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## White Paper

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### **The Cost Advantages of NetApp FlexPod Datacenter with VMware**

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## Executive Summary

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IT departments are under constant pressure of supporting, at higher levels of reliability, IT infrastructures that are growing in scale and complexity. Integrated infrastructure platforms have emerged as one means of enabling scaling, complexity reduction, flexibility and reliability. Although integrated infrastructure platforms represent a small portion of the overall datacenter hardware infrastructure market, the interest in and use of integrated platforms has grown significantly over the past two years. This rapid segment growth is recognized by a number of sources, including Gartner<sup>1</sup>, who projected that this market was going to hit \$83 billion in 2013.

Integrated infrastructure platforms contain various pre-integrated hardware components combined by the vendor to support specific tasks, such as cloud computing. These hardware components, including servers, storage and network, are integrated with management software to provide an easy to manage set of disparate components that are designed to work together.

Within the integrated infrastructure platform vendor landscape, there are two different approaches to solution development: reference architectures and vendor-built appliance-like devices. Reference architectures are sets of configuration specifications derived from previously validated configurations and best practices, which allow a channel partner to assemble and build the platform from components that meet the platform specifications. NetApp FlexPod and EMC VSPEX are examples of reference architecture based, integrated infrastructure platforms.

Appliance-like offerings, such as VCE's Vblock series, are pretested, preconfigured and pre-integrated by the vendor. This type of approach may deliver an easier to support solution, but it is less flexible than a reference architecture. It relies on predetermined vendor components, restricting the choices to a limited set of components; there are usually no component substitutions.

This paper focuses on the NetApp FlexPod Datacenter offering. It compares NetApp's capabilities to both VCE and EMC at a high level as well as demonstrating value via the Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO) analyses.

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1: Market Share Analysis: Data Center Hardware Integrated Systems, 1Q11-2Q12,  
<https://www.gartner.com/doc/2260715>

From a Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO) perspective, a datacenter equipped with NetApp FlexPod Datacenter is respectively 24.1 percent and 26.3 percent less expensive than one equipped with VCE Vblock 700. When compared against a datacenter equipped with EMC VSPEX, NetApp FlexPod Datacenter is 32.7 percent (TCA) and 36.8 percent (TCO) less expensive. The dramatic cost advantage exists primarily because the cost of storage acquired through NetApp is significantly less expensive than the EMC storage solutions used by both VCE and EMC.

## Integrated Infrastructure Platform Alternatives

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This paper compares and contrasts three of the larger players in the Integrated Infrastructure Platform Market: NetApp, VCE and EMC. All of these vendors rely on multiple component vendors to provide a complete solution. However, their specific solutions differ in architecture approach, scalability and flexibility.

NetApp FlexPod is a flexible, integrated infrastructure platform designed to work in many different environments. FlexPod, based upon a reference architecture, is highly scalable, providing transparent growth from entry to enterprise level. This approach has the advantage of being able to provide flexible configuration templates consisting of pre-validated designs. These designs cover the spectrum from the entry level FlexPod Express through enterprise class FlexPod Datacenter. FlexPod customers can scale up their platforms from Express through the largest Datacenter configurations without the need to replace older components. (Given the differences in scale between the two designs, customers who go for a rack-mount server-based FlexPod Express are unlikely to move directly to a large-scale chassis and blade server-based FlexPod Datacenter deployment, but there are no vendor defined obstacles to this growth.)

VCE is a joint venture of VMware, Cisco and EMC. Its integrated infrastructure platform is called Vblock. This family of products range from the entry level Vblock 100 series through the enterprise class Vblock 700 series. Each series in the Vblock family consists of a narrow range of supported hardware from Cisco, EMC and VMware. Though many of the constituent components of each family are the same, and specific models in the families can be expanded within the design parameters for each family, there is no direct migration path between series, nor is there a direct migration path between models within a series. For example, owners of a Vblock 300 interested in upgrading to a newer

Vblock 340 must purchase an entirely new system. (If the Vblock 300 is being replaced, some licensing can be transferred to the new system.)

