



COMPANY

Founded in 2004, MAKO Surgical Corporation is a medical device company that focuses on restoration instead of restructuring of joints to address early to mid-stage osteoarthritic knee disease. Located in Fort Lauderdale, Florida, MAKO manufactures and markets its advanced robotic solution and implants for minimally invasive orthopedic knee procedures. With an intellectual property portfolio of more than 200 licensed or owned patent applications, MAKO is leveraging innovation to improve their patients' quality of life, and is growing very rapidly. Maintaining an agile information technology (IT) infrastructure is critical to accommodating this growth as MAKO grows both organically and through acquisitions.

INDUSTRY Healthcare



CHALLENGES

- Rapidly provisioning new virtual machines (VMs) to accommodate evolving business requirements
- Leveraging thin provisioning to save on storage capacity while still meeting performance requirements

SOLUTION

Microsoft Windows Server 2008 Hyper-V R2 and Virsto

RESULT

Enhanced native Hyper-V capabilities to speed new VM deployments and leverage thin provisioning while still meeting performance requirements

CHALLENGES

MAKO Surgical considered server virtualization to provide them with the flexibility to meet their high forecasted growth rates. With two acquisitions already completed within the last year, they expected to double in size over the next 12 to 18 months, and it was clear that their physical server infrastructure would limit their ability to accommodate this growth. High availability (HA) was another concern, as MAKO was located in the hurricane corridor. With a primary data center in Fort Lauderdale, and a secondary data center in Durall (outside of Miami), Senior Systems Administrator Eddie Diaz wanted to deploy both local clustering and replication technologies on a strong storage foundation to ensure business continuity throughout the year.

As primarily a Windows shop, MAKO looked to Microsoft to help them transform their IT infrastructure. Initial testing showed that Hyper-V R2 provided the flexibility they needed, but presented challenges in the areas of provisioning and storage capacity consumption. New VM provisioning times were longer than Diaz liked with Hyper-V's native snapshot technologies, and he also wanted to leverage thin provisioning to help manage storage capacity consumption without incurring any performance degradation.

"We create new VMs multiple times per day to meet a variety of needs in both production and test," said Diaz. "We're a small shop, so getting the most out of the administrative and storage resources we have is a critical concern. Spinning up new VMs just took too long with Hyper-V's native tools, and we found in test that using dynamic disks, while they saved on space, imposed unacceptable performance impacts."

"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*



“Our long term plan was to migrate all of our infrastructure, including critical applications, to the virtual environment,” explained Diaz. “We needed enterprise-class snapshot/clone and thin provisioning technology that delivered on our performance requirements yet would run on top of our existing SATA-based SAN array.”

SOLUTION

Provisioning performance was what initially drove Diaz to start looking for options that would address his needs with his Hyper-V environment. An online search turned up Virsto Software. What initially piqued Diaz’ interest in Virsto was the promise of rapid provisioning times that leveraged a software-based enterprise-class snapshot technology that ran against heterogeneous storage. After downloading and running a trial version in his SAN test environment, Diaz discovered that his provisioning times were cut by more than 80%. He was also pleasantly surprised by Virsto’s thin provisioning performance, which indicated that he could save more than 85% of the capacity he had been consuming using native Hyper-V fixed disks, and in particular by the improvements to his I/O performance. “Prior to installing Virsto, we were generally getting between 6 and 20 MB/sec out of our hosts, but afterwards I was getting an almost unbelievable 200 – 280 MB/sec - on top of Virsto’s thin provisioned vDisks. Amazing.”

Virsto’s solution deploys at the hypervisor-level with a single software install on each Hyper-V Host, regardless of the number of VMs supported. Virsto establishes a virtual storage layer that can boost VM I/O performance, reduce storage capacity consumption, cut provisioning times, and simplify VM management. Virsto’s optimized snapshot technology enables instant creation of an unlimited number of clones without taking up any

additional space. Virsto’s innovative architecture offers performance, storage capacity utilization, and management advantages for either virtual server or virtual desktop environments, helping customers to get the most out of their Hyper-V deployments.

“We had done the trial testing in a SAN test bed that very closely reflected what our production environment looked like, so we knew exactly what we would be getting,” added Diaz. “It was clear that Virsto and Hyper-V together gave us what we needed to be responsive to the needs of the business.”

RESULT

The bottom line for MAKO Surgical was simple: using Virsto, MAKO got the enterprise-class storage management functionality they needed to meet business requirements without having to invest in an enterprise-class array. “We were so confident in what Virsto offered that the first production application we moved to the new environment was one of our most critical ones – the telephony system,” added Diaz. “We had a very smooth and reliable changeover, and are now planning how we will bring our SharePoint, SQL Server, and other key Windows and Linux applications into the virtual world. Virsto is definitely part of the standard operating environment we have defined for our virtual servers.”

“Virsto unlocked the true value in Hyper-V, and we’ve put that to work to meet the needs of a rapidly evolving business,” concluded Diaz. “It was a win-win on all counts: we used storage we already owned, we increased performance by over 10x, we can spin up new VMs in minutes, and we’re getting the most out of our existing resources.”

