

*ESG Lab Spotlight*

## NetApp Project Shift – Dynamic Data Portability

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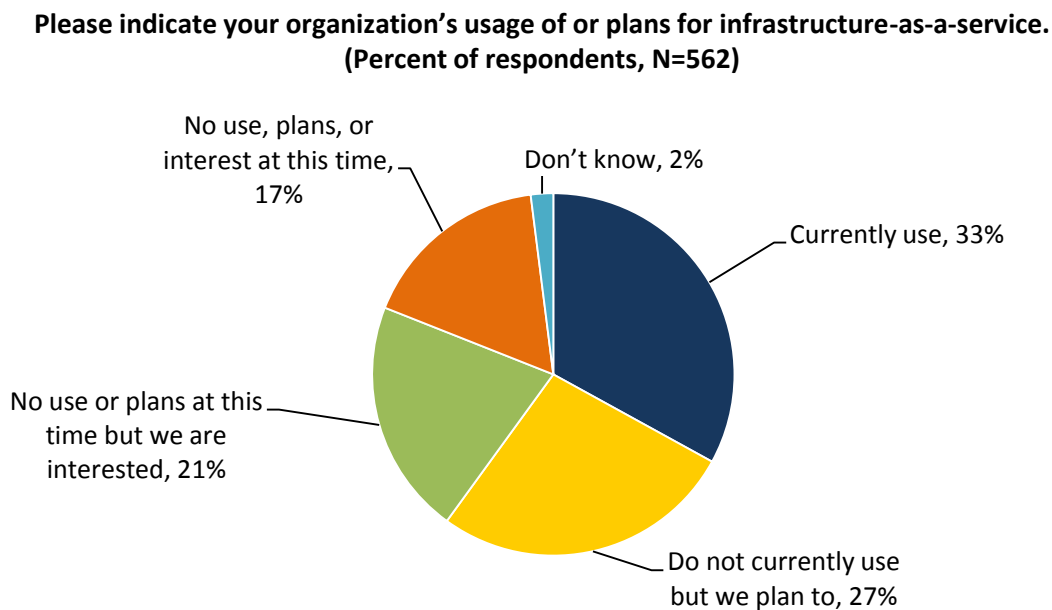
**Abstract:** This ESG Lab Spotlight explores NetApp Project Shift, a key component of NetApp's vision for connecting diverse and disparate clouds. Project Shift can help organizations change the cloud platform their virtual machines run on without migrating any data. This enables organizations to create cost-efficient heterogeneous cloud solutions without the onerous time and resource requirements of importing and exporting data.

### The Challenges

Several barriers have delayed IT's progress in migrating to cloud computing environments. One of the biggest barriers is application migration. A reason for this is the complexity associated with performing a successful migration. Application migration requires detailed knowledge of all the moving parts in an application as well as its dependencies and its behavior with regard to usage and workloads.

ESG asked organizations to characterize their existing and planned use of cloud computing services. As can be seen in Figure 1, 60% of respondents indicated that they are either currently using infrastructure-as-a-service or have plans to, with an additional 21% looking at the technology with interest.<sup>1</sup>

*Figure 1. Usage of and Plans for Infrastructure-as-a-service (IaaS)*



Source: Enterprise Strategy Group, 2014.

As IT continues to move more production applications to the cloud, the need to perform migrations quickly and efficiently while preserving application functionality is paramount.

<sup>1</sup> Source: ESG Research Report, [2014 IT Spending Intentions Survey](#), February 2014.

The goal of ESG Lab reports is to educate IT professionals about data center technology products for companies of all types and sizes. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by NetApp.

