WHITE PAPER

Dell AIM Delivers Automated Workload Mobility for Virtualization and Private Cloud

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IDC OPINION

The increasing complexity of highly virtualized datacenters and cloud environments comes at a time when IT organizations are finding it hard to add headcount and business users are demanding faster responses to new service requests. Virtualization provides the technology needed to dynamically share compute resources across multiple workloads. Cloud takes virtualization a step further by providing self-serve access to pooled compute, storage, and network resources that are dynamically allocated as needed to different workloads and business services. Both virtualization and cloud reduce IT capital costs, improve resource utilization, and enable IT organizations to better meet business needs.

To take full advantage of virtualization and cloud, IT organizations need to standardize workload configurations and policies and streamline the way that workloads are moved across physical and virtual resources. Automated workload mobility management products such as the Dell Advanced Infrastructure Manager (AIM) enable IT organizations to improve performance and add business value by:

- Improving business continuity and disaster recovery by automatically replicating and restoring workloads in the event of a hardware failure or power outage
- Improve application development and testing productivity by enabling capacity-on-demand solutions in labs
- Reduce power, cooling, and IT staff costs by optimizing workload placement and resource sharing

The most effective workload mobility and recovery management solutions will integrate tightly with existing virtualization and cloud management processes and tools and enable IT administrators to streamline and automate many tasks that might have formerly involved multiple tools and time-consuming, error-prone configuration tasks.

IN THIS WHITE PAPER

This paper describes the reasons why the increasing use of virtualization and cloud architectures creates new IT requirements for workload mobility and recovery. The paper identifies the more important attributes that customers should evaluate when considering these types of solutions and discusses how Dell is addressing these requirements with AIM.
SITUATION OVERVIEW

Enterprise IT Infrastructures in Transition

Virtualization has emerged as an important technology to help IT organizations operate more efficiently and effectively in support of emerging business and IT priorities. IDC’s research indicates that by 2013, over 90% of North American IT decision makers expect that at least some of their production workloads will be supported by virtual servers. The majority of organizations also expect to be using private cloud architectures to support at least some production workloads.

As shown in Figure 1, of the 679 U.S. enterprise IT decision makers polled in July 2011, almost a third (32.4%) described their private cloud initiatives as proven and established and already running production workloads. Another third (36.7%) described their efforts as early-stage implementations, including pilots and planning programs. In some cases, organizations referred to virtualized environments as private clouds even though they had not yet fully implemented the self-serve provisioning capabilities that are typically part of full cloud environments. Most plan to get there but still have some work to do.

FIGURE 1

Current State of U.S. Private IT Cloud Environments

![Pie chart showing the distribution of private cloud initiatives: 32.4% proven/established, 36.7% planning/pilot, and 30.9% no plans currently.]

Source: IDC’s U.S. Private IT Cloud Systems Management Survey, July 2011

It is clear that collectively virtualization and cloud are becoming increasingly important in shaping IT strategies and datacenter architectures for the majority of enterprise-class organizations. As a result, applications, middleware, databases, and infrastructure are less and less likely to be tightly coupled and business users are no longer willing to wait weeks or months for new applications and services to be implemented. Today’s IT environments are dynamic, and end users, who have been conditioned by the always-on, fast-changing nature of Internet and mobile applications, expect nearly instant support for rapidly changing business requirements.
Business users have become sophisticated IT consumers, expecting to be able to access applications at any time and from any place using any device. Application development teams access public cloud services when internal IT resources are not immediately available. The result is a highly complex and dynamic environment where a failure in one system or network element could wreak havoc with multiple applications and mission-critical business services.

**Operational Challenges Proliferate**

IT organizations are being forced to manage these increasingly complex and heterogeneous physical and virtual IT environments, but they are rarely able to increase headcount or to invest in staff training and support. Simultaneously, downtime windows are shrinking, and it becomes more and more challenging to isolate and remediate the root cause of a problem in highly interdependent multitier architectures.

To further complicate matters, more organizations expect to rely on a mixture of virtual, physical, and cloud resources for a number of years, based on the specific needs of application, database, and middleware workloads, as well as corporate policies related to compliance, change control, and risk management. In these hybrid environments, some workloads will rely on traditional architectures and will be supported by dedicated physical servers, while others will be supported by internal virtualized servers. Yet other workloads will reside on public cloud service hosts, and some workloads may migrate back and forth across public and private resources.