EMC introduced VSPEX in 2012. EMC VSPEX also uses a reference architecture approach. EMC calls its solutions EMC Proven Architectures. Not surprisingly for a storage company, these architectures are centered on EMC VNX storage arrays and EMC data protection platforms. The architecture gives the partner and customer the option to choose whatever x86 server platform they prefer, a choice of network hardware from Cisco or Brocade, Microsoft or VMware Hypervisors, and whatever virtualized applications they wish to run. There is, however, a defined set of solutions (Microsoft Exchange, SharePoint, SQL Server, Oracle, Virtual Desktops and Private Cloud) that are more precisely defined than are other applications. Though a VSPEX platform can be scaled pretty much as needed, entry-level is limited to the lower end of the VNX product line.

When comparing these three platforms, Edison believes that NetApp FlexPod offers a more versatile and scalable platform, suitable for a wider range of customer use cases than either VCE Vblock or EMC VSPEX.

## **Total Cost of Acquisition (TCA)/Ownership (TCO)**

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From a Total Cost of Acquisition (TCA) and Total Cost of Ownership (TCO) perspective, a datacenter equipped with NetApp FlexPod Datacenter is respectively 24.1 percent and 26.3 percent less expensive than one equipped with VCE Vblock 700. When compared against a datacenter equipped with EMC VSPEX, NetApp FlexPod Datacenter is 32.7 percent (TCA) and 36.8 percent (TCO) less expensive. The cost advantage exists primarily because the cost of storage acquired through NetApp is significantly less expensive than the EMC storage solutions used by both VCE and EMC. The full extent of the advantage is best seen by observing the results of comprehensive TCA and TCO analyses of a set of competing systems.

### **Methods of TCA and TCO Analysis**

Total Cost models review the costs associated with the acquisition, installation, licensing, maintenance, and bricks-and-mortar infrastructure needs of a server solution. Within this study, list prices are used throughout; no discounts are applied.

The cost components reviewed include:

- Hardware licensing and maintenance
- OS licensing and maintenance
- Virtualization licensing and maintenance
- Database licensing and maintenance
- Network licensing and maintenance
- Storage licensing and maintenance
- System Management software licensing and maintenance
- Facility costs including space, power and equipment
- Staffing costs

Total Cost of Acquisition reflects the out-of-pocket costs paid on Day One, and includes the purchase cost of all hardware and software plus the initial cost for the first term of any maintenance contracts, whether the term is for one or three years. There is no accounting treatment and therefore no need to separate component costs into capital and/or operating categories. Rent, power, and personnel are not included, as they are paid as a part of daily operations, not upfront.

Total Cost of Ownership is analyzed using a five-year horizon. All cost components are included as either capital costs or operating costs. Costs are considered capital costs if they are one-time costs, such as equipment purchases, software licenses and storage purchases. Operating costs include all costs that are needed to sustain operations. These include all maintenance, power, space and staffing costs.

## Methodology by Component

The foundations for these analyses were based on the sized platform that would be needed by each vendor to support 1,000 Virtual Machines. Reference architectures were used for each vendor<sup>2</sup>.

Depending on the components, different approaches were used to emulate real-world costs. Note that list prices were used for all systems.

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<sup>2</sup> NetApp:

[http://www.cisco.com/en/US/docs/unified\\_computing/ucs/UCS\\_CVDs/FlexPod\\_esxi51\\_ucsm2.pdf](http://www.cisco.com/en/US/docs/unified_computing/ucs/UCS_CVDs/FlexPod_esxi51_ucsm2.pdf)

VCE:

<http://www.vce.com/asset/documents/vblock-700-technical-overview.pdf>

EMC:

<http://www.emc.com/collateral/technical-documentation/h12076-vspex-pc-vsphere-vnx-pi.pdf>

