

Miami-Dade County Public Schools



“You forget how it was in the old days with physical hardware. The scalability, resilience and cost advantages of VMware software are that huge. What’s more, the technology is so reliable we virtualize even our business-critical applications, including SAP software. We don’t create paychecks, produce gradebooks or teach students without relying on VMware technology. It is much faster and easier. The future is nothing but a virtual instance.”

— Craig Rinehart,
Administrative Director,
ITS/Business Operational
Services, Miami-Dade County
Public Schools

KEY HIGHLIGHTS

Challenge

Miami-Dade County Public Schools needed a cost-effective, flexible and scalable technology infrastructure to support a growing array of teaching-related and business services expanding educational opportunities for all students.

Solution

The district virtualizes all applications with VMware software, including business-critical applications for enterprise resource planning, district web servers, teacher and student technology services

Results

- All district applications either wholly or partially virtualized
- SAP deployment completely virtualized from the start, enabling otherwise unaffordable implementation
- 99.9% availability maximizes system uptime to support all business functions and end users
- IT provisioning time reduced from 40 hours to less than 2 hours
- Three-year ROI of 116%, with \$2.2 million capital cost savings; \$112,298 energy savings; \$328,883 productivity savings; avoidance of 343 metric tons of carbon emissions

Leading Florida school district virtualizes business-critical applications with VMware

SAP software latest in series of mission-critical virtualization projects

When Miami-Dade County Public Schools virtualized its first application some five years ago, it didn’t set out to become an education industry virtualization pioneer. Like many organizations, the district simply was running out of room in its datacenter. Success of the first project, however, led to another, then another—until eventually Miami-Dade made the leap to virtualizing even its business-critical applications. The district’s SAP environment, in fact, never has directly touched a physical server. Miami-Dade relies on VMware software for every one of the instructional and business functions that keep the district at the forefront of advances in education. With budgets under pressure and demand always on the rise, the cost and performance advantages of virtualization—from multi-million dollar savings to near-perfect uptime—accelerate with each new project.

Miami-Dade’s experience provides insight for large-scale enterprises everywhere into how VMware software helps organizations progress from server consolidation to reliable virtualization of the most demanding business applications, including Microsoft® Exchange, Microsoft® SQL Server, Microsoft® Office SharePoint, Microsoft® Office Communications Server and SAP. The results include faster provisioning, increased availability and more dynamic scalability throughout the enterprise.

“Many times in the beginning, we were the first customer to virtualize a given application,” recalls Craig Rinehart, administrative director of business and operational services for Miami-Dade. “I say with confidence today, whatever applications we implement will run on VMware software. It’s our technology standard. We don’t produce paychecks, we don’t produce gradebooks and we don’t teach students without VMware technology.”

The benefits, Rinehart says, have been game-changing: an affordable, resilient, scalable platform providing 24/7 availability, simpler maintenance and on-the-fly upgrades. A three-year study revealed an ROI of 116%; capital-cost savings of \$2.2 million; and carbon-emission reductions equivalent to taking 63 cars off the road. The district has not purchased physical servers for more than three years, except a handful to host VMware software. With virtualization, provisioning times have been reduced from a full week down to two hours. The built-in availability capabilities of vSphere ensure simple, cost-effective High Availability for all applications. Applications can be scaled up or down dynamically to match workload requirements.

VMware technology touches all business-critical applications

Miami-Dade is the largest school district in Florida and the fourth largest in the United States, with some 350,000 students, 53,500 employees and 400 facilities. Like school districts everywhere, Miami-Dade is experiencing profound changes in the nature and delivery of educational services. To equalize opportunity for all students, the district engages parents and the community at large, leverages digital curricula, enables teacher mobility among schools and operates efficiently as a business. Miami-Dade

VMWARE AT WORK

VMware vSphere 4 and VMware vCenter Server, including:

- VMware ESX Server with VMFS
- VMware vMotion
- VMware High Availability
- VMware Distributed Resource Scheduler

DEPLOYMENT ENVIRONMENT

Business-critical applications running in production on vSphere:

- SAP
- Microsoft Office SharePoint Server 2007
- Microsoft SQL Server 2005
- Microsoft Office Communicator 2007
- Microsoft Active Directory

Additional key district applications running in production on vSphere:

- IBM Cognos, Business Intelligence and TMI
- HEAT Self Service
- Sophos security
- BlackBerry
- Edulog school bus routing
- Magellan GPS
- Primavera
- Plato Learning
- Pinnacle Gradebook (Excelsior/ESI)
- X2 Aspen scheduler
- Informatica data warehousing

Guest operating systems:

Windows 2000; Windows 2003; Windows 2008; Windows Vista, Windows XP; Linux

Hardware:

HP BladeSystem with HP ProLiant BL680c Server Blades; HP StorageWorks Enterprise Virtual Array (EVA) storage systems; HP StorageWorks XP Disk Array

also faces uncommon challenges: It lies in a hurricane zone, requiring robust disaster protection and recovery for its computing infrastructure. Its student and parent population might speak English, Spanish or Haitian Creole as a primary language. All this places ever-growing demand on the district's technology infrastructure. Internet portals, 24/7 access, resource-intensive applications, non-disruptive upgrades, flexibility and security are essential. Budgets, meanwhile, remain tight.

Virtualization with VMware provides the means to meet all of these demands.

The first application Miami-Dade virtualized, back in 2005, was HEAT Help Desk, with a Microsoft SQL Server database. The district at the time faced typical datacenter problems. Built 35 years earlier for a mainframe environment, the datacenter had not grown in size for 24 years and was crammed full of power-hungry, heat-spewing servers.

"There just wasn't enough space, power or air conditioning to accommodate the server environment as opposed to the mainframe," Rinehart recalls.

"Every application that came in wanted its own servers," adds Lawrence Grubbs, Miami-Dade's ERP director. "You'd have to maximize the potential to handle peak demand, but the servers might be minimally used at any time. In addition, we'd wonder why we couldn't house the data on a centralized database rather than install and license separate databases. There was a lot of cost waste."

Coming from a mainframe environment, the concept of virtualization was familiar to a Miami-Dade technology staff eager to pursue a solution to server sprawl. The team chose industry-leading VMware to provide its server-virtualization technology—and never looked back. At times, they were the first customer ever to scale an application to so many users, since a centralized district datacenter serves a greater population than any individual school. VMware software handled it all so well that Miami-Dade adopted a virtualization-first strategy for every computing workload.

A Microsoft® Office SharePoint 2007 web portal gives nearly a million students, teachers, employees, parents and community members access to secure data and applications such as homework, grades and pay information. Microsoft Exchange 2003 handles employee email for approximately 60,000 users, with Microsoft Active Directory implemented in parallel. To enable staff telecommuting, Miami-Dade virtualized Microsoft Office Communications Server 2007; soon the district discovered additional value in the ability to conduct video conferencing. Many implementations, such as X2 Aspen scheduling and Pinnacle Gradebook, have run fully virtual from the start. Some continue to run partly on the legacy mainframe, but are accessible to end users through the virtualized portal.

VMware is ISV-supported industry standard

VMware vSphere™ 4, the school district's current VMware platform, aggregates the infrastructure of an entire datacenter to create a single powerhouse with resources that can be allocated quickly and dynamically to any application in need. Existing applications can be deployed on VMware vSphere with no changes to the application or the operating system on which it runs. The platform provides a set of application services to provide availability, security and scalability. VMware High Availability (HA) and VMware Fault Tolerance (FT) protect applications from downtime without the complexity of conventional clustering. VMware Distributed Resource Scheduler (DRS) helps scale applications dynamically to meet changing loads. The VMware vCenter product family, meanwhile, enables proactive management and centralized control of the virtual infrastructure.

As the provider of industry-standard virtualization software, VMware works closely with its industry partners to ensure customers have the assurances and reliability they need to run their enterprises. Microsoft, IBM, SAP and Oracle all provide support statements

for VMware software, ensuring that customers can rely on their virtualized business applications. In addition, hundreds of smaller software providers officially support VMware technology, and the list is growing rapidly. The Miami-Dade school district reports receiving outstanding implementation support from vendors such as Microsoft, SAP and hardware provider HP.

