



White Paper

Private Cloud Infrastructure

NetApp and Microsoft Fusing a Formula for Success

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NetApp and Microsoft: The Power Couple for Private Cloud

Current State of NetApp and Microsoft

By working together, [NetApp](#) and [Microsoft](#) have become a formidable power couple offering a highly competitive private cloud package based on NetApp's data management and storage features, and Microsoft's virtualization and system management capabilities. Any organization looking to expand its virtualization infrastructure with cloud capabilities would be well-served by evaluating these two companies and their products.

Microsoft significantly raised its competitive private cloud profile last year by loading up Windows Server 2012 R2 with a wealth of virtualization, networking, and storage capabilities, while providing a more feature-rich version of System Center 2012 R2 with infrastructure provisioning/monitoring, application monitoring, and self-service and IT service management. Redmond also introduced new services that enable its Azure IaaS offering to support use cases such as hosted virtual machines, modern application platforms, storage, backup, and recovery.

For its part, NetApp has focused on four key private cloud ingredients: First is the Clustered Data ONTAP operating system, which streamlines operations by non-disruptively performing storage maintenance tasks and providing open infrastructures for disparate workloads. Second is the NetApp OnCommand Plug-in for Microsoft, which integrates with Microsoft Systems Center 2012 R2, enabling users to manage their unified storage systems. Third is NetApp Snap Manager for Hyper-V, which consolidates Hyper-V environments, providing the flexibility of iSCSI, Fibre Channel, and Fibre Channel over Ethernet SAN infrastructures. Fourth is FlexPod Datacenter, a predesigned and validated architecture through the Microsoft Fast Track reference architecture program that is a complete server, storage, and networking solution, which runs a range of hypervisors and enterprise workloads. FlexPod is built on the Cisco Unified Computing System, Nexus switches, and NetApp FAS storage, and is available in numerous configurations.

The Goal of Private Cloud

In a recent ESG research study of IT professionals who have experience with server virtualization, respondents stated that the most important private cloud infrastructure capabilities are rapid elasticity—the ability to add or remove IT resources as needed—(34%), followed by universal network access with seamless connectivity to public cloud resources (20%), resource pooling (20%), on-demand self-service (15%), and measured service—usage-based tracking and billing—(10%). Given the fact that elasticity is the primary benefit of public cloud adoption on a large scale, it should come as no surprise that it is so highly ranked in this list of private cloud computing capabilities.

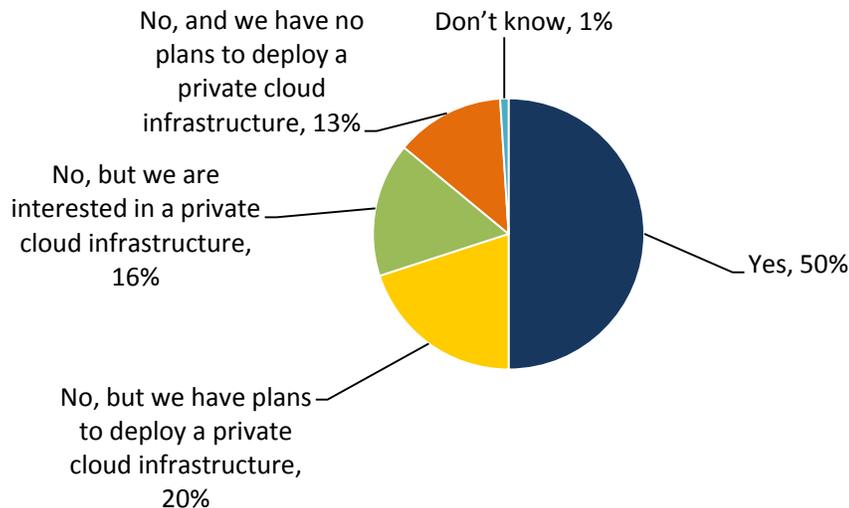
As ESG research indicates, the concept of a private cloud infrastructure is becoming increasingly popular with users (see Figure 1).¹ Fifty percent of respondents say their organizations currently have private clouds deployed, 20% say they have plans to deploy one, and 16% say they are interested in having one. That's 86% of respondents who either have a private cloud infrastructure or will in the future. Certainly, private cloud is a huge area of investment for IT organizations. With 50% of respondents indicating that they have a private cloud infrastructure in place, it's easy to see the quick transition IT is making from a virtualized data center to a private cloud infrastructure, turning on cloud features such as elasticity and on-demand self-service. Undoubtedly, some homegrown clouds have been engineered to provide certain classic cloud capabilities, even though they do not strictly adhere to prevailing cloud definitions and do not include all the attributes as defined by NIST.²

