vStart 50 Hyper-V Solution Overview

Release 2.0 for Dell 12th generation servers

Dell Global Solutions Engineering

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vStart 50 Solution Overview

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1 Introduction

The vStart solution is a virtualization infrastructure solution that is designed and validated by Dell Engineering. It is delivered racked, cabled, and ready to be integrated into your datacenter. vStart is offered as four configurations: vStart 50, 100, 200 and 1000\(^1\).

The vStart 50 configuration includes Dell\textsuperscript{TM} PowerEdge\textsuperscript{TM} R620 servers running Microsoft\textsuperscript{®} Windows Server\textsuperscript{®} 2012 Datacenter Edition with Hyper-V\textsuperscript{®} Role enabled, Dell EqualLogic\textsuperscript{TM} PS6100 iSCSI storage, Dell PowerConnect\textsuperscript{TM} 7024 or PowerConnect 6224 switches, an optional Dell PowerEdge R420 server that manages the solution by hosting Dell management tools.

The configurations also include Dell EqualLogic Host Integration Tools for Microsoft (HIT Kit)\(^2\) for Windows Server 2012. The vStart 50 solution has two configurations that vary in the number of EqualLogic PS6100 storage arrays to meet resource needs.

The following documents describe the various aspects of the solution. Contact your Dell Sales or Services representative to get the latest revision of all the documents.

- **vStart 50 Hyper-V Solution Overview (this document)** - Provides a solution overview including various components and how the solution is delivered.
- **vStart 50 Hyper-V Solution Specification** - Provides a detailed specification of various components included in the solution.
- **vStart 50 Hyper-V Solution Design Guide** - Provides a detailed architectural solution design.

2 Audience

This document provides an overview of the vStart 50 solution. CTOs and IT managers and administrators, can use this document to understand the overview and scope of the solution.

IT administrators and managers can use this document to understand the solution architecture.

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\(^1\) vStart 100, 200 and 1000 are covered by a separate set of documents.

\(^2\) HIT Kit helps to automate the detection and configuration of MS iSCSI initiators while providing enhanced MPIO functionality and EqualLogic Array detection and interoperability capabilities. HIT Kit 4.5 which will have full support for Windows Server 2012 will be released Dec'12. Until then the solution will use Microsoft Native MPIO. Once released, HIT can easily be incorporated into the existing solution.
3 Solution Overview

The solution discussed in this whitepaper is powered by Dell PowerEdge servers, Dell EqualLogic iSCSI storage, Dell PowerConnect networking, and Windows Server 2012 Datacenter Edition with Hyper-V role enabled. The solution implements Dell and Microsoft best practices. EqualLogic SAN HeadQuarters (SAN HQ) and Group Manager are included in the solution for storage array management and monitoring. The solution also includes the rack, power distribution units (PDU), and an optional uninterruptible power supply (UPS), KMM (Keyboard, Monitor, Mouse), and management server.

The vStart 50 includes two PowerEdge R620 servers and one EqualLogic PS6100 array. Storage expansion modules are offered in this release. More details are provided in the section below.

Figure 1 provides a high-level overview of the components utilized in each of the configurations.

Figure 1. vStart 50 Configuration Overview
vStart 50 Solution Overview

Table 1 provides descriptions for the solution components.

Table 1. Component Logical Groups

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyper-V Cluster</td>
<td>PowerEdge R620 servers running Windows Server 2012 Datacenter Edition with Hyper-V role enabled</td>
<td>Host virtual machines (VMs)</td>
</tr>
<tr>
<td>iSCSI Storage</td>
<td>EqualLogic PS6100 with 24 x 300 Gigabyte (GB) 10,000 RPM SAS Drives</td>
<td>Provide shared storage for the Hyper-V cluster to host the VMs</td>
</tr>
<tr>
<td>LAN Traffic Switches</td>
<td>PowerConnect 7024 or PowerConnect 6224 switches</td>
<td>Support VM, Live Migration, Management, Cluster, and Out-of-Band Management traffic</td>
</tr>
<tr>
<td>SAN Traffic Switches</td>
<td>PowerConnect 7024 or PowerConnect 6224 switches</td>
<td>Support iSCSI data</td>
</tr>
</tbody>
</table>

3.1 Storage Expansion Options

This section provides an overview for the vStart 50+ storage expansion options.