Each workload will have different security, configuration, and operational settings and require different memory, I/O, storage, and network connectivity configurations. Many organizations may run multiple operating systems and rely on infrastructure hardware and operating systems from a variety of vendors.

Effective, automated workload mobility and recovery (i.e., the ability to rapidly replicate, restore, and migrate standardized workloads and associated storage and network connectivity across physical and virtual systems) is particularly critical in these types of environments. Automated workload mobility and recovery allows IT organizations to make the most efficient use possible of physical and virtual resources while ensuring compliance with business SLAs and security policies. It also allows them to streamline and simplify operational workflows, reduce human error, and ensure configuration control and standardization.

**Role of Workload Mobility in Efficient Dynamic Datacenter Operations**

Compared with traditional server provisioning automation solutions, workload mobility software treats the entire workload (e.g., operating system, application, and middleware) as a bootable image with associated metadata about storage and network connectivity that allows the complete workload to be automatically deployed, moved, and restored as needed. In some cases, this capability is tightly bundled within vendor-specific hardware or hypervisor platforms. However, for organizations that want to optimize workloads across multivendor environments and resources,
standalone solutions can be more appropriate. Typical use cases for this technology include:

- **Disaster recovery/business continuity** can be simplified and automated by using workload mobility and recovery tools to shift workloads proactively before end users experience service outages and to quickly shift to backup bare metal compute resources when hardware or power failures are experienced.

- **Green IT/power and cooling optimization** can be improved by using workload mobility to consolidate workloads and free capacity that can be powered off when not needed. Workload mobility software can also move workloads to address concerns about hot spots in the datacenter by relocating workloads to cooler areas.

- **Technology migration** can be accelerated using workload mobility automation to retarget workloads from older compute platforms to newer resources. This can include supporting physical to virtual, virtual to virtual, or physical to physical migrations as well as enabling hardware upgrades across dissimilar vendors’ servers. The scenario also supports capex reduction due to workload consolidation and the transition from physical to virtualized architectures.

- **Lab productivity** can be improved by capturing network bootable images of various development and test workloads so that they can be quickly replicated as needed.

In each of the preceding scenarios, IT staff is able to operate more efficiently, maintain service levels, and avoid human error. All of these use cases require the ability to respond to changing conditions in minutes rather than the hours or days that would be required using manual workflows and traditional provisioning tools and processes. Figure 2 provides an example using a simple disaster recovery scenario.

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**FIGURE 2**

*Workload Mobility Disaster Recovery Scenario*

Source: Dell, 2011
In this scenario, a failed server’s workload can be rapidly replicated onto any spare server anywhere in the infrastructure. Workload mobility management solutions can detect the failure and retarget the failed server’s image to any available physical or virtual server.

**FUTURE OUTLOOK**

**Effective Workload Mobility and Recovery Management Solutions for Complex Dynamic Environments**

Workload mobility and recovery software separates workloads from hardware dependencies, enabling IT organizations to assign resources more flexibly and to respond to changing business requirements more quickly. As more and more workloads become virtualized and shift into cloud environments, IT organizations will need workload mobility solutions that can:

- Support heterogeneous compute, storage, network, hypervisor, operating system, middleware, database, and application platforms and environments
- Integrate seamlessly with existing infrastructure and virtualization management tools and processes
- Automate asset and configuration discovery
- Automatically detect and respond to server failures
- Replicate, boot, retarget, and reconnect workloads across multiple clusters and locations
- Boot and restore from bare metal in a secure and reliable manner
- Manage storage and network configurations including VLAN connectivity to enable migration without recabling
- Scale modularly over time as needed
- Be supported by a large ecosystem of third-party partners
- Provide SDKs and open APIs that enable customers, partners, and ISVs to easily extend the range and type of managed systems

Potential customers must evaluate the needs of their organization and consider how plans to evolve to more dynamic cloud environments will impact them over time. Organizations that are committed to heterogeneous hypervisor and hardware environments need to be particularly careful to select solutions that can accommodate a wide range of solutions cost-effectively.

