Zerto has revolutionized the industry with a software-only IT Resilience Platform for enterprise-class replication that’s purpose-built for virtual environments.

Virtualization of the data center has proven to be a true IT game-changer, providing increased flexibility and control in managing production workloads, as well as significantly streamlining implementation and operational support. Organizations continue to expand their virtualization initiatives to private, public and hybrid cloud environments.

To more fully realize the benefits of virtualization and get the most out of their investments, organizations need to optimize all IT processes and activities for their virtual environment. This includes security, compliance, and business continuity/disaster recovery (BC/DR). Of the three, BC/DR is perhaps the most difficult because until Zerto’s IT Resilience Platform solution, there were no simple, agnostic virtual-ready remote replication methods that organizations could adopt.

**BACKGROUND**

Most common replication technologies and methods essential to mission-critical BC/DR initiatives have been tied to the physical environment. Although they do work in the virtual environment, they aren’t optimized for it. Physical hardware dependency undermines the benefits of virtualization and leads to significant operational and organizational challenges. Among them:

- If a replication solution isn’t virtual-ready, management overhead could be more than doubled. Many of the benefits achieved through virtualization, therefore, could be lost in the disaster recovery sphere.
- Virtualization is scalable, but traditional BC/DR methods are not. Customer data is always growing, so a company can find its information inventory expanding exponentially with a replication solution that can’t keep pace.
- In an increasingly heterogeneous IT environment, some replication methods remain firmly tied to a single vendor and hardware platform, limiting the organization’s ability to obtain newer, best of breed solutions – and service – at the best price.

Clearly, there was a critical need for BC/DR to become aligned with the promise and reality of virtualization in the data center. Competitive and compliance-related pressures are at an all time high, and organizations need every advantage to ensure excellence in their BC/DR capabilities.

With the introduction of hypervisor-based replication, Zerto elevates BC/DR up the infrastructure stack where it belongs: in the virtualization layer.

Not only are today’s array-based, guest/OS-based, and appliance-based replication technologies not optimized for the virtual environment, most were developed specifically for use with physical IT assets. As such, all three have issues that inhibit the efficiency and effectiveness organizations require. A brief review of the structures and limitations of these methods will help to amplify the advantages and benefits of Zerto’s virtual-ready, hypervisor-based replication solution.
Array-Based Replication: Insufficient Granularity

Array-based replication products are provided by the storage vendors and deployed as modules inside the storage array. They are single-vendor solutions, compatible only with the specific storage solution already in use. Legacy solutions, such as array-based replication does not have the granularity that is needed in a virtual environment.

- Relationship between the VM and storage is fixed, eliminating the flexibility of the virtual environment.
- Entire LUN is replicated, whether it is 40% or 90% utilized – increasing power, cooling and storage costs.

Figure 1: Array-based replication requires strict relationships between the virtual and storage environment, undermining the investment in virtualization.

Array-based replication has other important disadvantages as well, such as:

- It is designed to replicate physical entities rather than virtual entities. It doesn’t “see” the virtual machines and is oblivious to the configuration changes. Due to their dynamic nature, virtual environments have a high rate of change. As a result, BC/DR plans will be out of sync with the current production environment.
- It requires multiple points of control: In addition to the physical storage array’s management console, IT also is managing virtual assets from a virtualization management console, such as VMware’s vCenter.
- Though optimized to work with an organization’s existing storage array, it locks in the organization to a single vendor, with no flexibility to try new storage arrays, and thus, reducing the opportunity for innovation.

When we purchased the software, we knew it would improve our BC/DR process, but we got so much more. We reduced our storage footprint by more than 40%. We never expected that. Now, we do not have to purchase storage for the foreseeable future, which is a huge savings for us.

Bill Rausch
Software Engineering Manager,
HAPO Community Credit Union

Guest/OS-Based Replication: Impossible to Scale

Guest/OS-based replication solutions comprise software components that must be installed on each individual physical and virtual server. Although much more portable than array-based solutions, guest/OS-based replication solutions are not fit for enterprises for the following reasons:

- Having to install a module on every single server limits scalability and makes it impossible to implement and manage in high-scale enterprise environments.
• Shadow virtual machines (VMs) are often part of the implementation, putting increased burden on the IT team with increased management complexity.

