

## Whirlpool Virtualization Project Saves \$2 Million While Supporting Aggressive Green Initiatives



### KEY HIGHLIGHTS

INDUSTRY: **MANUFACTURING**

#### GEOGRAPHIES

Headquartered in Benton Harbor, Michigan; Asian headquarters in Shanghai; 70 manufacturing and research facilities around the world.

#### SOLUTION OVERVIEW

- Moved 52 systems and 13 terabytes of data from Maytag's data center in Newton, Iowa to Whirlpool's new data center in Kalamazoo, Michigan.
- Completed project on schedule and within budget, with a total downtime of six hours and no problems powering on in the new location.
- Saved \$2 million by using virtualization rather than a traditional data center migration approach.
- Duplicated the migration process several times on projects of all sizes.
- Created a truly dynamic, energy-efficient data center that is not constrained to hardware or geographic locations.

*"We saved more than \$2 million by using a non-traditional data center migration plan. Through virtualization, we've turned our high-cost, low-efficiency data center into a dynamic data center with a shared, utility-like model. Our systems are no longer constrained to hardware or geographic locations."*

Michael Rappette, *Delivery Manager Global, Infrastructure Services, Whirlpool*

### Project Summary

Whirlpool Corporation is the world's leading maker of major home appliances, marketing products under such popular brand names as Whirlpool, KitchenAid, Jenn-Air and Amana. The company's 73,000 employees provide appliances to customers in virtually almost every country—to the tune of more than \$18 billion in annual sales. Nearly 40 years ago, Whirlpool became one of the first appliance manufacturers to focus on minimizing its impact on the environment. As part of the company's aggressive green initiatives, Whirlpool consistently looks to its IT department to make technology decisions that support its green goals.

Whirlpool recently found a unique opportunity to save the company more than \$2 million while also reducing energy consumption and cooling costs. When the company acquired Maytag, it needed to move its massive data center from Newton, Iowa to a brand new, state-of-the-art data center in Kalamazoo, Michigan. After many small, successful virtualization projects, the company decided that virtualization was the right solution to generate a speedy return on investment for this monumental move.

VMware® supported Whirlpool's efforts to migrate 52 systems and 13 terabytes of data from the old data center to the new facility. During the project, the team created a unique approach to data migration that preserved data integrity, reduced downtime and dramatically reduced the need to transport physical hardware. By November 2007, the new data center was up-and-running on the first attempt, after only six hours of downtime. Whirlpool's new data center now relies on virtualization to save on hardware, energy and cooling costs, and to minimize physical space requirements.

## Physical Server Migration Presents Risks

Since 1970, when Whirlpool Corporation established a corporate office for environmental control, the company has aimed to protect the environment in two ways: by producing products that allow homeowners to use energy as efficiently as possible, and by understanding and managing the ecological impact of its own business operations. Recognizing the intensive power and cooling demands of running a large data center—and the immense capital expenditures required to build it out—Whirlpool consistently looks for ways to minimize its IT footprint.

Whirlpool initially addressed the challenge by establishing a highly efficient new data center in Kalamazoo, Michigan. But when the company acquired its longtime rival, Maytag, it needed to absorb hundreds of Maytag servers and applications as well. Wanting to avoid the energy and cooling costs of maintaining Maytag's data center in Newton, Iowa, Whirlpool sought the safest and most cost-effective way to consolidate the two facilities.

Whirlpool initially considered hiring a vendor to move Maytag's entire data center to Kalamazoo—a traditional approach, but certainly not without risk and cost implications. The vendor would have to accurately label and mark thousands of pieces of equipment before moving them. Because Maytag's application support staff had been laid off in the merger, all applications would have to be left exactly as they were. There was no contingency plan if the project failed, the estimated cost would top \$3 million, and the company could expect a three-day downtime.

"Physically moving the existing data center seemed like a huge risk to us," says Michael Rappette, Delivery Manager, Global Infrastructure Services, Whirlpool. "The physical servers in Newton were several years old, and what would we do if they didn't power up after we moved them? The only option would have been to bring them back to Newton and try to rebuild what we originally had."