- **Hardware**—broken down into chassis, servers and cards. Hardware is refreshed every five years, so hardware refresh is not a factor in these analyses. Maintenance is generally around 18 percent of license cost.
- **Network**—the network configurations for all three vendors are very similar. The number of virtual switches, Cisco Nexus 1000v, is based on the number of CPUs.
- **OS**—all three vendors use the same operating system, Windows Server 2012 Datacenter Edition. The number of instances is based on the number of servers.
- **Virtualization**—provided by VMware for all three vendors. The number of instances is based on the number of servers, not including the management servers.
- **Storage**—both VCE and EMC use EMC storage, while NetApp uses its own storage products. All three vendors use a combination of both SAS and flash drives. The total storage capabilities are equivalent for all three at 35TB.
- **Systems Management**—provided using Cisco servers (2) and a variety of management software.
- **Facility**—there are three sub-components, namely racks, data center space and power:
  - The number of racks is determined by how much equipment is used by each vendor, rounded up to the nearest full rack.
  - Data center space use is computed using the number of racks times 14.4 square feet, which is the amount of the space needed for the rack plus common access area. The cost of rentable square feet/year is based on the cost of datacenter space in New York, New York as of November 2013. Usable square feet is equal to 80 percent of rentable square feet.
  - Power is computed based on the cumulative power requirements of the equipment plus the power required to support the infrastructure. Using the Power Usage Effectiveness (PUE) measure (1.8), the infrastructure load is taken into account. The total wattage requirement is then multiplied by the national average for cost per Kwh, as per the Energy Information Administration.
- **Personnel**—annual cost of system administrators is established by salary.com. Assumption is made that a system administrator can support 25 servers.

## Configuration Comparisons

The table below shows the configurations of the competing systems upon which the analysis are based. The systems were sized relative to supporting up to 1,000 virtual machines, and are thus comparable. The configurations themselves are suitable for an enterprise deploying a shared IT infrastructure for typical uses, such as application roll-out and migration, consolidation, virtualization, private cloud and desktop virtualization.

System Components	NetApp FlexPod Datacenter with VMware	VCE Vblock 700	EMC VSPEX for Private Cloud
<b>Cisco UCS Hardware</b>	Cisco 5108 B-Series Blade Chassis; Cisco B200 M3 blades; Cisco C220M3 C-series Servers; Cisco Fabric Interconnect 6248UP;	Cisco 5108 B-Series Blade Chassis; Cisco B200 M3 blades; Cisco M81KR Virtual Interface Card converged network adapter; Cisco UCS 6248UP;	Cisco 5108 B-Series Blade Chassis; Cisco B200 M3 blades; Cisco C220M3 C-series Servers; Cisco Fabric Interconnect 6248UP;
<b>Network</b>	Cisco Nexus 5548UP; Cisco Nexus 1000v; Cisco Nexus 1110-X; Cisco Nexus 2232PP FEX	Cisco Nexus 5548UP; Cisco Nexus 1000V; Cisco MDS 9148 Multilayer Fabric Switch; Cisco UCS 2104XP or 2208XP Series (FEX);	Cisco Nexus 5548UP; Cisco Nexus 1000v; Cisco Nexus 1110-X; Cisco Nexus 2232PP FEX
<b>Operating System</b>	Windows Server 2012 Datacenter Edition	Windows Server 2012 Datacenter Edition	Windows Server 2012 Datacenter Edition
<b>Virtualization</b>	VMware vSphere ESXi 5.1.0; VMware vCenter 5.1.0; VMware vCenter Server	VMware vSphere ESXi 5.1.0; VMware vCenter 5.1.0; VMware vCenter Server	VMware vSphere ESXi 5.1.0; VMware vCenter 5.1.0; VMware vCenter Server
<b>Storage</b>	NetApp FAS 3250; Cisco Nexus 5596 cluster interconnect; NetApp DS4243 Disk Shelves; NetApp DS2246 SSD Shelves	EMC Symmetrix VMAX 10K; 300GB 15K 3.5 SAS Drives; Flash Drives 400GB	EMC VNX5800 - Drive Enclosure; 300GB 15K 3.5 SAS Drives; Flash Drives 200GB
<b>Systems Management</b>	Cisco Prime Data Center Manager 6.1(2); NetApp OnCommand System Manager 5.1; NetApp Virtual Storage Console (VSC) 4.1	Cisco UCS Manager; EMC Unisphere; VMware vCenter Server	Cisco UCS Manager; EMC Unisphere; VMware vCenter Server

**Table 1: Configurations**

## TCA Results

This TCA uses any Day One out-of-pocket costs. It does not include any costs associated with daily operations.

