Virtualizing disaster recovery helps ensure business resiliency while cutting operating costs.

Virtualization doesn't stop with servers and storage devices—it's a springboard for innovation

Contents

Introduction

IT managers have eagerly implemented virtualization to reap its many benefits: lower hardware and energy costs, more flexibility, faster responsiveness to changing and new applications, and improved resiliency.

But when disaster strikes, some IT managers find their disaster recovery techniques and hardware configuration have not kept pace with their changed production environment, and they're stuck, along with their recovery times, in the previrtualization era. They falsely believe the improved day-to-day resilience of their virtualized environment lessens their need for disaster recovery (DR) planning. In fact, the opposite is true: Catastrophic hardware failures in virtualized environments bring down many more applications than in nonvirtualized environments, making DR planning and implementation more critical, not less.

Fortunately, the virtualization technologies that make production environments more resilient and responsive can also transform the responsiveness and speed of recovery of the DR environments that back them up. Indeed, virtualizing your DR environment, along with your production servers and storage, can dramatically improve recovery times as measured in both recovery time objectives (RTOs) and recovery point objectives (RPOs).

Virtual DR is designed to increase the reliability of your recovery, mitigate risk for your enterprise and position you to implement the coming waves of IT innovation. These virtual recovery benefits also apply to the majority of IT applications that have not yet been virtualized. In those situations, an added major benefit is that virtualizing DR removes the problems inherent in recovering to dissimilar hardware, as is typically the case. That makes "physical to virtual" recovery much more reliable and faster.

Acme found that it needed to update its disaster recovery strategy and configuration to better serve its new, virtualized environment.

Don't let disaster recovery stay stuck in the past

Ensuring business resilience requires IT managers to understand, budget and plan for the critical differences in DR approaches called for in virtualized environments. To illuminate these issues, let's review the experience of one IBM client, a large, U.S.-based medical testing company that we'll call Acme.

Acme recently made a three-year investment to migrate its Microsoft® Windows® production environment to virtual servers using VMware products. The project was a financial success, saving significant sums in hardware and energy. Virtualization also dramatically improved the operational resiliency and responsiveness of Acme's applications, using VMware's tools to dynamically reallocate server capacity on the fly.

But Acme neither budgeted nor planned for updating its DR strategy and configuration. Like many IT departments, Acme took the path of least resistance to virtualization and simply migrated its production servers, unchanged, to virtual ones. In particular, the backup technique for its physical servers, a file-based backup software client installed on each machine, was left intact. Thus, after implementing virtualization, each of Acme's virtual machine images included an operating system, an application and a backup software client. The result was inefficient at best: A single physical server in Acme's data center might be running 30 instances of the backup software, one for each virtual machine it hosted. Just as in its previrtualized environment, Acme's file-based backup of each application was stored in a tape library via a media server, and the library was trucked offsite nightly.

A dissimilar hardware environment aggravated inherent delays with the tapes-and-trucks backup to leave disaster recovery time unimproved from previrtualization days.

A mismatched environment can bog down recovery and drive up costs

When Acme conducted a DR test, it waited many hours for its backup tapes to be delivered to the recovery center, then loaded its tapes onto the media server at the DR center. Because of the amount of data involved (6TB), the tape restoration took many hours. Then Acme restored each individual file-based backup of the virtual machine images from its media server onto more than 100 separate physical servers, one per application—a process that took more than 24 hours.

Along the way, Acme encountered the inevitable hardware compatibility mismatches inherent in the recovery of servers to dissimilar hardware. In the large majority of cases, the advanced proprietary recovery techniques from IBM enabled Acme to recover to dissimilar hardware. But a handful of servers had hardware incompatibilities that required the use of dedicated, bespoke equipment for successful recovery.

Despite Acme's lengthy and fruitful migration to a virtual server production infrastructure, it still had a disaster recovery time measured in days, leaving its DR posture unchanged from its previrtualization days.

IBM best practices align your DR approach with your virtualized infrastructure

IBM proposed two new DR alternatives to Acme, each leveraging the backup and recovery techniques made possible by virtualization:

1. *Remote data protection* provides a once-daily snapshot of Acme's applications and data, transmitted nightly to an IBM recovery center via the Internet. The RPO is typically one business day.
2. *Disk replication* provides a real-time copy of Acme's data and applications at an IBM recovery center. This option's RPO is typically single-digit minutes, but it is more expensive.

Authentication commands from Acme restore data and applications from an IBM recovery center, with most servers restored in less than one hour.

Let's look at these alternatives in more detail.

