within their same vStart rack for virtual machine (VM) operation. By this we mean that Cluster A should only attach to VMFS volumes that reside within EqualLogic Storage Pool A, and all virtual machines that are attached to Cluster A reside with those same VMFS volumes. This is accomplished by creating EqualLogic storage pools at the rack level and placing all VMFS volumes for the cluster within that rack in that storage pool. By ensuring that virtual machines reside on VMFS volumes local to the individual vStart rack, storage locality is ensured. This locality provides for optimal SAN performance.

For further details on LAN and SAN connectivity and additional vStart Cluster configuration options, contact Dell Support for best practices for the interconnection and configuration of multiple vStarts.
Sample Organization

VIS Creator and vStart are focused on solving real world organizational challenges. To assist in explaining this, we will describe how VIS Creator helps meet challenges at a fictitious software development company, WidgetSoft. And like all fictitious companies, WidgetSoft develops software solutions to enable the manufacture of widgets.

WidgetSoft has three key business units: Sales, Software Development, and IT operations. Members of each business unit need to deploy workloads, but each has unique requirements. Table 1 lists the different business units and their requirements.

<table>
<thead>
<tr>
<th>Business Unit</th>
<th>Business Unit Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>• Able to quickly spin up a sales demonstration environment.</td>
</tr>
<tr>
<td></td>
<td>• Request desktop OS systems.</td>
</tr>
<tr>
<td>Software Development</td>
<td>• Expand the software build environment on demand.</td>
</tr>
<tr>
<td></td>
<td>• Deploy additional QA environments on demand.</td>
</tr>
<tr>
<td>IT Operations</td>
<td>• Deploy file servers for corporate use.</td>
</tr>
<tr>
<td></td>
<td>• Deploy webservers for web production use.</td>
</tr>
<tr>
<td></td>
<td>• Needs a dedicated, isolated cluster for mission critical operations.</td>
</tr>
</tbody>
</table>

Today, WidgetSoft’s IT organization is over-utilized with emergency deployment requests, server reboots, and struggles to control VM sprawl. They are struggling to keep up with the fast pace of the sales and software development teams. Administrators would like to grant each business unit access to deploy new workloads and control existing workloads, in accordance with IT governance policies. By empowering the end-user to request and manage workloads themselves, IT is able to more quickly meet the needs of the business while also alleviating the IT organization of these repetitive tasks.

By adding VIS Creator to their vStart environment, WidgetSoft is able to solve these and many more challenges.
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VIS Creator Overview

VIS Creator offers IT operations the tools necessary to more efficiently manage vStart resources. The features of vStart are expanded by adding self-service deployment, IT governance, chargeback, and VM sprawl control. These features enable end-users to request, deploy and manage workloads in accordance with IT governance.

Each member of the various business units may login through a web-based portal to choose from a catalog of workloads established by IT. Requests may be granted immediately, or require a multilevel approval process. Once approved, the provision and customization process completes quickly. IT-developed post-deployment scripts can complete any environment-specific install and integration tasks. The requesting user is notified by email upon the completion of their request.

Once the deployment process has completed, members of the business unit may control the workload through the same web-based portal. Users are provided with the ability to start, stop, and reboot the workloads. Links are also provided to connect to the workload over Microsoft’s remote desktop protocol (RDP). Custom actions, such as snapshots or software installation, may also be made available to the user based on organizational requirements. At the end of the lease, the workload is powered off and archived.

To convey the value provided, IT can generate chargeback reports for each business unit. A complete lifecycle is defined for each workload, which includes a lease time, approvals, and costs, to help minimize VM sprawl. VIS Creator reporting may be also utilized to identify and reclaim underutilized workloads.

For details on the complete features of VIS Creator, refer to the VIS Creator User’s Guide.

VIS Creator Concepts

To describe VIS Creator’s implementation and configuration, several VIS Creator specific terms are utilized in this paper. For readers who are not familiar with VIS Creator, a brief description of each term and how they apply to our scenario environment is provided.

Enterprise Group: A method of identifying physical resources for use by VIS Creator. In this case, enterprise groups are used to identify the vStart clusters as resources available for use.

Proxy Agent: Software that facilitates communication between the VIS Creator and external systems. In our scenario, this agent facilitates communication between the VIS Creator server and the VMware vCenter Server. Proxy Agent may be utilized to integration with other third-party systems or execute custom scripts.

