

Accelerating VMware with Tegile Intelligent Flash Arrays



As you move more workloads to a virtualized environment, chances are your legacy storage system is struggling to keep up. Each one of your virtual machines (VMs) is sending I/O streams to the hypervisor for processing. As you deploy more VMs, this creates highly random I/O—also known as the “I/O Blender” effect—which can lead to high latency and unpredictable performance.

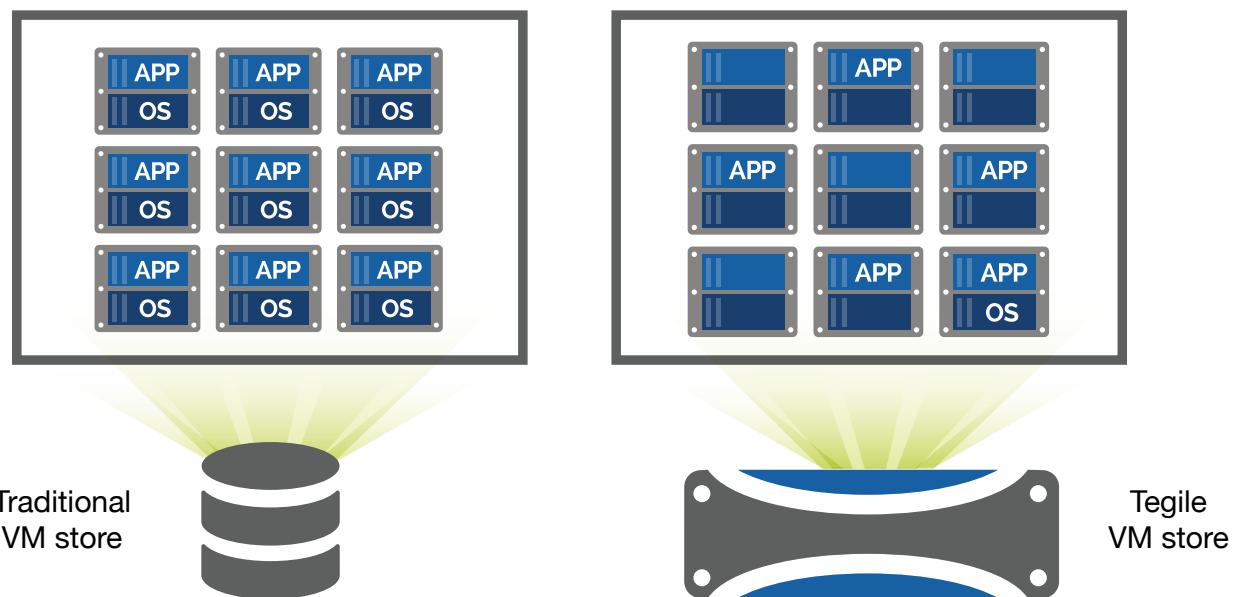
Highlights

- Neutralize “I/O Blender” effect and deliver consistently high performance
- Simplify administration with vCenter integration and VM-aware storage
- Consolidate storage by hosting VMs and data on the same array
- Have the flexibility to deploy VMs on NFS or VMFS datastores
- Ensure VMs and data are protected with VM-consistent snapshots

Tegile Intelligent Flash Arrays effectively manage random I/O streams to deliver consistently high performance at one-third the cost per gigabyte of traditional storage arrays. Each array includes a comprehensive set of data management capabilities and can seamlessly support different storage media (high-performance flash, dense flash, and hard disks) under a single storage operating system. Dial up or down the amount of flash storage to meet your performance needs. Get the lightning-fast performance of flash with the economics of disk.

Deliver Consistently High Performance

Tegile arrays are available in both all flash and hybrid configurations. Go with all flash for virtualization workloads that require sustained low latency and very high IOPS. For a balance of performance and economics, choose a hybrid array. Add capacity with additional storage when needed.



Accelerating VMware with Tegile Intelligent Flash Arrays

All Tegile arrays are powered by IntelliFlash™—regardless of their configuration. This proprietary software architecture employs several techniques to intelligently manage different storage media and neutralize the "I/O Blender" effect.

IntelliFlash uses the arrays' high-speed storage layers (DRAM and flash) as a high-performance cache. Data is organized and coalesced prior to landing on the capacity storage layer, turning random I/Os into sequential I/Os. Inline deduplication then acts as a performance multiplier, freeing up space in the cache for even faster reads and writes.

Tegile arrays also automatically separate metadata from data. The metadata is then organized, aggregated, and stored on the high-performance storage. This stands in stark contrast to traditional storage solutions, which interleave application data with metadata in one storage pool.