¹ Source: ESG Research Report, [Trends in Private Cloud Infrastructure](#), April 2014. All other ESG research references and charts in this white paper have been taken from this research report unless otherwise noted.

² Source: NIST, [The NIST Definition of Cloud Computing](#), October 2009.

Figure 1. Use of Private Cloud Infrastructure

Would you consider your organization to have a private cloud infrastructure? (Percent of respondents, N=303)



Source: Enterprise Strategy Group, 2014.

Choosing a Cloud Architecture and Infrastructure

The pressure is on IT organizations to keep a constant eye on the future when it comes to maintaining competitive IT environments. It doesn't take many conversations with CIOs to realize that in order to continue justifying their occupations, they need to ensure that their enterprises are constantly taking advantage of cutting-edge technologies, which come with hefty price tags. They must constantly consider questions such as: How much does it cost to implement a new ERP infrastructure? What about keeping up with mobile computing network challenges? And of course, there's security, inside and outside the firewall. Virtualization and cloud computing are underlying factors for all these technology challenges. IT professionals should focus on the following features as they continue to invest in private cloud infrastructures:

Design win for today and future-proofed for tomorrow: IT budgets being what they are, technology refreshes have to be far more thoughtful than they were during the old days of simply throwing more hardware at the problem. Whatever technology IT organizations buy today has to work for years to come in a coordinated fashion with legacy infrastructures and workloads, and future applications.

Best of breed: There are many virtualization, hardware, and management tools to choose from, and savvy buyers know they need to do their homework before committing to vendors—or as they are now called by many users, business partners—that they may be working with for years to come. They have to choose from a multiplicity of proprietary solutions, and for the more intrepid, who are more likely to try a fairly exotic approach, the technical challenges may be daunting.

Reliability, availability, and performance: When it comes to understanding and obtaining these mission-critical qualities, there's no substitute for talking with colleagues and peers at other enterprises or with analysts and consultants. Predesigned and validated packages such as the joint NetApp Cisco FlexPod with Microsoft Private Cloud offering are strongly appealing when it comes to reduced risk, reliability, availability, and performance. This solution is a Microsoft Private Cloud Fast Track validated reference architecture, which encompasses all the best practices to deploy a private cloud based on the Microsoft software stack.

Simple to maintain: From a private cloud perspective, complexity can become a serious issue when it comes to supporting a wide range of platforms from front-end applications, like CRM, to back-end applications, like financials

and ERP systems. This may be a place where internal cloud brokers can be of use by acting as intermediaries between line of business managers who require services and the IT departments who provide them.

Seamless scalability: We've gone from the days of scaling up or out to days of seamless scalability. Private cloud fabric needs to scale seamlessly to meet the dynamic needs of growing businesses and adopt to change as their business needs dictate, without disruption to their business. Connectivity to the public cloud with hybrid solutions such as private storage for public cloud also helps with extreme elasticity requirements.

Flexibility: There are many uses for private clouds. They may support multiple applications involving a range of critical workloads; satisfy a requirement for integrated options to connect with proprietary platforms; or be dialed up by software-as-a-service (SaaS) providers who need a highly secure environment for customer records. Given these varied possible scenarios, it's not difficult to understand why flexibility is such a cherished key component of private cloud environments.