• There are no consistency groups, each VM is protected individually. This is counter intuitive to applications that typically span across multiple VMs.

Appliance-Based Replication: More Moving Parts

Appliance-based replication solutions – such as EMC RecoverPoint – are similar to array-based solutions. They are hardware-based and specific to a single platform. The main difference is that the replication code runs on an external, physical appliance instead of inside the storage arrays themselves. This gives it an advantage over array-based solutions because it is more flexible and does not consume array resources.

When it comes to protecting virtual environments, however, appliance-based solutions suffer from the same disadvantages as the array-based products. Specifically:

• They are designed to replicate physical entities rather than virtual entities. It doesn’t “see” the VMs and is oblivious to configuration changes – and due to their dynamic nature, virtual environments have a high rate of change. As a result, BC/DR plans will be out of sync with the current production environment.
• They replicate physical entities rather than virtual entities. Their focus, therefore, is the logical unit rather than the VM. This lack of granularity conflicts with the requirements and promise of virtualization.

• They require dual points of management: the physical management console and the virtualization management console.

• Entire LUN is replicated, whether it is 40% or 90% utilized – increasing power, cooling and storage costs.

• Included here is VMware vCenter Site Recovery Manager. This orchestration piece provides limited automation of failover and failback and it requires constant coordination that greatly increases management complexity.

**We really like the simplicity of having full automation and orchestration, combined with robust replication in just one product. I had two separate products – VMware SRM and RecoverPoint – which was challenging to manage. For example, when a new version of vSphere was released it had a feature I wanted to leverage. In order to use it, and ensure BC/DR would not be affected, I had to upgrade not only vSphere, but also SRM, RecoverPoint and the array; it was just too much.**

*Zerto is not only easier to manage, but it handles VSS checkpoints seamlessly and the ability to easily rollback a failover streamlines our BC/DR processes.*

Zach Dickins  
Senior Network Administrator  
Rapidparts, Inc

**The Best Approach: Hypervisor-Based Replication**

Because these three different categories of replication technologies are designed for physical IT environments, they have critical limitations in a virtual context. They undermine the investment made in virtualization and limit its functionality. To fully benefit from virtualization without compromising on BC/DR, a new approach is required.

Before virtualization, replication was managed at the storage layer, which made perfect sense because that’s where the information was. If there is a physical box you want to keep track of, you could track it with physical sensors. But in a virtual environment, the boxes aren’t (or aren’t all) physical, so putting a physical sensor on a virtual box isn’t going to help you monitor its contents.

This historical problem is common. One technology often advances at a faster rate than others, creating a capability gap. Virtualization offers extraordinary capabilities and benefits, but they cannot be fully realized unless and until other technologies within the data center evolve to enable them. Managing a virtual or hybrid environment from the physical storage layer makes it harder to fully leverage the benefits of virtualization and inhibits the move to the cloud.

That’s why Zerto realized the need to move replication up the stack – above the resource abstraction layer – into the virtualization/hypervisor layer. And that’s how hypervisor-based replication was born.

**Zerto Architecture: Simple, Effective, and Virtual-Ready**

Zerto’s virtual-aware, IT Resilience Platform™ provides an enterprise-class replication solution that’s purpose-built for virtual environments. The company’s innovative hypervisor-based replication solution is currently the first and only solution that delivers enterprise-class, virtual replication and BC/DR capabilities for the data center and the cloud.
At the heart of this replication technology are components that are easily deployed:

- **Zerto Virtual Manager (ZVM)** – The ZVM plugs directly into the virtual management console (such as VMware’s vCenter), enabling visibility into the entire infrastructure. The ZVM is the nerve center of the solution, managing replication for the entire vSphere domain, keeping track of applications and information in motion in real time.

- **Virtual Replication Appliance (VRA)** – The VRA is a software module that is automatically deployed on the physical hosts. The VRA continuously replicates data from user-selected VMs, compressing and sending that data to the remote site over WAN links.

