



*“Anything with Cerner in the title is like throwing the ace of spades on the table. If anything goes wrong with these applications, people all over the organization start to yell and scream. Cerner software is part of the infrastructure that Florida Hospital spent 60 million dollars on, in order to provide a safer environment for our patients and to comply with rigorous HIPAA standards for ensuring the security and privacy of healthcare information. Our Cerner applications our hosted by Cerner, and the fact that they run on VMware speaks volumes about our faith in VMware.”*

— Matthew Johnson  
Systems Engineer, Florida Hospital

#### KEY HIGHLIGHTS

##### Challenge

Streamline IT infrastructure and implement reliable IT solutions to enable the hospital to provide the highest quality healthcare in a competitive market

##### Solution

Implement VMware Infrastructure 3.5 to facilitate IT management, improve application performance and availability, enhance disaster recovery, and reduce server hardware, maintenance, and energy costs

##### VMWARE AT WORK

VMware Infrastructure 3 Enterprise, featuring:

- VMware ESX 3.5
- VMware High Availability (HA)
- VMware Distributed Resource Scheduler (DRS)

## Florida Hospital

Florida Hospital was established in 1908, when it opened its first facility, a 20-bed cottage in Orlando. Today, Florida Hospital is a 2,188-bed hospital with seven locations throughout Central Florida. Seeing more patient visits than any other hospital in the country, Florida Hospital is nationally recognized for its Centers of Excellence for cancer, cardiology, and diabetes, to name just a few. In fact, for the past ten years, Florida Hospital has been recognized as one of “America’s Best Hospitals” by US News & World Report.

As the nation’s busiest hospital and one of its largest, Florida Hospital’s 2,000 physicians and 15,000 employees depend on reliable, efficient information systems. Florida Hospital’s MIS Department works around the clock from its centralized datacenter in Orlando to provide cutting edge IT solutions and reliable infrastructure to meet the needs of its healthcare providers and, ultimately, its patients.

To this end, Florida Hospital has partnered with VMware to virtualize many of its key applications and servers. From communications applications, including Blackberry Enterprise Server and Microsoft Exchange, to applications that control building climate, such as Siemens APOGEE and Johnson Controls, Florida Hospital has implemented VMware Infrastructure 3.5 to facilitate IT management, improve application performance and availability, enhance disaster recovery, and reduce server hardware, maintenance, and energy costs.

### Virtualizing Resource-intensive Applications with Ease

Although Florida Hospital has been a VMware client for many years, its first major foray into virtualization was with the migration of one of its most essential applications, the Cloverleaf Integration, from AIX hardware to VMware ESX servers. The Integration Engine enables the hospital’s hundreds of clinical applications to communicate with each other and exchange patient information, such as admissions, discharge, and ER orders. Without the Integration Engine, the hospital would have to employ thousands of people to do nothing but take information from one clinical system and input it into other systems.

Matthew Johnson, System Engineer at Florida Hospital, describes the decision-making process for virtualizing the Integration Engine: “The Integration Engine was running on AIX hardware, which was at the end of its life. We were trying to decide what to replace it with when one of the guys at the table suggested, half-jokingly, that we virtualize it. Everybody laughed—after all, this is one of the most important applications at our hospital. But as we started looking at the application requirements, we realized that it was entirely possible to run the Integration Engine on RedHat operating system and VMware virtualization platform. Everyone outside of the organization, including the software vendor, insisted that the Integration Engine was too heavy to run on anything other than AIX equipment, but we were confident that VMware could handle it. And we were absolutely right!”

## DEPLOYMENT ENVIRONMENT

Applications virtualized in production:  
 Blackberry Enterprise Server, Microsoft Exchange, Cerner Reporting, Cerner FTP, Dictaphone, Epic Web Server, JBOSS, Oracle Grid Control, Copath, Misys Monitoring Server, Active Directory Certificate Authority, 3m Encoder, NextGen, Lotus Notes, Domino, Mediserve, Epic Clarity Console, and more

*“Providing relevant information quickly is one of the major tasks of IT infrastructure. VMware supports us in this task by improving application performance and availability, thereby reducing delays and interruptions in communication services. For example, we have over 1500 Blackberry users at every level of the organization who rely extensively on our two virtualized Blackberry Enterprise Servers. They expect and require 100 percent application reliability. Using VMware features such as HA and DRS, we can provide the highest possible availability and minimize planned and unplanned downtime.”*

— Matthew Johnson  
 Systems Engineer, Florida Hospital

The Integration Engine now runs on its own cluster of 20 virtual machines, and there have been no issues with running the application on VMware. “In fact, there was a quantum leap in performance capabilities when we went from AIX to VMware,” continues Johnson. “A big part of that, obviously, was due to the upgraded hardware, but it was also attributable to features such as Distributed Resource Scheduler (DRS) and High Availability (HA) clustering. The performance of the Integration Engine on VMware has been fantastic.”