NetApp and Microsoft Private Cloud—Better Together

Microsoft and NetApp have been working together for many years, and during that time, they have made significant strides in application-level integration. Expanding on those efforts, they have developed a cooperative best practices architectural design that is battle-tested and ready for prime time in private clouds. FlexPod with Microsoft Private Cloud is a validated Microsoft Private Cloud Fast Track architecture. Additionally, Microsoft is part of the FlexPod Collaborative Support Model, meaning it will work with NetApp, Cisco, and other members of the group to provide the highest levels of collaborative support in the industry.

As evidenced by the capabilities of Clustered Data ONTAP, and improved operational efficiencies, such as the ability of Windows Server 2012 R2 Hyper-V to handle the most complex workloads, the two companies have created a foundation that provides an accelerated path toward non-disruptive IT operations, while improving operational efficiencies that free up IT staff. The bottom line: NetApp and Microsoft have an agile software and infrastructure plan that can be built upon and that also aligns with today's challenging business goals.

NetApp—Cornerstone of the Private Cloud

SnapManager for Hyper-V

As part of NetApp's Data Protection portfolio, SnapManager for Hyper-V provides backups and restores, disaster recovery, and favorable storage economics, which help enable non-disruptive operations. Tightly integrated with Microsoft technology, SnapManager for Hyper-V adds value to Microsoft virtual machines by virtualizing the underlying storage environment, consolidating hardware, and creating the same value for storage that Hyper-V creates for servers. SnapManager for Hyper-V also includes a snapshot capability that protects against data loss, and provides application and hypervisor backup value.

Server Message Block (SMB) 3.0

The SMB protocol is a network file sharing protocol that allows applications and IT end-users to access files or other resources from a remote file server, allowing applications to read, create, and update files on the remote file server. This protocol makes it easier to manage storage in high-performance NAS environments, and performs equally well in both SAN and NAS systems. The SMB protocol can further communicate with any server program that is set up to receive an SMB client request. Windows Server 2012 introduced the new 3.0 version, which, among other capabilities, enables users to perform live migration by using 3.0 as a transport. It also improves scalability and manageability for scale-out file servers, enhances small I/O workload performance, and improves SMB event messages.

Migration

Migrating virtual machines can take hours or days because of the amount of data that is involved. In this environment, data must be copied from the source VMDK to a destination VHD(x). However, that time can be cut

dramatically for NetApp SAN/NAS users with a technology called NetApp Project Shift.³ This technology makes it possible for current VMware users looking to leverage Hyper-V to migrate from VMware without migrating any data. Shift converts a VMDK to VHD, helping customers who choose this path to efficiently make the transition in a seamless manner. NetApp and Microsoft have collaborated to create a downloadable tool called [MAT4Shift](#), which combines NetApp Project Shift hypervisor conversion technology with Microsoft's Migration Automation Toolkit. MAT4Shift provides comprehensive and efficient VMware to Hyper-V conversion, which minimizes downtime to acceptable levels for enterprise customers.

Storage Economics

NetApp is so confident in its virtual storage capabilities that it has made the following offer for users of its NetApp Virtualization Guarantee Program: Show NetApp how much data is stored in your virtual environment, and NetApp will guarantee you will use 50% less storage with NetApp FAS as opposed to a baseline of traditional storage. Available for Microsoft environments, the program also claims it will reduce data by at least 35% in non-NetApp storage environments using NetApp V-Series, or NetApp FAS8000 with FlexArray storage virtualization software, with deduplication. Participants must also use other NetApp features, including RAID-DP, thin provisioning, and NetApp Snapshot.

System Center Integration

NetApp builds on its System Center connectivity to tighten the integration it shares with Microsoft. Some products and attributes that support that integration include:

The NetApp OnCommand Plug-in for Microsoft (OCPM): This capability provides out-of-the-box integration with System Center Operations Manager (OpsMgr) and System Center Virtual Machine Manager (VMM). The OCPM Management Packs enable Windows admins to monitor the health, performance, and utilization of NetApp storage infrastructures. OCPM Management and Virtualization Packs can automatically discover NetApp controllers and their hosted objects.

Monitoring Alerts: System Center Operations Manager (SCOM) monitors the health and performance of all aspects of IT infrastructure, including the physical layer, the virtualization layer, the operating system, and the applications. It also offers end-to-end transaction monitoring for applications to maximize availability and improve performance against SLA commitments to the business. SCOM can detect and react to potential crises before they turn into disasters.