Distributed Execution Manager (DEM): A key software component that is responsible for the execution of workload deployment operations and other VIS Creator tasks.

Blueprints: The construct used to define the lifecycle of a workload, including approval requirements, deployment methods, lease, and archival time. Blueprints may be accessible by one or more business units. In this scenario, each workload would be represented by a blueprint. These individual blueprints make up the catalog of workloads available for end-user deployment.

Provisioning Group: The method of identifying users or groups who can access VIS Creator. Users or groups may be granted access to one or more roles within the provisioning group, including
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administrative, support, and end-user roles. If needed, users may be a member of multiple provisioning groups. Access to blueprints is defined by the provisioning group. In this scenario, provisioning groups map directly to each business unit, three total — Sales, Software Development, and IT Operations.

**Reservations:** The method in which an administrator allocates resources to a provisioning group. Reservations are comprised of the targeted hypervisor cluster, memory allocation, storage path selection, network settings, and usage allocation.

For more details on these and other VIS Creator terms, refer to the *VIS Creator User’s Guide.*

![VIS Creator Overview](image-url)
VIS Creator / vStart Architecture

To meet WidgetSoft’s challenges, VIS Creator was chosen to manage the Dell vStart environment. VIS Creator is comprised of several components including portal and report websites, model managers, manager services, distributed execution managers, agents, and a SQL database. As illustrated in Figure 3, all VIS Creator components are installed on a single VM within a VMware cluster in the vStart environment. This architecture is based on VIS Creator 2.1; check with Dell Support for best practices with other versions.

Figure 3. VIS Creator / vStart Architecture Overview
VIS Creator Server

Creator Server Virtual Machine

The VIS Creator Server is installed within a single Microsoft Windows® 2008 R2 virtual machine located on a vStart cluster. Virtual machines specifications are described in Table 2.

<table>
<thead>
<tr>
<th>Table 2. VIS Creator Server VM Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
</tr>
<tr>
<td>4 vCPU</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
</tr>
<tr>
<td>4 GB vRAM</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
</tr>
<tr>
<td>40 GB OS/Applications</td>
</tr>
<tr>
<td>10 GB SQL Data</td>
</tr>
<tr>
<td>5 GB SQL Log</td>
</tr>
<tr>
<td>10 GB SQL Backup</td>
</tr>
<tr>
<td>All volumes may be thin provisioned</td>
</tr>
<tr>
<td><strong>Network</strong></td>
</tr>
<tr>
<td>1 Gb/s connectivity to vCenter</td>
</tr>
</tbody>
</table>

The Creator server requires Microsoft Windows 2008 R2 Standard Edition, .NET Framework 4, and other prerequisites outlined in the VIS Creator Installation Guide and VIS Creator Support Matrix. For best integration, this VM should be a member of the organization’s Active Directory domain. Active Directory membership will enable domain users to authenticate with VIS Creator to request workloads and ensure time synchronization.

**Best Practice:** Create a unique service account for the VIS Creator service to utilize. This account should be a domain administrator to ensure access to all newly provisioned systems.

SQL Database

The Creator Server VM will house the SQL database for VIS Creator. Installation of SQL 2008 R2 Standard is recommended, however SQL 2008 R2 Express is acceptable.

**Best Practice:** Follow Microsoft’s best practices for SQL Installation to ensure optimal performance. Sufficient backup and maintenance routines must be established and monitored by your database administrator.

VIS Creator Software

All components of the VIS Creator software suite, including the portal website, reports website, model manager website, DEM, and agents, are installed on the Creator Server VM. Installation of each component should follow the guidance of the VIS Creator Installation Guide. Dell Global Services can provide assistance with any installation challenges.

VIS Creator Manager

The VIS Creator Manager is the core software component. This component includes the installation of the portal website, reports website, model manager website, and manager service. All of these components are installed on the VIS Creator Server VM. Prior to installation, ensure that all prerequisites are met by running the VIS Creator Prerequisite checker.
It is recommended to install and run the manager services as a dedicated Active Directory (AD) VIS Creator service account with domain administrator privileges.