Remote data protection

This solution virtually eliminates the need for Acme to load one instance of backup software on each virtual machine (as many as 40 instances on a single physical server). Instead, IBM uses one copy of remote data protection client software on each of Acme's physical production servers. Remote data protection takes once-daily snapshots of all the virtual applications and data on each server. Using advanced deduplication technology, remote data protection conserves bandwidth by transmitting only the changed data each night from Acme to a shared data vault at an IBM recovery center.

At time of disaster or test, IBM connects the shared data vault to shared hot-site servers at an IBM recovery center, which are quickly preloaded with VMware using automated procedures developed by IBM. Acme then issues an authenticated command to restore the data and applications from the IBM vault to each virtual machine. Because the vault and the servers are collocated, the restoration of data and applications takes place at local area network (LAN), not wide area network (WAN), speed. Most servers are restored in less than one hour. The RPO of this solution averages half a business day, but it can be as long as one business day if the outage emergency occurs at close of business.

After each virtual machine is up and running in the recovery center, Acme makes the DR instances "live" and begins delivering applications via the DR environment. There are no tapes to wait for (and possibly fail). There is no need to restore scores of physical servers, operating systems and their applications. Best of all, server hardware incompatibilities are virtually eliminated.

Smooth-running, consolidated backup tools enable a new recovery procedure that goes from long and fraught with risk to short and straightforward.

Disk replication

This solution also frees Acme from running one backup client on every virtual machine and instead uses the consolidated backup tools at the hypervisor level of each virtualized server. These backup tools periodically and smoothly quiesce each virtual machine application to take snapshots of each virtual machine. The snapshots are saved to Acme's production storage area network (SAN) in industry-standard, portable virtual machine images.

Acme's SAN then replicates via high-speed leased line to a dedicated fiber-channel-equipped SAN at an IBM recovery facility. The fiber-channel backbone at the IBM facility is connected to Acme's other assets, including a dedicated VMware control server and five very large x86 shared hot-site servers.

At the time of a disaster or test, Acme's recovery procedure goes from long and fraught with risk to short and straightforward: IBM technicians configure Acme's five shared hot-site servers with VMware. IBM then connects these servers to Acme's dedicated fiber director and SAN at the recovery center and configures the fiber director to allow the shared servers to "see" the SAN. Acme then uses VMware's control server to register each virtual machine image on the SAN to a virtual machine in the company's shared server pool, a process that takes a few seconds per machine. Once the shared hot-site servers are brought online and made available to Acme, it takes only minutes to recover all of Acme's virtual servers.

Again, there are no tapes involved, there is no restoration of scores of physical servers and server hardware incompatibilities are largely eliminated by the use of VMware.

Either solution—remote data protection or disk replication— would yield significant cost savings, speed recovery and reduce risk for Acme.

Acme's decision

Either disaster recovery solution provided by IBM would yield significant cost savings to the client over its traditional tapes-and-trucks approach. Acme was paying about US$41,000 per month. Its recovery time was measured in days and with high risk for success. Low-risk remote data protection from IBM was estimated to cost about US$21,000 per month with recovery time measured in hours.

Acme decided to implement the disk replication approach. Estimated to cost about US$35,000 per month, it would still produce significant savings. And the difference the IBM approach made to Acme's DR posture was stark, providing low-risk recovery time measured in minutes:

Before
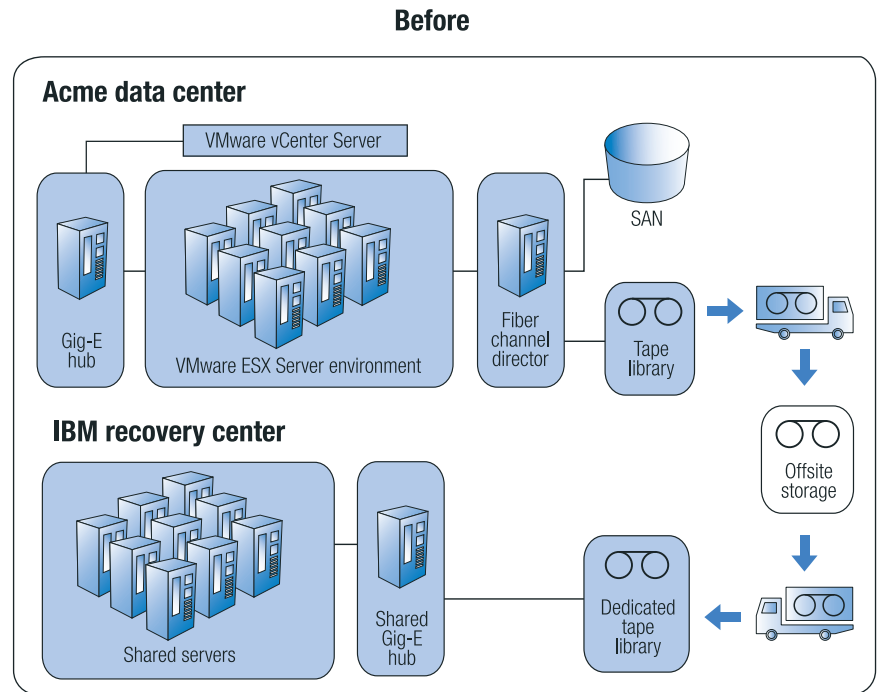
Figure 1
Acme's traditional tapes-and-trucks approach was costly, slow to recover and risky.