Automation: At a time when integrated computing platforms such as private clouds are becoming common components of successful businesses, automation-based policies are finally moving beyond their previous position as wish-list items to their current stature as implemented and highly valued elements. Automation is the lynchpin that makes it possible for users to stop worrying about the inevitable problems caused by human error, and concentrate on the prime directives of their enterprises.

Powershell Toolkit: The Data ONTAP PowerShell Toolkit is a collection of over 1,400 cmdlets that make NetApp APIs available within PowerShell scripts to automate a wide variety of NetApp-specific management and operational tasks.

FlexPod—NetApp, Cisco, and Microsoft

The Value of Converged Infrastructure

The rapidly growing popularity of converged infrastructures is a natural response to the unprecedented explosion of computing, storage, networks, and big data that has put IT in such a difficult, defensive posture. Eager to consolidate systems, increase their utilization rates, and lower costs—but fearful of cyber-attacks both internally

³ For more information, please see ESG Lab Spotlight, [NetApp Project Shift – Dynamic Data Portability](#), April 2014.

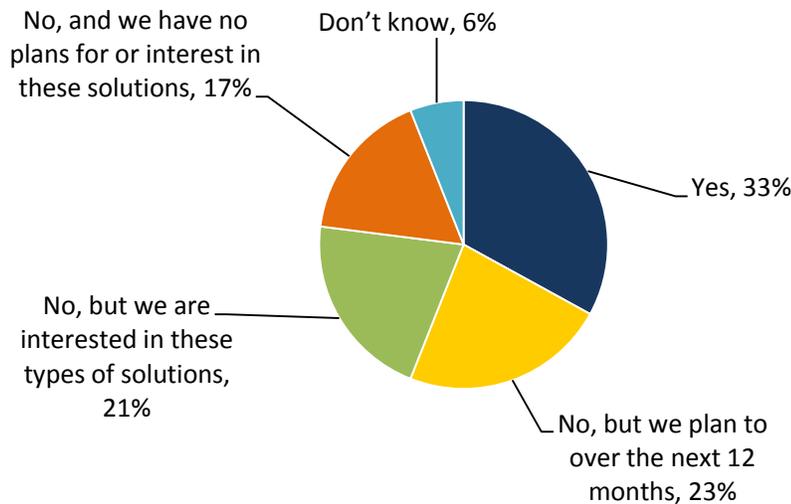
and externally—companies are centralizing the control and operation of their information assets on-premises in highly secure private clouds, which are safe havens for enterprises focused on converging their IT infrastructures.

Private clouds and other integrated computing platforms (ICPs) are revolutionizing the way IT thinks about infrastructure investments. ESG describes ICPs as virtual computing infrastructure (VCI) solutions that integrate hardware and software components into single, consumable IT systems. ICPs are revolutionary because they offer more value than independent pieces of IT infrastructure, which are normally operated separately, through policy and common functionality, to form simplified computing platforms targeted at virtualized and cloud environments. As such, they provide rapid time to market, automate IT processes, and predictably expand and contract based on demand. As organizations begin to transition to an improved IT service model fueled by the success of server virtualization, ICPs will act as the conduit to connect on-premises VCIs with off-premises cloud solutions. This hybrid cloud model delivers a flexible consumption option that enables IT to maintain development and execution control of applications as well as ensure optimum utilization of assets and resources.

In Figure 2, ESG research reveals that many companies have already embraced ICPs or have plans to do so. Asked if their organizations currently use any type of integrated computing platform, 33% said yes; 23% said they plan to over the next 12 months; 21% replied no, but indicated they are interested in these types of solutions; and 6% said they didn't know. Given the persistent and pervasive market buzz about cloud operating systems and IT transformation, it seems likely that this modest 33% of users will increase significantly over the coming two years as more companies find themselves forced to make a sharp turn toward infrastructures that simplify decisions related to ICPs and private clouds.

