

U.S. Air Force 45th Space Wing Replicates Physical Servers to Virtual Servers in Order to Minimize Downtime



CUSTOMER PROFILE

Organization:

U.S. Air Force 45th Space Wing

Industry:

Military

Employees:

10,606

Business Impact Summary

BUSINESS:

The 45th Space Wing (45th SW) manages launch and tracking operations for unmanned space vehicles being launched from Cape Canaveral Air Force Station. Customers include the Department of Defense, NASA, and other commercial and governmental entities.

CHALLENGE:

To virtualize existing servers without experiencing service outages that would violate service level agreements (SLAs). Cut costs and eliminate vendor and hardware dependencies.

SOLUTION:

Use CA XOssoft™ Replication to replicate physical servers to virtual servers in order to help minimize downtime. CA ARCserve® Backup to back up both physical and virtual machines.

RESULT:

Entire migration completed in three months. Hard cost savings of \$140,000* per year. Plus, reduced support costs.

Business

LAUNCHING AND TRACKING UNMANNED SPACE VEHICLES

Operating under the motto “Control of the battlefield begins here” The United States Air Force's 45th Space Wing (45 SW) main duty is to manage launch operations for Department of Defense space programs. It also provides spacecraft processing, launch and tracking facilities to commercial entities, as well as to NASA, the National Security Agency and foreign governments. Headquartered at Patrick Air Force Base (AFB) on the eastern Florida coast, it manages all unmanned rocket launches from Cape Canaveral Air Force Station, and operates satellite tracking facilities in Newfoundland, Antigua and Ascension Island.

The 45th Space Wing employs more than 10,000 personnel and boasts a record of more than 3350 successful launches over the past 60 years.

Challenge

SEAMLESSLY MIGRATING FROM A PHYSICAL TO VIRTUAL ENVIRONMENT

The 45 SW operates out of two main locations – Patrick Air Force Base and Cape Canaveral Air Force Station – located 24 miles apart. It utilizes a storage area network (SAN) in a virtual environment that spans both bases. The two sites act as warm sites for backup and disaster recovery for each other. But keeping up with the typical hardware refreshes every two to three years, the constant need for updates and patches, and the annual doubling of storage capacity needs proved costly. A few years ago, therefore, the 45 SW began consolidating its storage.

“Putting in a SAN was a game-changing technology,” says Glenn Exline, Manager of Enterprise Networks for Computer Sciences Raytheon (CSR), the Eastern Range Technical Services contractor for the 45 SW. “Then we looked at how we were using servers, and found that they were mostly idle – 10% or less CPU utilization and less than 60% RAM utilization, even under peak loads.”

Low level of utilization run into hundreds of thousands of dollars annually in hard costs, not counting the time spent maintaining underutilized gear. Straight server consolidation alone would not solve the problem. “We looked at loading multiple applications onto a single server, but many applications did not play well together,” says Exline. “There were DLL conflicts, application conflicts and the like.”

Exline continues to explain, “One way around these conflicts was to virtualize the servers, but this also proved problematic for us. We looked at using VMware's VM Converter to convert the physical boxes to virtual, but found in testing that it did not do a good job of converting Windows 2000 servers to VMs – the import would sometimes get to 97% complete and then die. Some conversion tests required shutting down the server for as much as eight hours, which meant that IT staff had to work overnight to minimize user impact.”

Another option was to stand up new virtual machines and replicate the data using hardware specific SAN replication, but this was expensive and was not supported on the existing storage hardware.

“Using Norton Ghost to image the physical servers onto the virtual failed because 1TB of user data needed to be imaged,” says Exline. “However, backing up the physical machine and restoring it as a virtual one had the same data size issue. Those issues could be addressed by creating new virtual machines and pointing them at the old storage. But since the storage hardware approached the end of its life, that didn't fully solve the problem either.”

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Solution

USING IP TO MIGRATE FROM PHYSICAL TO VIRTUAL

Although the usual methods of converting from physical to virtual servers didn't function adequately in this environment, Exline found a simple solution by using IPbased replication, which is low cost, easy to implement, and did not require changing existing storage.

He downloaded evaluation versions of three prospective products, spoke with long-term customers and read the reviews. As well as being cheaper than the other software options, CA XOssoft turned out to be far less expensive than hardware-based replication.

“By using CA XOssoft, we can replicate from old to new regardless of vendor, class of system or type of processor,” says Exline. “We can achieve freedom from outdated storage technology.”

The strategy called for the replacement of 60 physical servers with 40 virtual machines on four physical servers running VMware ESX server. The first step entailed setting up the virtual environment and making a standard server template with the latest operating system version and patches. Then Exline created a virtual server with the same name as the physical server, but with a “V” added to the name. He loaded CA XOssoft Replication onto both the physical and the virtual server – the virtual server replicated all data and shares from the old server. In some instances, more than one physical server could be replicated and migrated to a single virtual server. After giving the servers 18 hours to fully synchronize, ten minutes of down time was scheduled in the evening to break the replication, shut down the old server and rename and reboot the new virtual servers.

“Shutting down the old physical server and changing the name to the new virtual server takes five to ten minutes, so impact on the staff was nil” says Exline. “We migrated from physical to virtual in a three month period with no data loss, little user impact and a significantly lower drain on the staff.”

Once the servers were migrated, they are continually backed up using CA Recovery Management technologies, including CA ARCserve Backup to back up both physical and virtual machines and CA XOssoft Replication to replicate physical servers to virtual servers in order to minimize downtime.

Results

HIGH AVAILABILITY COMPUTING AT LOWER COST AND SIMPLIFIED BACKUP OF PHYSICAL AND VIRTUAL MACHINES WITH CA ARCSERVE BACKUP

The 45 SW now has duplicate server environments at both Cape Canaveral and Patrick AFB. The virtual servers at each location connect via Brocade switches to the SAN. The SANs replicate to each other and the servers replicate between sites via an IP cloud. Users access the servers and storage through this same cloud. CA ARCserve Backup talks directly with the VMware Consolidated Backup (VCB) to back up the physical and virtual servers at both locations.

“We didn't have to retrain personnel for backup since CA ARCserve works with both physical and virtual backup,” says Exline. “ARCserve lets us backup physical and virtual servers in much the same way, with the same tape libraries and interfaces. Rather than one set of backup processes and hardware for physical and another for virtual, there is a seamless integration with the VCB backups.”

He says that having the virtual environment makes it much easier to deploy new servers. He has standard templates for different sizes of virtual servers. When a new one is needed, it can

be set up in hours rather than weeks, especially since no hardware needs to be purchased. While it may be hard to put a price on the time save, Exline estimates that the 45 SW is saving \$180,000 annually in hard costs. This includes \$30,000 to power and cool 60 physical servers, \$28,000 for maintenance and \$104,000 in hardware refresh costs. The new setup only costs about \$34,000 per year for power, maintenance and refresh. In addition, the organization doesn't have to buy new hardware to deploy a new application. It also cuts the CO2 output by more than half, saving 50 tons per year.

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