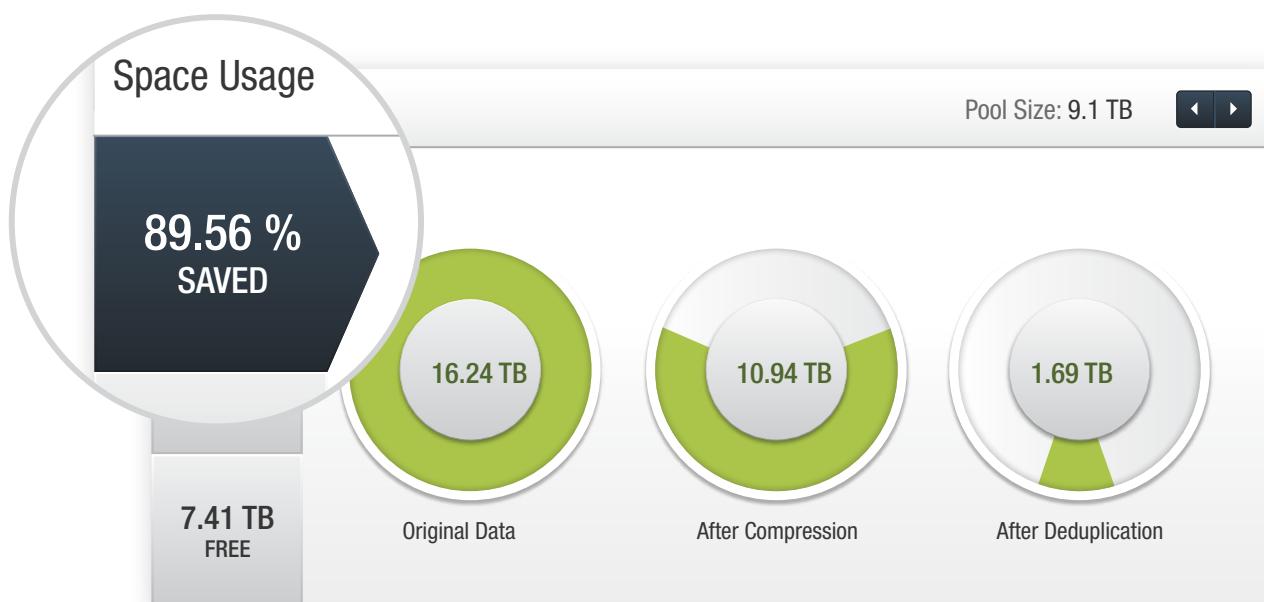
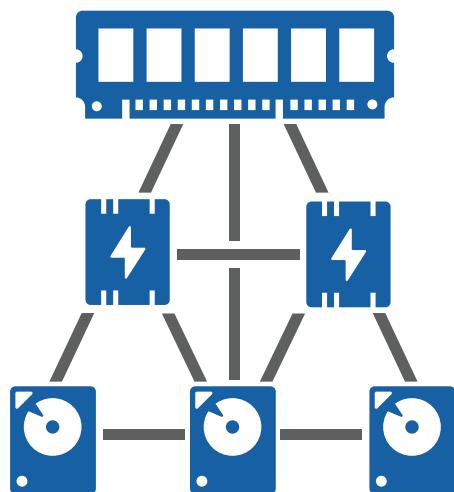
Moreover, Tegile arrays take advantage of vStorage APIs for Array Integration (VAAI), which minimize I/O on the hypervisor and storage network by offloading storage operations like cloning and snapshots to the array. This means operations complete much faster and with reduced CPU overhead on the host.

Drive Down Storage Costs

Tegile arrays are engineered for storage efficiency, allowing you to dramatically cut down your storage acquisition and operational costs.

Allow your VMs to run with just the storage they need. Thin-provisioned LUNs automatically allocate physical storage as data is being written. Any space that's been allocated but hasn't been consumed remains available for other VMs and applications.

Tegile arrays also use inline compression and deduplication, which can shrink the storage footprint up to 90% in VMware environments. Data blocks are compressed and redundant blocks are removed before they are written to disk. In a virtual environment, redundant OS images can be reduced to a single instance and stored in flash.



Consolidate Workloads on a Single Array

Get an even greater return on your investment by consolidating workloads. Tegile arrays support both block-level (iSCSI and Fibre Channel) and file-level (CIFS and NFS) protocols, enabling you to deploy VMs, virtual desktops, databases, and user data on a single array.



Choose between NFS and VMFS Datastores

There are two main approaches to deploying a VMware-based datastore in a virtual environment: file-based NFS and block-based VMFS (virtual machine file system). Each has its merits. With Tegile arrays, you have the flexibility to deploy VMs using both VMFS (iSCSI and FC) and NFS datastores—whichever meets your needs and preferences.