Figure 2. Usage of Integrated Computing Platforms

**Does your organization currently use any type of integrated computing platform?
(Percent of respondents, N=303)**



Source: Enterprise Strategy Group, 2014.

Features of the Tripartite FlexPod Package

Microsoft, NetApp, and Cisco are poised to help conflicted companies jump on board the ICP/private cloud bandwagon with the Microsoft Private Cloud Fast Track program, a pre-validated, pre-engineered, converged, turnkey solution based on NetApp and Cisco's versatile FlexPod Data Center solution, which includes design guides and installation support. This package has been designed for use with open, public APIs, and reduces infrastructure and application deployment time from days to hours. As partners in this solution, Microsoft supplies Windows Server 2012 R2 and System Center 2012 R2, while Cisco offers its Unified Computing System and Nexus switches,

while NetApp provides FAS storage and management software. FlexPod solution configurations and workloads are published as Cisco Validated Designs or as NetApp Validated Architectures.

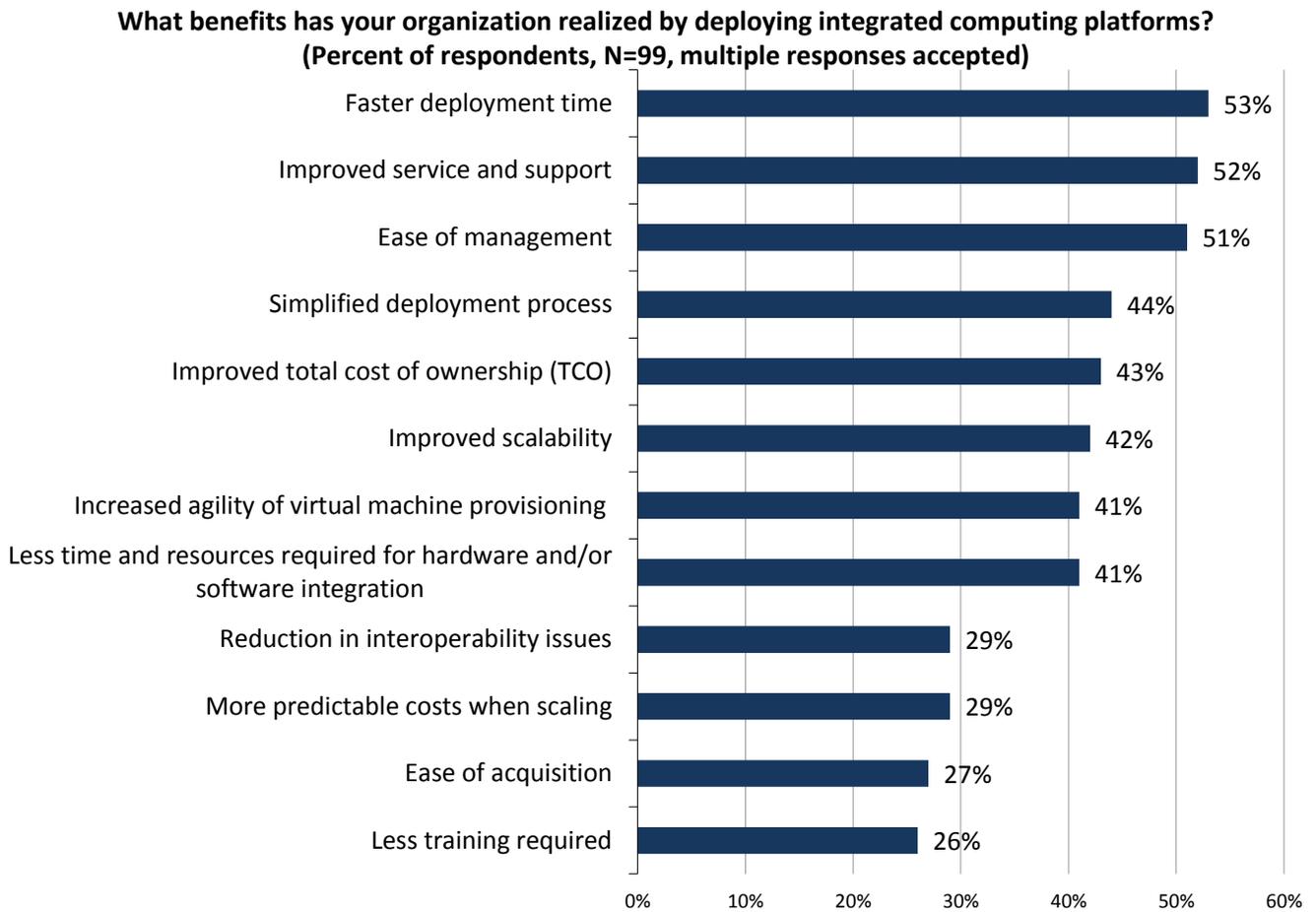
Benefits of Converged Infrastructures

Based on their replies, ESG research respondents seem to be in line with the value of the three-way FlexPod offering (see Figure 3). For example, when they were asked which benefits their organizations have realized by deploying integrated computing platforms, the top five most-cited answers were:

- Faster deployment time (53%)
- Improved service and support (52%)
- Ease of management (51%)
- Simplified deployment process (44%)
- Improved total cost of ownership (43%)

Clearly, IT organizations, which have carried heavy burdens relating to these response categories for so long, are eager to embrace converged infrastructures. For them, it is an opportunity to work more compatibly with line of business managers and continue their efforts to change the perception of IT from a cost center to a clearinghouse in order to help the business gain competitive advantage and market share.

Figure 3. Benefits Realized by Deploying Integrated Computing Platforms



Source: Enterprise Strategy Group, 2014.

The Bigger Truth

Private cloud is a multifaceted jewel of technology. Via virtualization, it adds tremendous value to existing IT infrastructures by consolidating them on one hand and right-sizing them on the other. It democratizes computing by carving it up to order for individual requests, and meting out only the data and applications required for large or small workloads that may be selected by self-service users or authorized personnel only. Automated and aware, it runs on optimized policies that relieve the management burden of people who invariably succumb to human error. It is an exemplar of integrated computing, and a largely secure shelter from the depredations of the outside world.