System Components	NetApp FlexPod Datacenter with VMware	VCE Vblock 700	EMC VSPEX for Private Cloud
Hardware	\$140,349	\$144,617	\$143,980
Network	116,425	52,556	116,377
Software	147,351	139,165	147,351
Virtualization	91,140	91,140	91,140
Storage	389,742	743,188	817,876
System Management	5,974	4,794	4,794
Facilities	4,000	4,000	8,000
<b>Total Cost of Acquisition</b>	<b>\$894,981</b>	<b>\$1,179,460</b>	<b>\$1,329,518</b>

Table 2: Total Cost of Acquisition

Total Cost of Acquisition for NetApp FlexPod Datacenter is \$284,477 lower than for VCE Vblock 700, or 24.1 percent lower. When compared to EMC’s VSPEX for Private Cloud, NetApp FlexPod Datacenter is \$434,536 lower, or 32.7 percent lower.

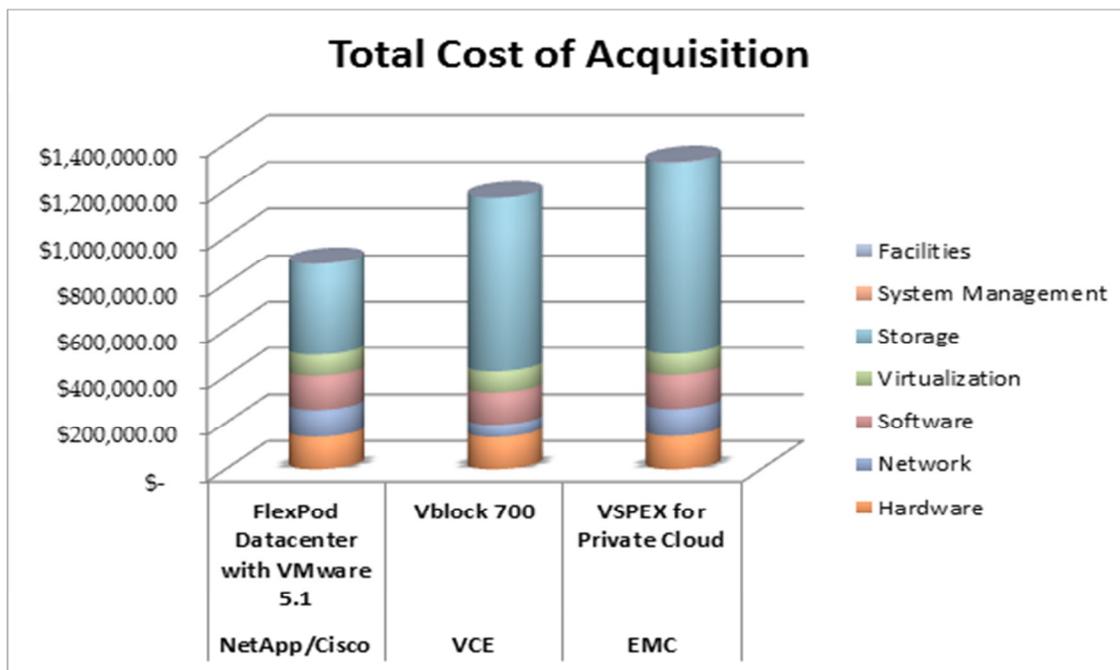


Figure 1: TCA

## Five-year TCO Results

As mentioned previously, the five-year TCO figure includes capital and operating costs.

System Components	NetApp FlexPod Datacenter with VMware	VCE Vblock 700	EMC VSPEX for Private Cloud
<b>Capital Cost</b>			
Hardware	\$118,940	\$123,288	\$122,940
Network	103,228	44,539	103,228
Software	110,790	104,635	110,790
Virtualization	67,320	67,320	67,920
Storage	330,920	629,820	693,115
System Management	5,794	4,794	4,794
Facilities	4,000	4,000	8,000
<b>Total Capital Cost</b>	<b>\$740,962</b>	<b>\$978,996</b>	<b>\$1,110,787</b>
<b>Operating Cost</b>			
Hardware	\$107,046	\$110,545	\$111,031
Network	65,985	40,085	65,743
Software	182,804	172,648	182,804
Virtualization	116,100	116,110	116,100
Storage	178,335	566,838	623,804
System Management	5,214	3,900	3,900
Facilities	134,364	124,785	253,916
Staffing	79,920	71,040	79,920
<b>Total Operating Costs</b>	<b>\$869,769</b>	<b>\$1,205,940</b>	<b>\$1,437,217</b>
<b>Total Cost of Ownership</b>	<b>\$1,610,730</b>	<b>\$2,184,936</b>	<b>\$2,548,004</b>