Project management best practices mitigate risk

Miami-Dade employs strict project management discipline to ensure the success of each implementation. From the beginning, the district enlisted buy-in from its network, service and core infrastructure staff. The current SAP implementation is the most ambitious of all. Miami-Dade is deploying in stages. Initial ERP go-lives took place in late 2009, including e-recruiting in December. Finance rolled out in February 2010, with Human Resources applications scheduled for July. Payroll is slated to go live in 2011.

“When you take on a major project like replacing your financials and your payroll, you’ve got to be very careful,” Rinehart says. “In situations like this, we mitigate risk by proceeding successively through sandbox development, quality training, pre-production and production environments. We work slowly through each of these landscapes so we can proceed with confidence.”

Over time, any skeptics who didn’t believe SAP could successfully be virtualized have either been won over or left behind, Rinehart says. VMware, SAP, HP and school district technology staff worked as a team. “I’m not bashful about contracting resources when those resources are going to get you started in the right direction,” he says. “Virtualization works, and not just for a handful of applications; it works for everything we use.”

Today Miami-Dade runs approximately 892 Virtual Machines—some 120 for SAP alone—running on 134 vSphere 4.0 hosts. With virtualization, Miami-Dade is able to stay current with the latest hardware. HP BladeSystems form the backbone, with HP ProLiant Server Blades, HP StorageWorks Enterprise Virtual Array storage systems and HP StorageWorks XP Disk Arrays. Just as VMware DRS moves capacity as needed, mechanisms of the storage array provide corresponding data and performance protections.

“VMware software goes hand in hand with the SAN, the storage area network; they work together to ensure service quality,” says ERP Director Grubbs. The resulting ease of deployment, cost savings and time savings are enormous. Instead of going out to buy hardware and build a huge environment, we can bump up some RAM or add another couple of cores to a system. We can provision new applications quickly, add memory or change applications on the fly in production. We can bring up servers or bring them down. Every time we upgrade a VMware host, all the servers on it realize the increased speed—compared to using physical servers that might be two generations out of date. That is extremely good leveraging.”

Administrative Director Rinehart points to accumulating benefits they’d not even thought to count in the beginning: “You look at cabling 100 computers vs. cabling 800. The savings figures we have are very conservative because they don’t include things like that, which add up.” In addition, the infrastructure’s relatively modest power requirements remain within the capacity of backup generators in the event of a hurricane.

As VMware technology advances, VMware vSphere 4 brings even greater speed, scalability, management and reporting enhancements, Rinehart notes. “We don’t get in the way of moving the virtual machines unless we have a specific application need. We let it manage itself. We have so many diverse applications running simultaneously that cycles hit us during gradebook, during payroll, during month-ends, testing and so forth. The machines can move around at machine speed; humans don’t have to get in the way. That’s a huge

advantage. And you can do that for the most part without the end-users knowing. If you have a problem on a piece of hardware, HA is already moving the processing by the time you sense an issue from a human standpoint. We have system availability at peak times and at all times. Because of VMware application services such as DRS, HA and vMotion, hardware issues don't take us out of service."

In the virtualization continuum, VMware vSphere 4 enables organizations to transform their datacenters into internal clouds—pools of virtualized resources within datacenters—and seamlessly leverage external cloud providers from within private clouds. Miami-Dade contracts some services to an external cloud, with all applications passing through the virtualized datacenter.

Miami-Dade's message to peers: Virtualization works

As word got out about Miami-Dade's virtualization success, other school districts and private-sector organizations started asking Rinehart for insight. His message: Virtualization works—not just for a handful of simpler applications, but for business-critical behemoths like SAP. Before you start, he says, get buy-in from your technology staff. Assemble your technology team, including vendors and any expert consultants needed. Learn and follow best practices.

"Frankly, I forget how bad it was in the old days with physical hardware," Rinehart says. "The advantages of VMware are so huge: fast provisioning of new applications, availability increases, cost savings, and much more. As for system resources, you buy what you need when you need it, so you're getting the latest, greatest and fastest technology going forward to support your organization's mission."