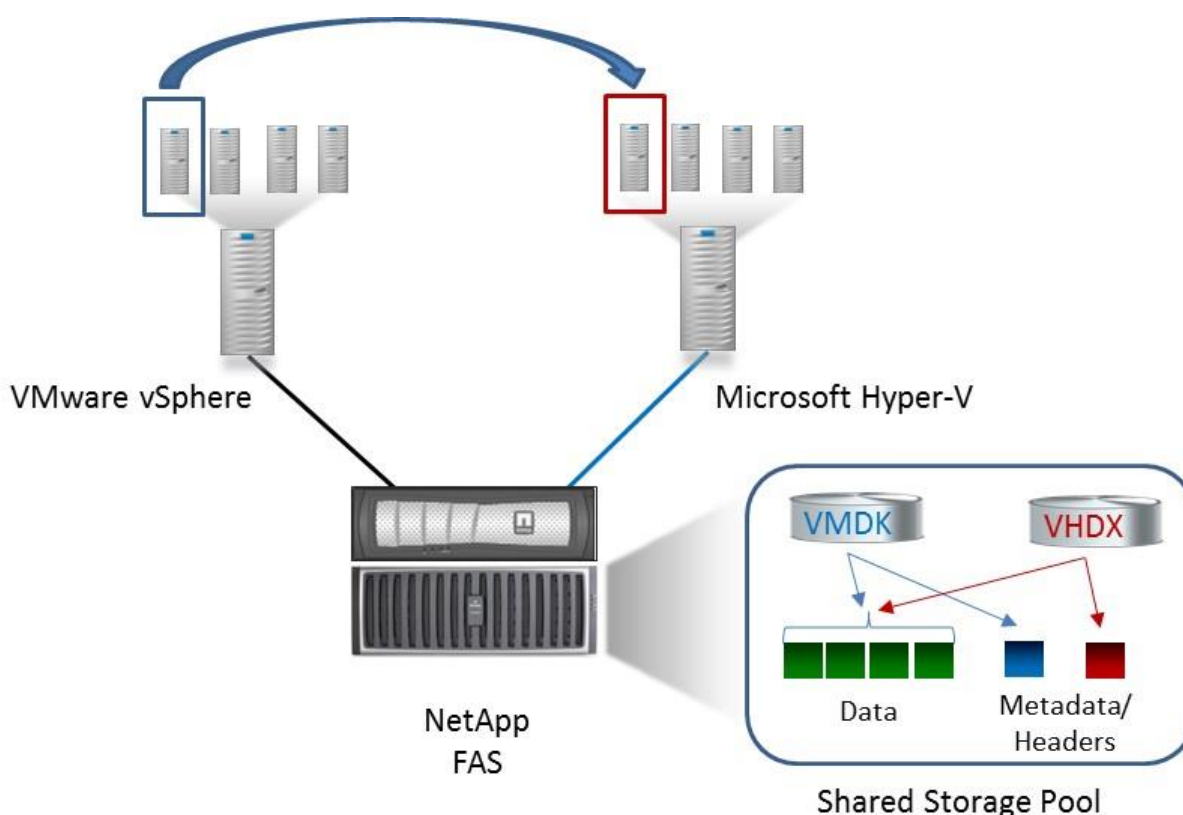
## NetApp Project Shift

Project Shift is a collaboration across various divisions at NetApp to enable customers to quickly shift a workload from any hypervisor to any other hypervisor—as well as from physical server to hypervisor or the other way around. The vision of Project Shift is to provide fast and efficient dynamic data portability between hypervisors and various cloud providers. NetApp leverages Data ONTAP, FlexClone, and a deep understanding of virtualization to accomplish this.

Microsoft has declared a commitment to providing flexibility and choice in the data center with investments in management of heterogeneous environments and support for hybrid cloud service models. Microsoft was very interested in the possibilities Project Shift could bring to their customers, offering them a way to adjust infrastructure to meet changing business needs. Microsoft collaborated with NetApp to integrate Project Shift technology into the Microsoft Automation Tool (MAT) to enable customers to rapidly convert VMware vSphere virtual machines to Microsoft Windows Server Hyper-V virtual machines to reduce the effort required for migration.

With MAT4Shift, when shifting from vSphere to Hyper-V, the flat VMware disk (VMDK) file is cloned into a virtual hard disk (VHD or VHDX), writing any headers and metadata as needed. This results in the ability to take a VMDK on an NFS data store and shift it to a VHD/VHDX in seconds. The efficiency comes from writing only the differences in the file format and not the contents of the virtual disk itself, as illustrated in Figure 2.