Based on the success of virtualizing the Integration Engine, Florida Hospital has extended its virtualization environment to include dozens of additional applications, such as Epic Web Server, Active Directory Certificate Authority, JBOSS, Oracle Grid Control, and Mediserve. Florida Hospital’s IT environment is currently 68 percent virtualized, with 262 virtual machines running on 23 ESX hosts in its production environment and an additional 111 virtual machines in development. Johnson expects to attain 75 to 90 percent virtualization within a year.

## Enhancing Patient Care and Safety through Virtualization

At Florida Hospital, as at any hospital, patient care and safety relies on efficient communication between doctors, nurses, pharmacists, lab technicians, and other hospital staff. According to Johnson, Florida Hospital has leveraged the power and flexibility of virtualization technology to strengthen its communications network. “Providing relevant information quickly is one of the major tasks of IT infrastructure. VMware supports us in this task by improving application performance and availability, thereby reducing delays and interruptions in communication services. For example, we have over 1500 Blackberry users at every level of the organization who rely extensively on our two virtualized Blackberry Enterprise Servers. They expect and require 100 percent application reliability. Using VMware features such as HA and DRS, we can provide the highest possible availability and minimize planned and unplanned downtime.”

Florida Hospital has also started migrating its Microsoft Exchange environment to VMware. According to Johnson, “We have one Exchange Server per year for the next five years going into hardware replacement. So, our plan is to virtualize one Exchange Server per year. At the end of five years, we expect to have greater than 10,000 mailboxes in our virtual environment.”

In addition to communications applications, Florida Hospital depends on VMware to run many of the critical applications that ensure compliance with the Health Insurance Portability and Accountability Act (HIPAA) and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), as well as hospital licensing and third-party reimbursement. Two such virtualized applications are Cerner Reporting and Cerner FTP. Johnson explains the significance of these applications: “Anything with Cerner in the title is like throwing the ace of spades on the table. If anything goes wrong with these applications, people all over the organization start to yell and scream. Cerner software is part of the infrastructure that Florida Hospital spent 60 million dollars on, in order to provide a safer environment for our patients and to comply with rigorous HIPAA standards for ensuring the security and privacy of healthcare information. Our Cerner applications are hosted by Cerner, and the fact that they run on VMware speaks volumes about our faith in VMware.”

Another critical application that runs on VMware is ARCHIBUS, Florida Hospital’s facilities and infrastructure management software. “ARCHIBUS is essential for tracking and reporting facilities-related information that helps us to remain JCAHO-compliant and to maintain our accreditation, hospital license, and Medicaid funding. The application runs flawlessly on VMware,” comments Johnson.

*“We have taken a design approach with vCenter Site Recovery Manager that allows the IT group to stake their reputation on successful recovery, sequencing, and timeframes. Through isolated testing, the IT group can now create Service Level Agreements (SLAs) that have a 100% guarantee for automated recovery.”*

— John Y. Arrasjid, Principal Architect  
VMware Professional Services

## Facilitating IT Management with VMware

From faster server provisioning to enhanced disaster recovery, virtualization has greatly improved IT management at Florida Hospital. One such example is the recent upgrade of the databases that run Johnson Controls. Johnson explains, “We originally thought that we would need eight to ten hours of downtime for the upgrade. This was a major concern, because Johnson Controls is a critical application, and without it we would not be able to adjust the atmospheric controls in the operating rooms. Thanks to VMware’s cloning capabilities, we were able to make a clone of the virtual machine that hospital staff could use while we upgraded the original machine. So, from the end-users’ perspective, there was virtually no interruption. That was absolutely phenomenal, and we received kudos for reducing the eight-hour downtime to a minute or two.”

Florida Hospital has virtually eliminated unscheduled downtime, as well, by leveraging features such as HA and DRS. According to Johnson, the peace of mind that this brings is invaluable. “VMware has absolutely improved downtime and SLAs. Before virtualization, when a host went down we would be stuck going into the office in the middle of the night or on a holiday. But now, if a server goes down the virtual machines that were on that server restart within minutes, usually before anyone can login and see what the problem is. Sometimes HA kicks in so fast that the virtual machines never get a chance to page out. It’s really nice not having to worry about getting that 2 a.m. call to fix a downed server.”

