



- **Provision high performance, thin provisioned storage up to 75% faster**
- **Increase the VM density your storage can support by at least 2x**
- **Use SSD much more efficiently for performance improvements**
- **Support high performance VSS/DPM backups in failover clusters**
- **Enable easy “self-service” with granular storage management at the VHD level**

*“Virsto helped us unlock the true value of Hyper-V, and we’ve put that to work to meet our business needs.*

*Eddie Diaz*

*Senior Systems Administrator*

*MAKO Surgical Corporation*



Microsoft Hyper-V R2 has significantly improved the utilization of server resources to provide much more cost-effective, flexible IT infrastructure. But storage is still being used very inefficiently in these environments, driving up the cost of storage necessary to meet performance requirements. What is needed is a “storage hypervisor” that will bring to storage the same kinds of benefits that server hypervisor technology brought to servers.

#### STORAGE ISSUES IN VIRTUAL SERVER ENVIRONMENTS

Hyper-V makes it very easy to spin up new virtual machines (VMs) as they are needed, and this has led to “VM sprawl”. All of these VMs must be provisioned with storage that meets performance requirements, and that can take a long time when high performance fixed disks are required. Fixed disks can also waste storage capacity, but may be required if dynamic or differencing disk cannot meet performance requirements. In environments where VMs are being spun up and down often, these issues can become a serious drag on administrative productivity and capacity consumption.

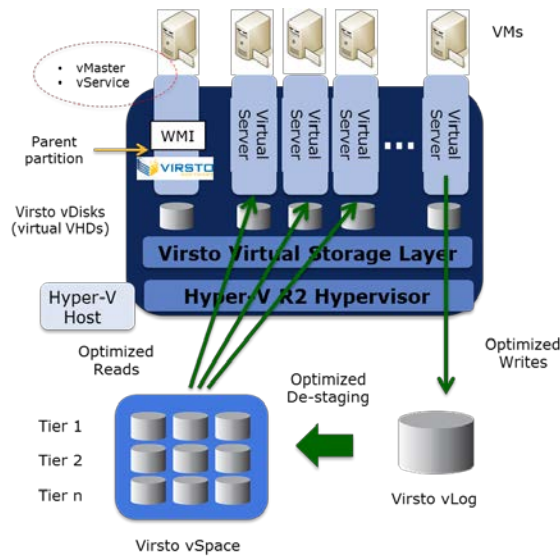
Virtual computing also generates much more random I/O patterns than physical server environments, slowing down spinning disks. As enterprises add more spindles or even SSD to build back up to required performance levels, storage costs increase.

Finally, if block-based storage is being used, storage operations like snapshots, live migration, failover, and replication occur very inefficiently at the storage LUN level. And when LUN management is required, storage administrators generally need to become involved during provisioning and de-provisioning tasks, precluding the kind of self-service storage that would maximize productivity.

#### VIRSTO: THE STORAGE HYPervisor

Virsto is a software-based storage hypervisor that installs in the parent partition of each Hyper-V Host, bringing the same types of efficiencies to storage that server hypervisor technology brought to servers in the areas of provisioning, performance, capacity consumption and management.

Designed to work with any heterogeneous, block-based storage, Virsto can almost instantly provision storage that performs better than fixed disks but is also thin provisioned. This combination of higher performance and very efficient storage capacity consumption has been proven in joint testing with Microsoft at the Enterprise Engineering Center in Redmond to at least double the VM density that any given storage configuration can support, with the attendant savings in hardware, energy, and floor space costs. Virsto achieves all this with your existing storage.



Virsto works transparently in Hyper-V environments while providing significant provisioning, performance and management advantages.

Virsto implements storage tiering that allows enterprises to create blended storage configurations to optimize for performance, cost, or both. A unique “spillover tier” provides an additional safety net for out-of-space conditions that might otherwise shut VMs down unexpectedly.

When installed, Virsto creates a virtual storage layer that presents Virsto vDisks, storage objects that look exactly like a Microsoft fixed virtual hard disk (VHD). Managed through a Microsoft Management Console (MMC) snap-in, Virsto for Virtual Servers preserves Microsoft’s familiar management semantics and can be used with all the major Microsoft Hyper-V products and tools, including Windows Server 2008 R2, MPIO, Windows VSS, Windows Server Failover Clusters, PowerShell, WMI and other relevant System Center technology including SCOM, SCCM, SCVMM, and DPM. In use, Virsto is completely transparent to Hyper-V and any applications and supports any guest operating systems and devices supported by Hyper-V R2.

### VIRSTO ARCHITECTURE

Virsto places a vMaster service on a master node and a vService service on all nodes. vMaster maintains the Virsto configuration database, but otherwise is not directly involved in runtime operations. vService manages all the I/O on each host. Both services can be made highly available using failover clusters. These services communicate with each other across all nodes through both the IP and storage networks.

As I/O’s flow through the system, they first hit the Virsto vLog, where a write acknowledgement is generated back to the VMs. Those writes are then asynchronously de-staged to the Virsto

vSpace, which the VMs view as primary storage. This design effectively splits the reads and writes into separate workloads that are handled by separate spindles, improving the performance of both. Much of Virsto’s intellectual property resides in the data mapping algorithms used to optimize and track I/O. The log effectively sequentializes the writes coming from the host, allowing whatever storage (SSD or spinning disk) used in the log to operate in its sequential write performance mode almost 100% of the time.

This virtual storage architecture leverages a time-proven design that has been in use for decades in enterprise-class database products to improve the performance of storage.

But this approach has other interesting implications. First, from the VM’s point of view, all write I/O to the storage subsystem appears to perform at the speed of the log. The logs are very small - a dedicated 10GB per host – so you can very cost-effectively turbo charge the performance of the entire system. Second, it allows other interesting operations, like thin provisioning and snapshot creation/usage, to occur without any performance degradation. Thousands of writable snapshots, can be created literally in seconds, all of which are thin provisioned but provide better performance than fixed disks. Third, this combination of improved performance and more efficient storage capacity utilization increase the VM density any given storage configuration can support by at least 2x. Fourth, all Virsto vDisks are cluster-aware and fully support live migration, failover, and workload balancing. vDisks provide a great option to store user data in failover clusters, supporting very high runtime performance as well as VSS/DPM backups.

Finally, despite the fact that it’s running on block-based storage, Virsto’s ability to present VHDs directly provides a much easier management model. Storage operations like snapshots, live migrations, failovers, and replication can be done at the individual VM level (or in selected groups) regardless of what the underlying storage configuration looks like. This enables safe, reliable storage provisioning and de-provisioning, all managed transparently by Virsto, that improves productivity for end users, Hyper-V and storage administrators (who no longer need to be involved as VMs are spun up or down).

### INCREASING THE UTILIZATION OF EXISTING STORAGE

Virsto virtualizes storage resources to increase utilization, allowing enterprises to get the maximum in provisioning speed, performance, capacity, and management from their existing storage. These efficiency improvements benefit both SSD and spinning disk, allowing storage of whatever type to be used most efficiently to lower overall virtual infrastructure costs.

If you’d like to get more out of your Hyper-V environment, let’s talk.