For customers who are considering purchasing a vStart 50, the option for two EqualLogic PS series arrays is available. For customers whose VM profiles and workloads require additional storage capacity or IOPS, an additional EqualLogic PS6100 array can be added as an upgrade for existing vStart 50s with one array. Figure 1 above shows the vStart 50 configured with two EqualLogic PS6100 arrays.

Table 2. vStart 50 Storage Expansion Options

<table>
<thead>
<tr>
<th>vStart Model</th>
<th>Base vStart Storage Array Configuration</th>
<th>With Storage Expansion Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>vStart 50</td>
<td>1 x EqualLogic PS6100 array</td>
<td>2 x EqualLogic PS6100 Arrays</td>
</tr>
</tbody>
</table>

It is important to note that the vStart architectures are designed with storage and host expansion in mind. Adding an additional storage array does not require the purchase of additional PowerConnect switches, management servers, or software.
3.2 Product Overview

This section provides an overview of the components in the solution.

3.2.1 PowerEdge R620 for Hypervisor Cluster

The Dell PowerEdge R620 uses Intel® Xeon® E5 2600 series processors and Intel chipset architecture in a 1U rack mount form factor. The PowerEdge R620 supports up to ten 2.5” drives. There is also an option for an LCD on the front of the server for system health monitoring, alerting, and basic management configuration. (Note: The LCD option is only available on 8-drive bay chassis.) The server features two CPU sockets and 24 memory slots supporting 2, 4, 8,16 or 32GB DIMMs to meet the varied memory demands of a virtualized infrastructure.

Energy-efficient design features include power-supply units sized appropriately for system requirements, innovative system-level design efficiency, policy-driven power and thermal management, and highly efficient standards-based Energy Smart components. For more information, see the PowerEdge R620 Technical Guide.

3.2.2 EqualLogic PS6100 for iSCSI Storage

The Dell EqualLogic PS6100 is a virtualized iSCSI SAN that combines intelligence and automation with fault tolerance to provide simplified administration, rapid deployment, enterprise performance and reliability, and seamless scalability. The storage architecture delivers a self-optimizing SAN that is simple to manage and has an all-inclusive software suite to help reduce Total Cost of Ownership (TCO). In the vStart 50, the PS6100X uses 10,000 RPM Serial Attached SCSI (SAS) 2.5” form factor disk drives to provide capacity and performance for a range of applications.

With a 24 drive chassis full of 300GB SAS drives, the PS6100X array delivers 7.2 Terabyte (TB) of iSCSI-based storage built on fully-redundant, hot-swappable enterprise hardware. Scale out capacity and performance is provided by adding additional arrays. Built-in software functionality includes automated load balancing, snapshots and replication, multi-path I/O (MPIO), and consistency sets. SAN HQ is also available for Multi-SAN historical performance monitoring.

Advanced data protection features such as Auto Replication and Auto-Snapshot Manager (ASM) also come standard. ASM Microsoft Edition provides intelligent and consistent snapshots for the Windows Server 2012 hosts and the Hyper-V environment.

Multipath IO (MPIO) capabilities are enhanced by the EqualLogic HIT KIT. The HIT Kit configures MPIO load balancing and redundant iSCSI initiator configurations for Windows Server-based hypervisor hosts. For more information about the HIT Kit for Windows Servers, see Dell EqualLogic Host Software.
3.2.3 Optional PowerEdge R420 for management server

The Dell PowerEdge R420 uses Intel® Xeon® E5 2400 series processors and Intel chipset architecture in a 1U rack mount form factor. The PowerEdge R420 server supports up to eight 2.5” drives. The internal RAID controllers supported are PERC models H310, H710, and H710P. The server features two sockets and 12 memory DIMM slots supporting 2, 4, 8, 16 or 32GB DIMMs, up to a total of 192GB of memory. This is sufficient to meet the demands of the management operating system and its software components. For more information on PowerEdge R420 management server, please refer PowerEdge R420 Technical Guide.