*Figure 2. Migrating Without Moving Data*



## MAT (Powered by Project Shift)

MAT (Powered by Project Shift) or MAT4Shift is a virtual machine conversion technology preview developed by Microsoft and NetApp that integrates with the Microsoft Automation Toolkit (MAT). MAT4Shift is designed to provide fast, complete, end-to-end conversion from VMware vSphere to Microsoft Windows Server Hyper-V. The Microsoft Automation Tool provides complete VMware to Hyper-V conversion capability on its own, but requires extended downtime for the conversion, which is not acceptable to many organizations, especially when production applications are being migrated.

MAT4Shift collects and stores all virtual machine information, takes backups before any work is done, removes VMware tools, converts VMs quickly, and recreates NIC configurations and Virtual LANs (VLANs). MAT4Shift is a free download, but is only useful to customers with access to NetApp storage because it uses NetApp Data ONTAP FlexClone technology to make the backups and clones. Customers can even arrange for a loan of a NetApp system to try this technology. As of this writing, MAT4Shift supports W2k3, W2k3R2, W2k8, W2k8R2, W2012 and W2012R2 virtual machines only and requires the VM to be running Windows PowerShell v2 and the current version of VMware tools.

## ESG Lab Tested

ESG Lab participated in a hands-on demonstration hosted by NetApp of MAT4shift technology and walked through the conversion of two Windows Server 2008 R2 virtual machines, one with a 30GB VMDK and the other with a 1TB data drive. Both machines were converted from vSphere to Hyper-V using MAT4Shift. Using just MAT, converting a 1TB volume from VMDK to VHD or VHDX would take several hours at a minimum because the entire volume would need to be converted. Because the MAT4Shift tool uses NetApp FlexClone technology to eliminate bulk copy of data, the cloning of the volume completed in seconds, and the complete VM conversion completed in less than five minutes, including removal of VMware tools and network reconfiguration. In addition, MAT4Shift can automate conversion of multiple machines with a simple text input file.

## The Bigger Truth

Cloud computing is clearly on the rise. In recent ESG research, 72% of respondents indicated that they planned to increase spending on cloud computing this year.<sup>2</sup> As enterprises move more applications to the cloud, it's essential to be able to perform multiple migrations simultaneously and online, quickly and efficiently. Traditional conversions have tradeoffs that organizations must consider. Warm conversions can copy the data while the virtual machine is running and typically take longer than a cold conversion, where the data copy happens while the VM is turned off. Enterprises, hosting providers, or anyone running a virtualized production application frequently have small maintenance windows and the time it takes to copy the VM from the VMware datastore over to the target for a cold conversion violates their SLAs for downtime.

MAT enables users to convert multiple machines at the same time, but it doesn't alter the speed of the underlying conversion engine. Like most conversion technologies, MAT is fighting physics. The virtual machine needs to be copied from wherever the VMware datastore resides onto a platform that can convert it, at which point it can be written to the Hyper-V destination, two full moves of the entire VM. The time required for a conversion is determined by the speed of the customer's networks.

NetApp solves the speed problem by eliminating the need to copy the data entirely. MAT4Shift uses NetApp FlexClone technology to create a virtual copy of the VMDK that consists of pointers to existing data blocks. MAT4Shift simply clones the data from the VMDK into a VHD or VHDX, writing the appropriate metadata as it goes. The resulting file is a VHD or VHDX file that takes up practically no extra space on disk. By integrating some of the conversion technology of Project Shift into the MAT and extending MAT to include the ability to migrate the network settings, a fast, non-disruptive, robust migration tool was created. For new NetApp customers, NetApp has included wizards to easily configure a new Storage Virtual Machine on the NetApp cluster to facilitate the migration.

Any organization interested in migrating virtual machines from VMware to Hyper-V or extending that migration to Microsoft Azure would be well-served to take a closer look at MAT4Shift technology today. MAT4Shift is a promising first step toward any-to-any virtual machine/cloud mobility.

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<sup>2</sup> Source: Ibid.