Because it is installed directly inside the virtual infrastructure (as opposed to on individual machines), the VRA integrates with the hypervisor to replicate any protected VM’s data change. Each time the VM writes to its virtual disks, the write command is captured, cloned, and sent to the recovery site. This is much more efficient, accurate, and responsive than prior methods.

Unlike some replication technologies that primarily offer data protection with cumbersome snapshots and backup paradigms, Zerto’s solution provides continuous replication with zero impact on application performance.

Hypervisor-based replication is fully agnostic to storage source and destination, natively supporting all storage platforms and the full breadth of capabilities made possible by virtualization, including high availability, clustering, and the ability to locate and replicate volumes in motion.

Finally, it installs seamlessly into the existing infrastructure. The carefully architected application configuration does not need to be changed in anyway. Zerto’s IT Resilience Platform™ enables IT administrators to continue to architect for performance and to meet SLAs rather than BC/DR.

**Journal-Based Recovery**

With Zerto, all replicated changes are stored in a journal for up to 30 days providing incredible recovery granularity through checkpoints inserted every few seconds. This reduces data loss to just seconds by enabling recovery of files, VMs, applications or entire sites, either to the latest point-in-time or, for example, when the VM is attacked by a virus or ransomware, to a point-in-time before the attack.

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**Diagram:**

- **vSphere**
  - vCenter
  - ZVM
  - VM
  - VRA
  - VPG

- **Hyper-V**
  - vCenter
  - ZVM
  - VM
  - VRA
  - VPG

- **Microsoft Azure**
  - ZCA
  - Database

- **Amazon Web Services**
  - ZCA
  - Database

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Figure 4. Hypervisor-based replication aligns the production and BC/DR strategy, extending all the benefits and flexibility of virtualization to the data protection and data mobility strategies.
Application-Centric Protection: Another Important Differentiator

Today’s applications are rarely run on a single VM, but instead most applications have multiple VM dependencies. Traditional methods of protecting VMs individually result in significant challenges to recovering complete applications quickly. Zerto resolves this by using our Virtual Protection Group (VPG) capability. VPGs allow you to protect multiple VMs together in a consistent fashion, ensuring every point in time that is inserted into the Zerto Journal is from the same point in time for all VMs within the VPG. This allows consistent recovery of an entire application, and all its VM dependencies, to a consistent point in time.

Zerto Long-Term Retention

Introduced in Zerto 7.0, Zerto long-term retention leverages the data at the replication site for a backup. This removes the traditional overhead and management burdens of the backup processes and infrastructure from the production site. With backup and BC/DR operations in the same user interface, it is easier to identify gaps in the data protection strategy while simplifying the management of data protection operations.

Granularity

The ability to replicate at the correct level of any virtual entity, be it a single VM or a group of VMs is critical. Zerto's solution can replicate all VMs consistently, along with all of the meta data. This ensures that the entire application infrastructure can be recovered in the event of a disaster.

A typical enterprise application includes a web server, application server, database server, etc., and all have their respective disks. Today, administrators tend to put all those disks in a single logical unit in storage so they can replicate the entire application at once without having to search for its individual components. The problem is that this means the entire logical unit must be replicated, even though it may contain other applications that are not in need of replication. That lack of granularity – where administrators cannot identify specific applications and application components to replicate – is inefficient.

When I first heard about Zerto I was skeptical. Now that we have it deployed, I call it a miracle for BC/DR. We have very aggressive service levels to meet – we must have our mission critical applications up in 15 minutes. With Zerto, we can recover our Microsoft SQL Server database, Exchange, File servers and other applications well within our SLA.

Uzah Chinedu
Infrastructure Manager
Leadway Pensure PFA Limited
For example, a given CRM application may span across eight virtual machines deployed on four physical servers, using five different data stores located on three different logical units. With hypervisor-based replication – and only with hypervisor-based replication – centralized management through the hypervisor layer enables the solution to find what it’s looking for no matter where it is located.

That is simply impossible with prior, non-virtual-ready replication technologies. The goal is full consistency between and among all application components. With hypervisor-based replication, that goal is achieved.