Disk replication produced significant cost savings and provided low-risk recovery time measured in minutes.

After

Acme data center

VMware vCenter Server

Gig-E hub

VMware ESX Server environment

Fiber channel director

SAN

IBM recovery center

Dedicated VMware vCenter Server

Shared Gig-E hub

Shared IBM VMware ESX Server environment

Dedicated fiber channel director

Dedicated replication link

Dedicated SAN
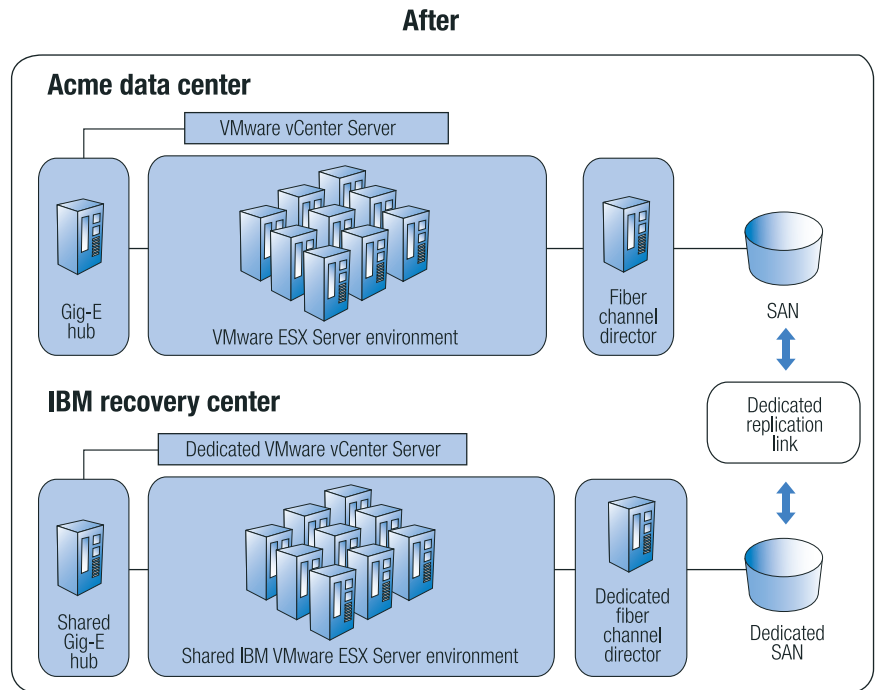
Figure 2
The disk replication solution from IBM cut Acme's total monthly costs by 15 percent and recovery time from days to minutes with far less risk.

Again, whether you're running physical servers or virtual ones, virtualizing your DR provides major benefits, including faster RPOs and RTOs, improved recovery reliability, reduced risk and smooth recovery to nonlike hardware.

Highlights

Embracing virtualization for both production and recovery helps position Acme and other clients for the next wave of IT—cloud computing.

The future

Acme's embrace of virtualization technologies in its production and recovery environments has the serendipitous benefit of positioning the company for the next wave of IT: cloud computing. Cloud computing turns virtual machine images into interchangeable workloads that can be run on any server in a network of Internet-connected servers. Right now, the tools to migrate virtual machines in real time across data centers in the cloud do not exist. But by modularizing its applications in virtual machines, Acme is well positioned to place and manage its applications in the cloud when those tools arrive.

Why IBM?

With more than 1,600 dedicated business continuity professionals and more than 150 business resilience centers located around the world, respected industry analysts have recognized IBM as a leader in business continuity and resilience. Our virtually unparalleled experience is based on more than 40 years of business resilience and disaster recovery experience and more than 12,000 disaster recovery clients. Further, IBM has been in the systems business for 50 years, and just about no other company understands systems like IBM does. Using our vast business process and technology expertise, we can help you design and implement a business resilience solution that meets your organization's needs.

IBM®

For more information

To learn more about virtualizing disaster recovery and ensuring business resiliency, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web site:

ibm.com/services/continuity

Recyclable, please recycle