**VIS Creator Distributed Execution Manager (DEM)**
The DEM is utilized by VIS Creator to execute deployment tasks and VIS Creator workflows. In our scenario, we utilize a single DEM installed directly on the VIS Creator Server VM.

**VIS Creator Agent - vCenter**
To communicate with the vStart vCenter host, VIS Creator utilizes a proxy agent. The proxy agent manages communication between the VIS Creator Manager Service and VMware vCenter. This agent is installed on the VIS Creator Server VM. Prior to installing the proxy agent, ensure that an appropriate “generic endpoint” is created within VIS Creator with the vCenter Administrator credentials.

**Best Practice:** Utilize a VIS Creator Service user or other VIS Creator specific service account for interactions with vCenter. This will facilitate appropriate auditing of actions initiated by VIS Creator. This single agent is utilized to interact with all clusters within the single vCenter.

**VIS Creator Agent - WMI**
VIS Creator utilizes the Windows Management Interface (WMI) to gather select information regarding deployed Microsoft Windows based workloads. The WMI agent is also installed on the VIS Creator Server. The WMI Agents must run as a domain administrator, or other user, with permission to the WMI interface of newly deployed Windows workloads.

Refer to the *VIS Creator User’s Guide* for workload-specific settings to enable the WMI within deployed workloads.

**Infrastructure Requirements**

**Active Directory**
The VIS Creator Server should be a member of your organization’s AD domain. VIS Creator utilizes AD for users for authentication and group membership. AD Groups are utilized to assign users to specific provisioning groups within VIS Creator.

Email is utilized to notify users of important events such as deployment request status and upcoming lease expirations. VIS Creator retrieves these email address directly from Active Directory. Ensure that email addresses are properly populated for all users in AD.

**SMTP Server**
As noted above, VIS Creator utilizes email to communicate important information with users and administrators. An unauthenticated SMTP server is required to relay mail to users and administrators. Ensure that an appropriate SMTP server exists in the environment. The setup of this server is outside of the scope of this whitepaper.

**Networking**
The VIS Creator Server VM requires network access to the vCenter management server and to any deployed workloads. Ensure that appropriate network connectivity is in place and that appropriate network, host, and workload level firewalls are configured correctly.
VIS Creator Configuration

Depending upon business needs, customers may have one or more vStarts deployed within their environment. Multiple vStarts may have their VMware ESXi™ hosts aggregated into a single cluster or configured as multiple clusters within a single vCenter instance. In the WidgetSoft scenario, their configuration has multiple rack-level clusters within a single vCenter instance. If necessary, this can be easily interpreted into an environment with a single cluster.

VIS Creator Deployment

Once VIS Creator is installed on the VIS Creator Server VM, we move forward to configuration. Below we describe how VIS Creator is configured for WidgetSoft. The configuration in your environment may be different. In this scenario, we will explore the mapping of the WidgetSoft requirements into an environment with three vStarts.

Enterprise Groups

Within VIS Creator, enterprise groups are utilized to identify virtualization resources available for use within Creator. The creation of a single enterprise group is appropriate in most cases. Every cluster in the vStart environment is then added to the single Enterprise group, as illustrated in Figure 4.

Figure 4. Enterprise Group Settings

Provisioning Groups

Provisioning groups are the method of providing access and resources to a group of users. There is no right or wrong way to group systems and users into provisioning groups — each environment has its own specific requirements. A Dell services professional can work with you to understand the ideal mapping of users to provisioning groups that would be best for your environment.

For WidgetSoft, three provisioning groups are created — Sales, Software Development, and IT Operations, as illustrated in Figure 5. During provisioning group creation, the AD groups of users for each provisioning group are identified.
Reservations

The mapping of virtualized resources to provisioning groups is accomplished by reservations. Each provisioning group requires one or more reservations. The reservation identifies compute clusters, memory allocations, storage allocations, and network paths for use by Creator for deployment operations. When linking multiple vStarts together, each vStart is configured as a standalone cluster as shown in Figure 1. The configuration of each vStart as a standalone cluster provides for independent pools of compute resources and ensures storage locality.

As described at the start of this whitepaper, the Sales, Software Development, and IT Operations teams each need a shared slice of the vStart environment. The IT Operations team also needs a dedicated cluster to host mission-critical applications. Using VIS Creator, we create reservations to meet these requirements. While the exact makeup of the reservation depends on your business needs, for WidgetSoft an equal division of resource within clusters A and B are selected, while Cluster C is dedicated to IT, as shown in Table 3 and illustrated in Figure 6.