Rather than go it alone in this promising arena, Microsoft and NetApp have formulated a tightly integrated relationship designed to capitalize on the unification of their efforts. Their plan is simple: Combine NetApp's data management and storage features with Microsoft's virtualization and system management capabilities.

In order to succeed with that plan, the two companies are equipping their customers with private cloud tools that will help them realize economic value and streamline their IT operations.

Enterprises that are planning on investing further in their virtualization and private cloud efforts should consider Microsoft and NetApp for the following economic values they can provide:

- Being more responsive to customer needs with infrastructure and software that helps accelerate private cloud initiatives.
- Gaining a competitive edge by getting products to market faster by creating integrated solutions such as FlexPod to help simplify consumption and time to value.
- Entering and exiting markets more quickly with rapid elasticity of resources and access across consumption models.
- Gaining the freedom to focus on core competencies as opposed to spending time configuring and tweaking hardware settings.
- Achieving easy access to additional resources including IT organizational efficiencies, scalability, and better visibility into the operating environment.
- Improving resource utilization that enables IT operations to constantly seek maximum efficiency at reduced operating costs.

The Microsoft and NetApp solution also allows enterprises to formulate strategies for streamlining IT operations today and in the near future, which include:

- Consolidating servers and data centers.
- Eliminating local IT operating jobs and moving them out to remote data centers.
- Expediting workflow provisioning.
- Automating network management processes.
- Tiering IT services and operations teams.
- Improving end-to-end application performance and stability.

The type of converged infrastructure exemplified by the combined efforts of the NetApp-Cisco FlexPod package with Microsoft Private Cloud validates ICPs while breaking down the barriers to entry that have tempered the industry-wide movement toward not only private, but also hybrid and public clouds.

The time is right for users who are looking to make additional investments in their virtualization and private clouds to adopt private cloud infrastructures. NetApp and Microsoft have combined efforts to offer these users a technically advanced solution based on proven technologies that are highly functional now, and engineered to support the future requirements of rapidly evolving converged infrastructure environments.



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