Johnson Controls Back in the Driver’s Seat Thanks to VMware

VMware Virtual Infrastructure Cuts $760,000 in Hardware Costs, Streamlines Server Deployment, and Enables Secure Offshore Productivity

“Our whole objective is to drive up our system utilization, and the beauty of VMware virtual infrastructure is that it allows us to do this—without performance degradation.”

Philip Cramer
Windows Team Supervisor, Johnson Controls, Inc.

Server Sprawl Leads to Rising Costs

Johnson Controls is a global leader in interior experience, building efficiency and power solutions. The company provides innovative automotive interiors that help make driving more comfortable, safe and enjoyable. For buildings, it offers products and services that optimize energy use and improve comfort and security. Johnson Controls also provides batteries for automobiles and hybrid electric vehicles, along with systems engineering and service expertise.

Johnson Controls Inc., (NYSE: JCI) has 136,000 employees in more than 1,000 locations serving customers in 125 countries.

Founded in 1885, the company is headquartered in Milwaukee, Wisconsin. No. 75 on the Fortune 500 as of 2006, Johnson Controls has a history of applying world-class technologies to help achieve its business goals, just as it provides the best control systems to help customers achieve theirs.

In early 2004, the Johnson Controls Windows team found itself running into physical constraints in the data center. The data center had classic signs of server sprawl: disappearing footprint, rising power and cooling costs, increasing networking conflict issues, and hardware expenditures that rose out of step with productivity gains.

“We had more than 200 physical servers, many of which served only a single application,” says Philip Cramer, Windows team supervisor. “We were experiencing CPU utilizations all the way down to 0.1 percent, and were on the verge of buying some in-room chillers to help with the heat load. What’s worse, because new server acquisitions were allocated to standalone applications, we had an aging server stock.”

By June, the Johnson Controls Windows team was searching for a solution. With the assistance of RapidApp, an application deployment partner, Johnson Controls developed a consolidation methodology that entailed a number of components, from application stacking to physical consolidation using blade servers to virtualization.

CHALLENGE
Server sprawl, rising power and cooling costs, increasing networking conflict issues

SOLUTION
VMware infrastructure decreases costs, streamlines server deployment

RESULTS
• Saved $760,000 in hardware renewal costs
• VMware virtual desktop infrastructure simplifies provisioning and management of remote developer desktops
• Increased CPU utilization from less than 0.1 percent to 70 percent
• Achieved 20:1 server consolidation ratio
• Reclaimed 180 square feet of data center space
• Regained 32 tons of cooling capacity
• Reduced average new server deployment time from six weeks to one week
• Redeployed 200 physical servers to other parts of the company

INDUSTRY: MANUFACTURING
"We initially discovered virtualization through local user groups in 2004," says Cramer. "Key to our decision was the fact that VMware had features such as the VMotion technology, which would allow us to move virtual machines to different physical servers."

**A Successful Test Drive**

The Johnson Controls Windows team's evaluation of VMware software consisted of a Web server running SQL Server, accessed by multiple users on the local area network. The team also tested a dual processor server with VMware VirtualCenter.

"We were impressed by what we saw," says Cramer. "We had instances of SQL Server running better and faster on a virtual machine with one CPU than on a four-CPU physical server." The pilot sold the value of virtualization; it was then time for the Windows team to sell the other stakeholders on the solution.

After installing VMware ESX Server and forming a migration team, Cramer sought out buy-in from all the stakeholders in the process. "We created a presentation for all the application owners, managers, and directors to teach them about VMware software," Cramer recalls. "We demonstrated the multiple benefits of virtualization, such as the failover and rapid deployment features and the fact that putting QA and development virtual machines on the same host machine as production virtual machines would provide resource buffers for their applications. It was kind of a mind shift for everyone here."

**Shifting into High Gear**

Johnson Controls started the virtualization process in the summer of 2004. The company immediately enjoyed the consolidation benefits they had been seeking, with physical server count falling by a factor of 20. However, as the Windows team continued to learn about the software, they realized there were even greater benefits they could reap.

"Like a lot of companies, we have offshore development resources to help us keep costs down," says Cramer. "VMware software helped us deal with some of the difficulties that come along with using third-party developers. First, to be most effective, these developers need access to internal applications at Johnson Controls. We use VMware virtual desktop infrastructure to set up XP sessions using virtual machines that these developers can VPN into. We don't have to worry about what they're running on their machines or what state their desktop is in. All that work can be done within the virtual machine at our data center."

Additionally, as all system managers know, security is a prime concern when working with third parties. "The great thing about this virtual desktop approach is the built-in security," continues Cramer. "I can have a one-to-one correlation between XP sessions and the offshore developers. That way, if something goes wrong, I can turn off the problem session without disrupting the other sessions. The added security really reduces the anxiety that comes along with third-party access to our systems."
• **Reduced hardware capital and maintenance costs.** Johnson Controls saved $760,000 in hardware renewal costs in the first two years. Maintenance costs fell by $5,348 a month. “We virtualized 168 physical servers and added 45 net new virtual guests and all on 11 physical hosts, which would have represented substantial capital expenditure,” says Cramer.

• **Increased server CPU utilization.** The organization has gone from as low as 0.1 percent CPU utilization to between 50 (average) and 70 percent (at peak times).

• **Improved server provisioning.** “Before, provisioning a new server could take up to six weeks. Now, we’ve got that down to less than a week,” says Cramer.

• **Power savings.** The Johnson Controls data center has been a much cooler, roomier space thanks to the virtual infrastructure. States Cramer, “We’ve reclaimed 32 tons of cooling capacity, and have reduced 49KVA in power usage in the data center to 8.1KVA.”

• **Happy customers on hot rods.** Application owners were delighted that they could use virtual machines on newer, faster servers to test ideas. Previously, Johnson Controls had cascaded older servers off into development and QA roles, which meant impeded performance for those customers.

• **Improved offshore security.** Johnson Controls uses offshore third-party developers to help with code development. “Because these third-party groups often have substantial engineer churn, it’s important for us to control who can and can’t have access to Johnson Controls’s internal resources,” added Cramer. “Running Windows XP sessions through VMware virtual desktop infrastructure allows the developers to access the resources they need, while also enabling me to turn individual access off if ever the need should arise.”

• **Future-proofing the data center.** “We like to see around 6.2 virtual machines per CPU,” says Cramer. “So even after shedding 200 physical servers, using VMware P2V Assistant to move 160 pre-existing physical machines to virtual machines, and adding a net 45 new virtual machines, we still have room for 75 more virtual machines on our current server farm.”

### Ready to Accelerate

The Johnson Controls team is already looking forward to the added features in VMware Infrastructure 3 to help them do more with their IT resources. “I’m especially excited about the automatic failover features in VI3,” says Cramer. “Rather than having to redefine virtual machines if hardware fails, the system will anticipate any sort of resource instability, and move machines before the failure happens.”

“Our biggest takeaway from our experience is that VMware technology lets us do more with less,” concludes Cramer. “Our whole objective is to drive up our system utilization, and the beauty of VMware virtual infrastructure is that it allows us to do this—with performance degradation. We’re looking forward to seeing what else we’ll be able to do with VMware software going forward.”