3.2.4 PowerConnect 7024 or PowerConnect 6224 Switches for LAN and SAN Traffic

At the heart of the solutions network configuration are four Dell PowerConnect 7024 or PowerConnect 6224 switches. These managed Layer 3 Gigabit Ethernet switches offer the enterprise-class level of performance required for this configuration. The LAN switches use a stacked configuration that enables connection redundancy and added bandwidth where required. Additionally, the 10Gb uplink enables design and implementation flexibility needed by advanced users. LAN and SAN switches are physically and logically separated per best practices to support security and network traffic segmentation. VLANs are implemented to support solution management, security, and network traffic segmentation, and routing is leveraged to provide flexible connectivity.
4 Delivery Model

The solution is racked, cabled, and delivered to the customer site, ready for deployment. Dell Services deploys and configures the solution tailored to the business needs of the customer. The final turn-key virtualization infrastructure solution is available for customer use. For more details or questions about the delivery model, consult with your Dell Sales representative. Figure 2 below shows the configuration in a Dell 24U rack (front side only) with all of the components.

Figure 2. vStart 50 Racked Configuration

In certain unique and limited circumstances Dell may not be able to deliver a pre-built vStart, and will have to assemble the vStart at the customer’s site. Please consult with your Dell Sales and Services team for more information.
5 Design Principles and Solution Capabilities

This section covers the design principles, requirements, and solution capabilities behind the vStart solution architecture.

5.1 No Single Point of Failure

The solution is designed such that there is no single point of failure and redundancy is incorporated into all mission critical components of the solution. Management applications, however, are not designed with this level of redundancy because the mission critical workloads continue to operate in the event of a management application failure. Network redundancy for the mission critical components is achieved with redundant network interface controllers (NICs) and redundant switches. NIC teaming for LAN and MPIO for SAN are used to provide failover across the redundant network interfaces.

iSCSI storage redundancy is achieved with redundant NICs, switches, and storage controllers. For both network and iSCSI traffic, the redundant NICs are selected such that they are mapped across the rack Network Daughter Card (rNDC) and add-in controllers to avoid any single point of failure. Hyper-V High Availability (HA) is provided by Windows Server 2012 Failover Clustering. The solution also includes an optional redundant power supply connected to separate PDUs.

5.2 Physical Separation of LAN and iSCSI SAN Traffic

Dedicated NICs and switches are provided for iSCSI storage traffic to isolate the storage traffic from LAN traffic. This helps to minimize network latency for storage I/O operations.

5.3 Logical Separation of multiple LAN traffic types

Virtual Local Area Networks (VLANs) are used to provide security and logical separation of various traffic types required for virtualization.

5.4 Prerequisites and Datacenter Planning

A domain name services (DNS), network time protocol (NTP), Active Directory® Domain Services (AD DS), and routing between VLANs are requirements for the vStart solution.

The vStart 50 architecture presumes that a network core and network routing are in place. Prior to deploying a vStart solution, DNS support must be configured and running in the customer’s environment. While not required, NTP is recommended for the environment. A site survey may be needed to gather additional information and confirm customer requirements. Contact your Dell Sales and Services representatives for more information about the site survey.
Table 3. Customer Infrastructure and vStart Solution

<table>
<thead>
<tr>
<th>Infrastructure Requirement</th>
<th>Function</th>
<th>vStart Solution Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNS</td>
<td>Provides name resolution for IP address to hostnames</td>
<td>Hyper-V hosts, iDRACs, and the PowerEdge R420 or VM Management Server require access to DNS for name resolution</td>
</tr>
<tr>
<td>NTP</td>
<td>Provides time synchronization services for components in the solution</td>
<td>PowerConnect switches, and EqualLogic storage arrays require time synchronization</td>
</tr>
<tr>
<td>Network Routing</td>
<td>Provides a network path in/out of the vStart LAN switches to the customer’s network</td>
<td>Existing network routing must be in place before the vStart solution can communicate with database, DNS, NTP, and other services in the customer’s environment</td>
</tr>
</tbody>
</table>

5.5 Hyper-V Features

The solution is designed to enable key features of Hyper-V and provides the following benefits:

- Consolidate physical servers and workloads as virtual machines.
- Automate the most frequent and time-consuming IT maintenance tasks to maximize productivity and reduce operational expenses.
- Manage the entire infrastructure including Windows®-based operating systems, business applications and databases, and heterogeneous hardware and software. Fully licensed to support the Hyper-V hosts and an unlimited number of 2012 Datacenter VMs via Windows Server 2012 Datacenter Edition.
5.5.1 Thin Provisioning

The solution enables support for thin provisioning of storage at the EqualLogic level. Thin provisioning avoids the inefficiencies of over allocation. This is possible by limiting the physical storage resource allocation to what is currently used and enables the automatic addition of storage resources as requirements grow.

5.5.2 Storage Tiering

EqualLogic PS arrays provide IT organizations numerous techniques for storage tiering as a standard part of their all-inclusive feature set. These techniques extend the automation at the core of the PS Series design philosophy while allowing broad customization of storage tiers to suit a wide range of business and organizational requirements.

6 Management Capabilities

This section provides an overview of various tasks that the administrator is required to perform on the virtualization infrastructure, and the tools that are used to perform those tasks.

As shown in Figure 3 below, Server and Cluster Manager provide a framework from which to view and manage the Hyper-V cluster, hosts, and VMs.

Figure 3. Server Manager
6.1 Performance Monitoring

Performance monitoring and troubleshooting can often be difficult in a complex environment such as virtualized infrastructure. It is important to understand the tools used and the metrics measured to monitor the performance. For storage, SAN HQ provides an easy-to-use and intuitive tool for monitoring storage level performance. Refer to the document *Monitoring your PS Series SAN with SAN HeadQuarters* for more information on monitoring and troubleshooting EqualLogic PS SAN performance. Performance Monitor for Windows can be used to monitor Hyper-V server performance.

6.2 Storage Management

Storage management can be performed from the management server using EqualLogic Group Manager. Figure 4 shows EqualLogic Group Manager, which is a web-based GUI that can be used to manage the EqualLogic storage arrays. Features include creating pools and volumes, configuring RAID options, and configuring access control. As discussed above, SAN HQ can be used to monitor storage performance.
6.3 Out-of-band management

Out-of-band (OOB) management is available for the PowerEdge R620 servers with the Hyper-V role enabled through the iDRAC7 Enterprise. The optional PowerEdge R420 management server uses the iDRAC7 Enterprise, which allows the PowerEdge R420 server to be remotely managed as needed.

iDRAC Enterprise features include:

- Remote systems management and monitoring
- Console redirection for remote system KVM (keyboard, video, mouse) functionality
- Virtual media that enables server access to local media drives on a management station
- Access to system logs
- Platform events and alerts that warn of potential problems by e-mail or simple network management protocol (SNMP) traps
- Remote power management functionality

For more information, see the Embedded Server Management web site.

EqualLogic SAN OOB management is available via the dedicated management ports on each EqualLogic PS6100 array storage controller. The PowerConnect 7024 switches provide a dedicated OOB port. The PowerConnect 6224 switches are managed in-band from the PowerEdge R420 Management Server.

7 Power, Cooling, and Weight Requirements

This section provides power, cooling, and weight requirements for the solution. Power values provided in the table are estimated maximum power values for the solution based on Dell Labs measurements. Actual power, cooling, and weight will vary based on configuration, workload, and Data Center Environment. PDUs and UPS(s) utilized in this paper are specifically for the solution available in the USA. Consult with your Dell Sales and Services representatives for further details.

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Power (max watts)</th>
<th>Cooling (BTU/hr)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>vStart 50</td>
<td>no UPS</td>
<td>2414</td>
<td>8237</td>
</tr>
<tr>
<td></td>
<td>with R3750 UPS</td>
<td>2789</td>
<td>9516</td>
</tr>
<tr>
<td>vStart 50+</td>
<td>no UPS</td>
<td>3114</td>
<td>10625</td>
</tr>
<tr>
<td></td>
<td>with R3750 UPS</td>
<td>3489</td>
<td>11905</td>
</tr>
</tbody>
</table>