**Scalability**

We believe that the virtual machine is the new atomic unit for replication strategies. Zerto works at the virtualization level, which allows us greater flexibility in the type of storage we replicate to and removes the limitations around LUN-based consistency groups. This solution adds a deeper level of control of recovery time objective (RTO) and recovery point objective (RPO) in a virtual environment than traditional replication methods.

R. Todd Thomas
Chief Information Officer, ARA

There are two aspects of scalability: deployment and management. As a virtual infrastructure grows, an organization’s DR capabilities must grow with it seamlessly, without having to purchase, install, and configure additional proprietary hardware. Zerto’s hypervisor-based replication solution is software-based so it can be deployed and managed easily, no matter how fast the infrastructure expands. The solution also enables administrators to perform operations and configure policies at the level of the VMs or applications.

**Ease of Management**

With no guest-host requirements or additional hardware footprint, Zerto’s solution is easy to manage.

It simply resides in the hypervisor, enabling centralized management from the virtual management console (such as VMware vCenter). Organizations can now manage everything from the same console. Because it is software-based, it is user-installable (the VRA install process itself is automated), user-configurable, and scalable.

**Server and Storage Motion**

One of the great advantages of the virtual environment is the ability to quickly move VMs around from one physical

Our customers are running their businesses 24 hours a day, 7 days a week and they require short outage windows for migrations to minimize disruptions. With Zerto, we are able to cut over applications in just 15 minutes. The setup is very simple and does not require customers to change anything in their environments. Within minutes we are replicating the applications to the new location with no disruption to the environment. We will be using Zerto for our next migration project.

TJ Tran
Platform Architect, Fujitsu

server or array logical unit (data store) to another. This might be done for load balancing or other strategic data management reasons. With VMware, this is accomplished manually through vMotion or automatically using Distributed Resource Scheduler (DRS). Only hypervisor-based replication supports this capability, continuing to locate and replicate data no matter where it resides or where it is moved.
Hardware-Agnostic

Hypervisor-based replication is hardware-agnostic, supporting all storage arrays, so organizations can replicate from anything to anything. In today’s increasingly heterogeneous IT environment, this allows users to mix storage technologies such as Storage Area Network (SAN) and Network-Attached Storage (NAS), and virtual disk types such as Raw Device Mapping (RDM) and VMware File System (VMFS).

Remarkably Effective

In BC/DR, the two key metrics are Recovery Point Objective (RPO) and Recovery Time Objective (RTO). The former is an indication of the amount of data at risk of being lost between data protection events and how long until all the data at risk is recovered. The latter refers to the amount of time it takes to recover from a data loss event and return to normal operation and availability. Zerto’s hypervisor-based replication solution achieves RPO in seconds and RTO in minutes.

CONCLUSION

If you have a virtual or hybrid environment, realizing the full benefits and promise of virtualization means your replication solution must be virtual-aware and ready. Zerto’s hypervisor-based replication technology is the first and only solution that delivers virtual replication and BC/DR capabilities for the data center and the cloud.

As your information and virtual initiatives grow over time, Zerto’s purpose-built hypervisor-based replication solution will position you for growth and optimize your business continuity and data protection needs.

To see how Zerto can work in your environment, schedule a demo.

The flexibility and usability of the Zerto solution was the deciding factor in our decision. Because the technology is hardware and storage agnostic, it provides us superior protection encompassing our entire environment, without the need for vendor-specific solutions. The singular management interface allows us to seamlessly manage our replication groups within the vSphere client, and provides excellent visibility of the replication statistics and process. Setup and configuration were quick and painless, and were completed within only a few hours. Zerto has proven to be indispensable in our environment and we are very pleased with the results we’ve seen.

Erik Rasmussen
System Administrator

About Zerto

Zerto helps customers accelerate IT transformation by eliminating the risk and complexity of modernization and cloud adoption. By replacing multiple legacy solutions with a single IT Resilience Platform, Zerto is changing the way disaster recovery, data protection and cloud are managed. With enterprise scale, Zerto’s software platform delivers continuous availability for an always-on customer experience while simplifying workload mobility to protect, recover and move applications freely across hybrid and multi-clouds. www.zerto.com

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