Likewise, organizations need to prioritize solutions that will easily integrate with existing monitoring and provisioning environments and workflows to deliver value quickly with minimal disruption.
**Dell AIM**

Dell AIM addresses many of the previously discussed requirements. Specifically, AIM provides Windows and Linux workload mobility and recovery across heterogeneous physical and virtual compute, network, and storage platforms by capturing network bootable images of the specific server builds used to support production business systems. This includes accurate copies of network and storage configurations. Dell refers to these images as personas.

When workloads need to be restored or replicated, AIM utilizes existing storage replication technology to boot and run remote servers from remote copies of the same persona that is running on production servers. Personas can be retargeted to new bare metal machines from different vendors, allowing datacenter staff to reuse existing assets or quickly activate new resources.

By freeing the business application from needing to be tightly coupled to specific hardware platforms, AIM enables IT organizations to quickly scale up and scale down heterogeneous environments as needed, without having to spend time and effort on physical recabling or manual changes to SANs and LANs. Figure 3 illustrates the scope of the Dell AIM integration architecture.

![Dell AIM Integration Architecture](image)

**F I G U R E 3**
Dell AIM Integration Architecture

Dell provides an off-the-shelf plug-in to connect AIM to several important third-party management platforms, including VMware vCenter, Microsoft System Center, and BMC Atrium. This allows IT administrators to access the most frequently used AIM functions via tabs in the consoles they use for most of their day-to-day activities. This capability can enable IT teams to operate much more efficiently. AIM's switch qualification SDK and open APIs allow partners and ISVs to build connectors and management packs for AIM integrations with a wide variety of management consoles.
AIM can be implemented as a standalone software product or factory integrated and pretested on selected Dell platforms. The tool includes automatic server discovery and remote power control capabilities, which can be activated on their own or as part of a more aggressive automation program. Personas can be created one at a time and validated via such routine tasks as centralized booting.

AIM currently supports VMware, Hyper-V, and Red Hat hypervisors as well as heterogeneous x86 server and storage platforms and network equipment from Dell, Intel, Cisco, Juniper, and Brocade, among others. Dell also provides consulting services to help customers craft operational strategies to take advantage of AIM, including strategy workshops, assessments, and proof-of-concept programs.

CHALLENGES/OPPORTUNITIES

Many enterprise datacenter operations teams have been ill-prepared for the torrid pace at which change and complexity are escalating in today’s complex, heterogeneous datacenters. For Dell, this is both an opportunity and a challenge. With the availability of AIM and related tools such as the Dell Lifecycle Controller and VIS Creator as well as a series of management plug-ins for major systems and virtualization management consoles, Dell has more infrastructure management and automation solutions to offer customers than ever before.

The challenge for Dell is that it has not traditionally been viewed as a source for sophisticated systems management and automation solutions. Dell has its work cut out for it in order to gain credibility with enterprise datacenter management and automation software buyers. Dell is addressing this challenge by hiring dedicated software sales specialists and sales engineers. In addition, Dell’s global network of Dell Solution Centers offer remote and local demonstrations of AIM technology and use cases. AIM demos can be set up quickly to easily illustrate how simple deployment and operation can be. The more Dell is able to demonstrate its capabilities to customers, the more likely the firm’s solutions are to be seen as valuable options.

ESSENTIAL GUIDANCE

CIOs, datacenter architects, and IT operations teams need to move quickly to take full advantage of investments in virtualization and cloud. Standardizing workloads and implementing automated workload mobility and recovery solutions across physical and virtual system resources will help IT organizations improve business continuity, reduce costs and business risks, and provide better, more flexible service levels to business stakeholders.

IDC’s research consistently indicates that IT leaders understand the value of automation but are often slow to implement it due to the cultural and organizational changes that may be required. As line-of-business decision makers find themselves with more and more options for sourcing computing services from outsourcers, cloud service providers, and SaaS providers, it is imperative that datacenter teams be proactive and aggressive in creating highly efficient environments that are not only more cost-effective than the alternatives but also more responsive to the business and better able to help the organization differentiate itself around the world.
Workload mobility and recovery solutions are important building blocks for creating and efficiently managing large-scale, dynamic virtual and cloud datacenter environments. Organizations that want to maintain business continuity, reduce risk, cut power and cooling costs, and accelerate technology migration should include workload mobility and recovery capabilities in their overall datacenter management toolkit.

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