<table>
<thead>
<tr>
<th>Provisioning Group</th>
<th>Cluster A</th>
<th>Cluster B</th>
<th>Cluster C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1/3 of Resources</td>
<td>1/3 of Resources</td>
<td></td>
</tr>
<tr>
<td>Software Development</td>
<td>1/3 of Resources</td>
<td>1/3 of Resources</td>
<td></td>
</tr>
<tr>
<td>IT Operations</td>
<td>1/3 of Resources</td>
<td>1/3 of Resources</td>
<td>100% of Resources</td>
</tr>
</tbody>
</table>

This design ensures that IT Operations’ mission-critical workloads are isolated from other workloads, while the Sales, Software Development, and the remaining IT Operations workloads can share the majority of the vStart resources. While VMware vSphere has safeguards to mitigate the impact of one VM on another VM, some organization desire physical segregation for added safety. The dedicated cluster ‘C’ for IT Operation is similar to a dedicated server, as the IT Operations business unit is isolated from other business units.
Allocation of all vSphere resources is not necessary. Unallocated resources will remain available for future use by new business groups, or to grow the allocation of existing business units.

**Best Practice:** To ensure adequate workload performance, careful monitoring of vSphere performance through vCenter is recommended. Alerting may be configured in vCenter to proactively notify IT Operations of performance issues.

WidgetSoft’s sample reservation configuration is illustrated in Figure 7.
Reservation Policies

With VIS Creator, either user-requested workloads are distributed across multiple clusters or workloads can be targeted to a specific cluster. Reservation policies are a VIS Creator concept used to group similar reservation together or target workloads to a specific reservation.

In this scenario, IT Operations utilizes two reservation policies, one for workloads targeted for Cluster A/B and a second for workloads targeted for Cluster C, as illustrated in Figure 8. This ensures that mission critical workloads are placed on Cluster C while general purpose workloads are distributed over Cluster A and Cluster B.

Figure 8. Reservation Policies

For more information about reservation policies, consult the VIS Creator User’s Guide for details.

Blueprints

The final setup step is the creation of blueprints for end-user use. The blueprint defines the entire IT lifecycle of a workload, including approval requirements, deployment methods, lease, and archival time. The catalog of workloads available for end-user request and deployment is comprised of blueprints.

VIS Creator supports a wide variety of deployment methods. The most common method in vStart environments are VMware template clones, which are highlighted here. VMware template clones are a vCenter-focused deployment method where a master VMware template image is cloned and guest OS customization is applied.

In the WidgetSoft scenario, each business unit has specific workload requirements. Each of these workload requirements are directly translated to a VIS Creator blueprint. When creating a blueprint, administrators specify which provisioning groups can access a workload, the source VMware template, and any customization to be applied. End-users may also ensure that their workloads are appropriately sized by adjusting the workload’s vCPU count and vRAM, based on their requirements.

Figure 9 illustrates the workload catalog with VIS Creator. Each of the business unit workload requirements translates to a single blueprint listed in the catalog.
Next the “Mission Critical WebApp” workload for the IT operations business unit is explored, as illustrated in Figure 10. This particular workload is provisioned by way of a VMware template clone. To allow for flexibility within each request, IT Operations business unit members may select between 2-4 vCPUs and 4-8 GB vRAM. Lease time may also be set based on workload need. This workload requires a post-deployment script to be executed, which is specified in the blueprint.

When a user requests a VMware template clone-based workload, VIS Creator initiates a template clone from vCenter. VIS Creator then utilizes the specific VMware Cluster, destination storage array, and network connectivity determined by the reservation policy and the reservations available to the provisioning group. In this case, the ‘vStart Dedicated’ reservation policy is utilized, which maps to the ‘Cluster C’ reservation.