*"Virtualization became an easy decision. VMware's Professional Services unique approach allowed us to leave everything in place at Newton as a backup, and switch everything over to the new data center online. From there, virtualization would let us run both Maytag and Whirlpool applications on a fewer number of state-of-the-art blade servers."*

Michael Rappette, Whirlpool

## Virtualization Minimizes Disruption, Provides a Contingency Plan

Whirlpool then considered another approach: virtualization. The company had successfully used VMware virtualization solutions on a smaller scale for several years, and the internal IT team was confident in their knowledge of virtualization to make the move a success. Whirlpool leveraged best practices of VMware Professional Services to evaluate ways of streamlining the migration project and accelerating the path to ROI.

### VALUE OF VMWARE SERVICES

- Project was the company's single largest move—in terms of both number of systems and amount of data
- Project created the best practice of moving and testing all IP addresses in the new location prior to a move to ensure success
- Whirlpool gained the ability to perform large migrations efficiently at any time
- Proactive virtualization strategy will help the company reach its green goals

### WHIRLPOOL'S MIGRATION ENVIRONMENT

- Virtualization: VMware Infrastructure, VirtualCenter, VMware Converter and VMware ESX™ 3.0
- Server: HP C7000 Blade System™ featuring BL460 blades, each equipped with dual 2.66 GHz quad-core Intel™ processors and 16GB of RAM
- Storage: NetApp 3u/270c with extra disk shelves, for a total capacity of 10 terabytes
- Backup: Tivoli Storage Manager™ and NetApp SnapMirror™

### ACTIVITIES AND TOPICS

- Technical architecture overview
- Installation and configuration
- Virtual machine creation
- Virtual machine migration
- Provisioning and managing virtual machines
- Physical to virtual migration process overview
- Physical to virtual migration
- Business continuity overview
- Planning for routine failures
- Backup and recovery of virtual machines
- Disaster planning overview

After a VMware Professional Services operational readiness assessment, Whirlpool developed a plan for virtualizing the entire x86 portion of the Newton data center and migrating it to Kalamazoo by moving the storage system. The plan was designed to minimize business disruption during the migration, provide a backup in case of disaster and prevent server sprawl in the new data center.

“When it came down to either physically moving the servers or virtualizing them, it was an easy decision,” says Rappette. “The virtualization plan allowed us to leave everything in place at Newton as a backup, then transport the necessary files over to Kalamazoo and switch our company over to the new data center online. From there, virtualization technology would let us run both Maytag and Whirlpool applications with fewer servers than ever, which we knew would help us convert CapEx to OpEx. “The only surprise in the project was how well everything worked.”

— Michael Rappette, Whirlpool

## Testing Stage Proves the Stability of Virtualized Systems

A team of Whirlpool engineers kicked off the 12-month migration project. After identifying the few Newton servers that it planned to keep long term, Whirlpool backed up and decommissioned the other machines. Meanwhile, four Whirlpool engineers set up new hardware in the Newton data center to serve as the location of the physical systems that had been chosen for virtualization.

Next, the team used VMware Converter to perform physical-to-virtual (P2V) conversions on the 52 Intel x-86-based application servers that had been selected for migration. On the advice of VMware Professional Services, Whirlpool also performed disk defragmentation to increase the speed of successful conversions. After the conversions, the team disabled each physical network interface card and set up virtual network interface cards with the corresponding IP addresses. They also used SnapMirror software to set up hourly replications between the production virtual environment and the backup storage system. With servers and network storage now virtualized, the team let all systems run for two weeks.

“We were surprised at how well our systems ran in the virtual state,” recalls Rappette. “It gave us peace of mind and credibility going into the migration. We were really thankful for this testing stage because it gave us the confidence in the migration and allowed us to set some of the more doubtful minds at ease.”

During the two-week stabilization period, Whirlpool's network team created a unique plan for changing IP addresses and two new VLANs were configured from Newton to Kalamazoo while the physical systems were in transit. The team then began changing IP addresses to the new range that would be used in the Kalamazoo data center, and allowed the servers to run for two weeks with their new IP addresses.

As the team addressed final issues, they ran backups with Tivoli Storage Manager and used SnapMirror to create a copy of all ESX™ data stores. They performed a final data backup the day before the move.