Table 3: Total Cost of Ownership

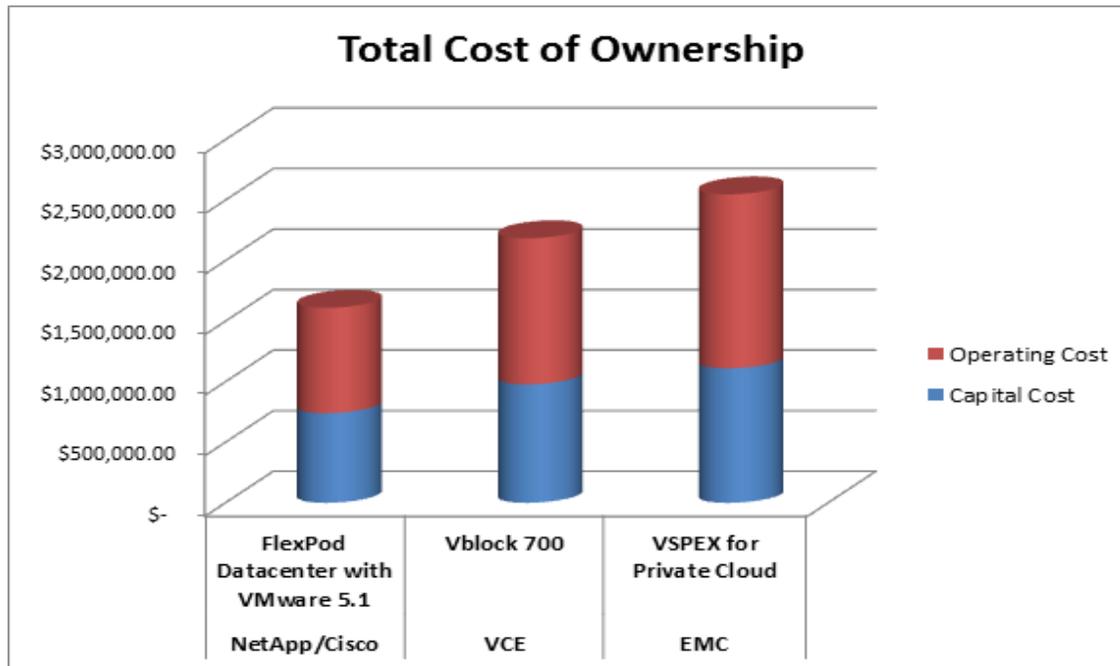


Figure 2: TCO

## Conclusions

The demand for Integrated Infrastructure Platforms is forecasted to increase significantly. This is motivated by the perceived and real reduction of complexity in delivering IT services. Although it is still a small portion of the overall datacenter infrastructure market, integrated infrastructure platforms' rapid growth makes them an important option for many organizations.

As a result, many of the major hardware, network and storage manufacturers are working together to deliver these platforms. This includes NetApp, EMC, VCE and others.

There are some fundamental benefits that make solutions based upon reference architectures more appealing than the appliance-like solutions. These include greater flexibility and scalability, wider component choices, transparent scalability and a wider range of pre-validated solution sets.

Reviewing the options presented in this paper, NetApp FlexPod Datacenter, VCE Vblock and EMC VSPEX, it is apparent that the costs associated with basic component categories, like servers, are nearly equivalent. However, the increase in storage infrastructure cost when using EMC storage devices makes both the EMC and VCE options more costly to acquire and own.

Since NetApp FlexPod Datacenter was built using the advantages of a reference architecture, it is significantly more flexible in deployment and scalability than an integrated infrastructure platform. Being less expensive in both acquisition and operation because of storage savings as well, NetApp FlexPod Datacenter with VMware becomes the clear choice.