Virtualization-Aware Storage for Easy Administration

Legacy storage systems leave you “flying blind” when it comes to understanding the storage resources used by your virtual infrastructure. Tegile arrays are virtualization-aware, giving you greater visibility into what storage resources are used by each VM. Quickly and easily correlate VM and storage performance characteristics. For example, you can see which VMs are demanding the most IOPS. You can also track deduplication and compression rates on a per-VM basis. Armed with these insights, you can quickly identify and resolve any performance-related issues that may arise, accurately forecast long-term capacity requirements, and ensure the long-term health of your virtual environment.

What's more, with Tegile's vCenter plug-in you can provision datastores, manage snapshots and restores, and monitor I/O status, space usage and latency for all of your Tegile arrays from within the vCenter console. You can also script and automate data protection tasks via Tegile's programmable RESTful APIs.

VMWare NFS Datastores									
		Total VMs	Total Mbps	Total Ops	Avg Latency(ms)				
		149	R:565.64 W:140.18	R:4608.4 W:1949.4	R:0.04 W:1.66				
ESX	VM Name		R Mbps	W Mbps	R Ops	W Ops	R Latency(ms)	W Latency(ms)	
10.64.16.186	VP-1		5.16	4.37	51	41	0.09	1.03	
10.64.16.185	VP-10		0	0.15	0	3	0	1.08	
10.64.16.186	VP-11		7.93	1.54	121.6	22	0.04	1.02	
10.64.16.185	VP-12		9.77	4.4	115.6	36.2	0.04	3.21	
10.64.16.186	VP-13		3.48	0.2	92.4	6	0.06	1.11	
10.64.16.186	VP-14		9.93	3.82	94	48.6	0.02	5.91	
10.64.16.186	VP-15		7.28	0	81.8	2.8	0.03	1.32	
10.64.16.185	VP-16		8.04	0.67	153.8	17	0.03	1.88	
10.64.16.185	VP-17		8.06	2.36	104.6	25	0.03	1.32	
10.64.16.185	VP-18		2.36	0.22	64.6	4.6	0.03	1.4	
10.64.16.186	VP-19		0.06	0	1	2.8	0.02	1.68	
10.64.16.185	VP-2		3.45	0.3	92	6.2	0.02	1.71	
10.64.16.186	VP-20		5.11	6.82	40.2	112.2	0.06	1.5	
10.64.16.185	VP-21		10.67	2.15	115.6	35.2	0.03	1.48	
10.64.16.186	VP-22		5.14	7.19	47.8	129	0.03	1.73	
10.64.16.186	VP-23		5.9	0.51	127.6	16.6	0.05	1.43	
10.64.16.186	VP-24		1.92	1.79	32.2	30	0.05	1.7	
10.64.16.185	VP-25		7.91	6.42	76.4	123	0.05	1.8	

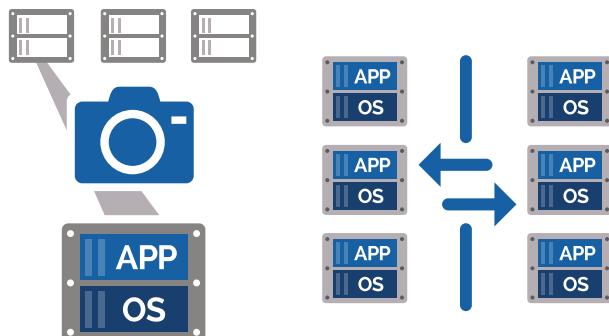
R: Read W: Write ms: Millisecond

Ensure the Availability and Protection of End User Data

End users expect their applications and data to be available 24x7. When deploying VMware on Tegile arrays, you'll benefit from the resilience, end-to-end data integrity, and high-availability features provided by the IntelliFlash architecture.

All Tegile arrays include space-efficient snapshots and remote replication capabilities. Integration with VMware and VSS enables VM-consistent snapshots for VM images and application-consistent snapshots for application data. Instantaneous thin snapshots create space-efficient, point-in-time copies of data that can be replicated and instantaneously restored.

Additionally, Tegile arrays are fully redundant with no single point of failure. All media (SSDs and HDDs) in Tegile arrays are dual-ported and accessible through a pair of highly available, redundant controllers. The controllers are configured in an active/active manner and can be used simultaneously for data access.



Getting Started

Tegile is a VMware Technology Alliance Partner (TAP). Our solutions are optimized for server and desktop virtualization and help customers efficiently scale their infrastructure without the cost and complexity of traditional storage. Our integration with VMware provides superior value to customers using VMware® vSphere™ for server virtualization and VMware View™ for desktop virtualization.