Once the workload has been provisioned, as illustrated in Figure 11, end-users may power-on, power-off, and perform other administrator configured tasks. The ability to connect to the workload via RDP is provided. End-users also have the ability to terminate a lease early, or request an extension.
VIS Creator offers extensive flexibility for blueprint creation and customization. For detailed instructions on how to create a VIS Creator Blueprint and supported guest OS, refer to the *VIS Creator User’s Guide* and VIS Creator Support Matrix.
Template Location

For blueprints based on VMware template clones to function correctly, a VMware template must be presented to each host in the cluster where that blueprint may be deployed. In an environment with multiple vStarts, and hence multiple clusters, it is advantageous to utilize a dedicated LUN for the VMware templates for all clusters. As illustrated in Figure 12, typically a dedicated template LUN is established on the shared storage array and presented to every host in the environment.

Figure 12. Template LUN Overview

When combining multiple vStarts, choose an appropriate EqualLogic Storage Pool to host the template LUN. Ensure that all templates reside on this shared LUN. Since this LUN is only utilized during deployment operations, the performance of the storage array is not critical. Additionally, during the clone operation, vSphere will utilize the EqualLogic MEM module to offload the copy operation to the storage array.
Reporting

As demonstrated above, VIS Creator offers IT the ability to empower end-users with numerous powerful features. To help keep tabs on the actions of end-user and business units, VIS Creator offers a number of advanced reports.

Chargeback

Chargeback reporting is available to demonstrate workload costs to the various business units.

Figure 13 illustrates a sample chargeback report. In this report, total workload costs for each business unit are aggregated. Additional reports are available that break down costs by individual workloads or business unit members.

Figure 13. Chargeback Report
Audit

With any dynamic environment, a strong audit trail is beneficial. VIS Creator provides a number of audit reports, including those by user, host, or blueprint. Key user interactions with VIS Creator are logged and available within the audit report. Figure 14 illustrates a sample audit log for one of WidgetSoft’s IT Operations team members.

Figure 14. Audit Log

Audit Log by Host

Audit log for the data filterable by host, user and date

<table>
<thead>
<tr>
<th>Timestamp</th>
<th>Host</th>
<th>Owner</th>
<th>Provisioning Group</th>
<th>Status</th>
<th>Message</th>
</tr>
</thead>
</table>

As of 11/22/2011 1:51:04 PM
Sprawl Control

VIS Creator offers IT administrators the ability to view key performance data for each workload. Figure 15 illustrates a sample report listing average CPU, Memory, Network, and Disk utilization for the various workloads in our cluster. Since underutilized workloads may no longer be needed, administrators can choose to send a reclamation request to the end-user. This reclamation request reminds users of their running workload and offers them the option to terminate their lease early. Tools such as this help control VM sprawl and ensure that the vStart resources are being appropriately utilized.

Figure 15. Underutilized VMs

The reports demonstrated above are a small sampling of the reports available within VIS Creator. Refer to the VIS Creator User’s Guide for a complete listing of available reports.
Summary

With the addition of VIS Creator to vStart, the business unit end-users can now request workloads through the self-service portal. This removes the deployment burden from IT operations staff, and ensures faster turn-around time of user requests. Once workloads are running, end-users are now able to connect via RDP, and perform VM operations such as power-on, power-off, or other IT configured operations.

With the ease of deployment, VM sprawl could become an issue; however, VIS Creator helps to minimize this issue in two ways. First, IT administrators may configure a range of lease times for each requested workload — end-users are able to choose the appropriate duration based on their needs. This ensures that workloads exist when needed and are automatically powered down and archived once the lease has expired. Secondly, VIS Creator reporting can help locate underutilized VMs. IT administrators can then contact these users or convert the workloads to a short-term lease.

As described above for WidgetSoft, VIS Creator greatly enhances the value and accessibility of a vStart environment. End-users are able to easily request workloads that are quickly deployed in accordance with IT governance. IT administrators are able to control the lease term of workloads and identify underutilized workloads, both aiding to reduce VM sprawl. VIS Creator’s ability to deploy to multiple clusters for a single business unit, offers a simple means of aggregating vStart resources while ensuring optimal storage performance. In short, VIS Creator extends and enhances vStart infrastructure solutions by offering more choices to end-users and helping to alleviate IT operations staff of routine tasks.
Additional Resources

- VIS Creator Reference Architecture, Dell.com/VIS
- VIS Creator Support Matrix, Dell.com/VIS
- Dell vStart 100v and vStart 200v Solution Overview, Dell.com/vStart
- EqualLogic White Papers & Tech Reports, Equallogic.com/ResourceCenter