*“By mid-2009, we're expecting the entire Intel server farm to be 90% virtualized”*

Michael Rappette, Whirlpool

## VMware Consultants Recommend Energy-Efficient Blade Servers

At the same time that one group of engineers was setting up the virtualized environment in Newton, another group had traveled to Kalamazoo to build and configure a complete blade system chassis with blade servers installed with VMware ESX. Following the advice of VMware Professional Services, Whirlpool selected HP Blade System servers, which are designed to offer high performance computing while saving time, power and money for IT staff. The team deployed a C7000 chassis and filled it with 16 BL460 blades, each of which provided dual 2.66 GHz quad-core Intel processors with 16GB of RAM. In addition, each blade was configured with ESX 3.0, providing a solid, energy-efficient infrastructure on which to virtualize the Intel space.

Whirlpool also set up a network attached storage (NAS) system based on the NetApp 270c model. The team added three extra disk shelves to the unit, giving it a total capacity of 10 terabytes. They cabled the unit directly to the back of the HP Blade System chassis switches to provide a solid 2GB EtherChannel trunk over which they could run iSCSI communications. As an extra safety precaution, the team also purchased and set up an identical unit that would stay on-site in Newton during the move and allow for mirroring of the virtual environment.

## Major Data Migration Requires Only Six Hours of Downtime

On moving day, the Newton team shut down all virtual machines and performed a final SnapMirror backup. Next, the team unracked the entire storage system, drove it to the local airport and loaded it onto the Whirlpool corporate jet to be flown to Michigan. In Kalamazoo, a blade system was waiting—with VMware ESX and data stores configured, virtual machines added to the inventory and power turned on.

The team quickly racked the discs, brought the NetApp system online and presented the data stores to the ESX host. One by one, the team then added the virtual machines to the inventory and tested individual applications. From initial shutdown in Newton to final application testing in Kalamazoo, Whirlpool experienced only six hours of downtime.

“The fact that everything worked the first time, exactly as planned, is a testament to a well-thought plan created by following the best practices of VMware Professional Services,” says Rappette. “We would have been looking at a much longer outage and a much higher total project cost if we hadn’t thought through every step and tested the systems so thoroughly. By helping us get our environment up and running so quickly, VMware reduced our time to value.”

*“Today, if it weren’t for VMware and its professional services consultants, I wouldn’t be able to support so many IT projects without hiring a much larger team.”*

Michael Rappette, Whirlpool

## Virtualized Migration Saves Whirlpool \$2 Million

Taking a staged approach to the migration and testing at every stage, gave Whirlpool peace of mind that its new data center would work as intended. The migration was the largest that Whirlpool had ever attempted and the company’s management considered it a complete success.

“Many hours of planning and hard work went into the migration,” says Rappette. “But a move of this magnitude would not have been possible without the knowledge and best practices of VMware Professional Services. They maintained a constant focus on delivering a rapid return on our investment

in virtualization. The only surprise in the project was how well everything worked.”

In addition to providing Whirlpool with a safe and easy way to migrate its systems, VMware also helped the company lower its monthly equipment leasing payments. By virtualizing most of its Intel-based systems, Whirlpool was able to return a lot of leased hardware, adding to its overall savings on the project.

“We saved more than \$2 million by using a non-traditional data center migration plan,” says Rappette. “Through virtualization, we’ve turned our data center into a dynamic data center, with tremendous improvements in service levels and overall agility. Our systems are no longer constrained to hardware or geographic locations.”

## Virtualization Continues to Support Green Savings

Whirlpool’s virtualization projects continue today. The company is currently working with VMware Professional Services on an 18-month project designed to reduce the physical hardware in its data centers.

“We have a lot of older hardware that we’re trying to get rid of,” Rappette explains. “VMware technology makes it so much easier to swap in more modern, energy-efficient servers.”

Whirlpool is hooked on virtualization. Their continuous efforts are helping the company cut power costs, deploy servers quickly and maintain a steady IT headcount by improving staff productivity.

“By mid-2009, we’re expecting to be about 90% virtualized,” says Rappette. “Not only will that bring us tremendous savings on our power costs, but we’ve dramatically reduced our server provisioning times. If it weren’t for the productivity improvements that VMware has enabled, I wouldn’t be able to support so many IT projects without hiring a much larger team. I’m confident that by mid-2009, we will have recovered our initial investment”

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