Virtualization has further simplified IT management by drastically reducing the provisioning time for servers from several weeks or months to a few minutes. “It can take months before we can get a physical server in the door, because of the purchasing process and budgetary constraints,” comments Johnson. “And once the hardware is here, we have to build it out, rack it, etc. But with our virtual infrastructure, when someone requests a server, I can quickly spawn one off in a couple of minutes. In fact, it’s so easy to provision that we have to be careful, because everybody wants one.”

VMware has also provided Florida Hospital with fast, easy, and affordable disaster recovery. Johnson credits VMware’s disaster recovery capabilities with helping to convince reluctant software vendors to allow their applications to run on virtual machines. “The success we’ve had with disaster recovery has been phenomenal, and that has been a huge driving force in the expansion of our virtualization environment. Occasionally, when we run into bureaucratic roadblocks or people who do not want to go virtual, the success we’ve had with disaster recovery has encouraged those people to change their minds. For example, when we asked Siemens admin to allow us to virtualize APOGEE, they were hesitant at first. But when we explained how easy it is to DR a virtual machine and how much money it would save us on physical hardware for the disaster recovery site, they consented. And they have been supportive ever since.”

## Translating Cost Savings into Improved Patient Care

Not only has virtualization facilitated IT management and dramatically decreased planned and unplanned downtime, it has also resulted in significant cost savings for Florida Hospital. Johnson estimates that VMware has saved Florida Hospital nearly a million dollars in hardware costs, in addition to approximately \$340,000 a year in energy savings.

“VM density achieved is exceptional. We’ve found that we can get over 30 applications on to one host thanks to superior I/O scalability, better CPU utilization, and distributed resource management of VMware Infrastructure. As a result, we end up with a very low cost per application compared to other virtualization offerings,” explains Johnson.

“In fact, one of our 8 CPU dual core hosts has 31 VMs and it is running at 25% CPU. I could put another 15 to 20 machines on it, which we already do during maintenance. The memory management VMware provides is excellent as well. Even at 31 VMs on a single host, we use 16 out of 30 gigs of memory assigned to the host. And DRS keeps us working at peak performance by taking advantage of unutilized resources within the cluster. In the early days of virtualization I had to best guess how to balance the virtual infrastructure and now I don't have to and I would never go back to the dark ages.”

Johnson summarizes the cost savings: “There are 262 VMs in our production environment for which we did not need to purchase individual warranties, install physical machines, upgrade the BIOS on those machines, or run 786 cables. Plus, each of those 262 VMs represents about \$1300 in annual energy savings.”

Furthermore, these savings have allowed Florida Hospital to provide better patient care and to remain viable in an increasingly competitive market. “Virtualization is one of the biggest trends in healthcare right now. We know that other hospitals are virtualizing, so if we want to remain competitive, we need to make strategic decisions that will enable us to streamline our IT infrastructure, minimize IT capital expenditures, and, ultimately, to channel savings into state-of-the-art medical technology, advanced medical training, and better overall healthcare,” says Johnson.

### **vSphere: Worth its Weight in Gold**

To support its mission of providing the highest quality healthcare, Florida Hospital continues to expand its virtual landscape and plans to upgrade to VMware vSphere. Johnson is excited to implement vSphere's many features and benefits, especially fault tolerance. “The idea that we could have zero downtime with hardware failure because of fault tolerance is something that really has people talking in the organization. It is hard to imagine, but I think we can actually improve on what little downtime we currently have by putting some of our most important applications on fault tolerance in vSphere,” comments Johnson.

Johnson also looks forward to leveraging vStorage Thin Provisioning. He explains, “If we were using Thin Provisioning, we could probably recover nearly a terabyte of space. We could then virtualize more servers without having to buy extra storage space. The ROI on vSphere from Thin Provisioning alone is worth its weight in gold.”

### **Results**

- Virtualized critical applications, including the Integration Engine, Cerner Reporting, Cerner FTP, Blackberry Exchange Server, ARCHIBUS, Johnson Controls and Siemens APOGEE
- Virtualized 68 percent of production environment
- Reduced hardware costs by nearly \$1 million and annual energy costs by approximately \$340,000
- Reduced server deployment time from several weeks or months to a few minutes
- Virtually eliminated planned and unplanned downtime
- Achieved an 11:1 consolidation ratio, with 262 virtual machines running on 23 ESX hosts

