Virtualized enterprise storage for flexible, scalable private clouds

By Timothy Sherbak, Nicholas Sweere, and Vikram Belapurkar

Featuring a virtualized, enterprise storage architecture and tight integration with VMware® software, the Dell™ Compellent™ Storage Center™ SAN helps boost IT agility by efficiently scaling to meet the needs of growing private cloud deployments.

After virtualizing servers to enhance IT efficiency, many large organizations are now turning to private clouds in the virtual data center to boost agility. Private clouds can advance IT agility while reducing operational expenses by offering self-service capabilities to end users—leading to an IT-as-a-service (ITaaS) model. Self-service helps reduce the amount of manual provisioning required by IT staff, enabling end users to obtain resources quickly and freeing IT staff to focus on high-level, innovative projects that further the mission of the enterprise. Private clouds also enable organizations to better accommodate seasonal demand spikes, quickly seize new business opportunities, and effectively track the costs of delivering IT—all fostering a strong partnership between IT and lines of business. In these environments, measures of success extend beyond traditional metrics of capital expenditures, operating expenses, and availability to include responsiveness, compliance, and time-to-market goals.

Adopting a flexible, adaptable, and scalable storage infrastructure is paramount for supporting the virtualized applications running in a private cloud. In particular, virtualized storage is well suited to a private cloud, enabling IT groups to create a dynamic, on-demand environment that can quickly accommodate changing organizational needs while controlling costs. The Dell Compellent Storage Center storage area network (SAN) array offers virtualized storage that is designed to meet enterprise storage requirements for private cloud environments.

📺 Virtualization tools for enabling the cloud

Darren Thomas, vice president and general manager of Dell Storage, discusses how the Dell partnership with VMware helps advance cloud computing initiatives.

compellent.com/popups/DarrenThomas.html

Built on the Dell Fluid Data™ architecture, the Compellent storage array creates a shared pool of virtualized storage that complements a VMware vCloud™ private cloud environment. Just as the VMware software abstracts resources from physical servers, Storage Center abstracts storage attributes from the physical storage system, presenting a consolidated pool of shared storage resources to VMware ESX® clusters managed by VMware vCloud Director. Administrators can modify the storage tier, RAID level within a storage tier, drive type, and server connectivity depending on specific workload needs—without affecting how the storage appears to the servers.

Performance and cost control with automated tiered storage

Over time in a private cloud, some applications and their data sets reduce their resource utilization while others scale and expand to meet the needs of new organizational initiatives. In this dynamic environment, IT groups look for ways to manage and migrate data efficiently within the storage environment so that they can optimize storage infrastructure while maximizing cost efficiencies.

The automated tiered storage capabilities of the Dell Compellent Storage Center array, available through built-in Dell Compellent Data Progression™ software, streamline the process of data movement so that storage performance for different application workloads is optimized intelligently and automatically. Data Progression automatically classifies and moves block-level data among
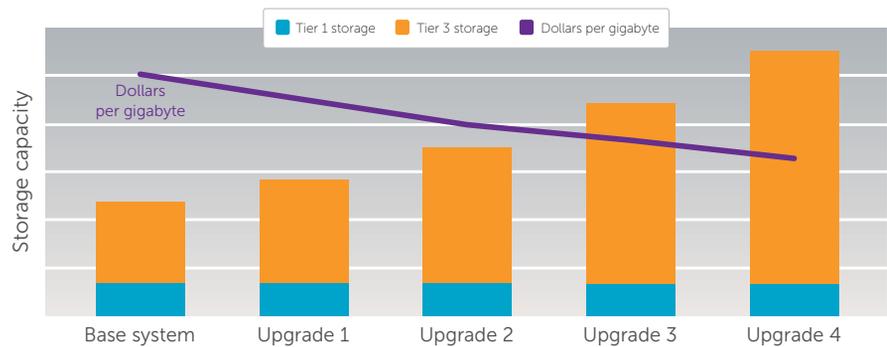

Figure 1. By automatically moving infrequently used data from high-performance tier 1 storage to less-expensive tier 3 storage, Dell Compellent automated tiered storage capabilities help organizations scale capacity cost-effectively

storage tiers and RAID levels based on the frequency of data access. Data is initially written to the array's highest-performing storage tiers, which enables excellent write performance to the benefit of applications accessing the array. Frequently accessed data is maintained on these high-performance drives, such as solid-state drives (SSDs), while less frequently accessed data is moved to slower, larger-capacity, more cost-effective disk drives.

The block-level approach helps create a finely tuned, high-performance environment that is designed to increase the efficiency of data movement, because the system reads and writes small blocks. In addition, since Data Progression identifies and moves data intelligently and automatically based on predefined rules, it eases storage administration.

Data Progression also helps reduce costs. By moving less-frequently accessed data from high-performance drives to cost-effective drives, Data Progression enables IT groups to reduce the need to buy additional high-performance drives (see Figure 1).

In addition, Compellent storage is designed to allow administrators to selectively pin workloads to specific tiers of storage. This flexibility is particularly beneficial in cloud-based environments with multiple service levels. For example, by mapping specific workloads to specific tiers of storage, cloud administrators and service providers can offer and easily manage gold, silver, and bronze levels of service.

Rapid, agile scalability and growth

As organizations introduce self-service IT capabilities for business groups, the IT team must ensure that it can provide the storage capacity necessary to accommodate applications and virtual machines (VMs) provisioned by those groups, while maintaining consistent performance levels. To help conserve capacity, the Dell Compellent Storage Center array leverages the thin provisioning capabilities of built-in Dell Compellent Dynamic Capacity™ software, which separates storage allocation from utilization. Administrators

(or self-service users) can provision storage volumes of any size for virtualized applications, but physical capacity is consumed only when data is actually written to disk. If and when an application requires additional capacity, the SAN can automatically provision capacity on demand from the pool of unused storage. As a result, Dynamic Capacity spares administrators the need to buy excess capacity up front.

When it is time to purchase physical capacity, Compellent storage offers simple, nondisruptive capacity expansion into the virtualized pool. Pre-existing storage workloads automatically benefit from the expanded capacity and disk performance without reconfiguration or additional tuning.

Unlike traditional infrastructure designs that force organizations into technology overhauls because of obsolescence, Storage Center is designed for persistence. Organizations can nondisruptively upgrade the system as needed, incorporating new generations of controller, disk, and network technologies without incurring expensive forklift upgrades. In addition, organizations retain their software licenses even as they

upgrade the system with next-generation controllers, helping preserve software investments and significantly reduce storage infrastructure costs over the long term.

The flexibility and agility of private cloud environments that are based on the Compellent storage arrays are also enhanced by direct integration and support within Dell hybrid-cloud service offerings. Private clouds hosted in an IT organization can be augmented using Dell Cloud with VMware vCloud Datacenter Services. This offering enables organizations to securely extend their private cloud environments using IT resources hosted within a Dell data center.

Streamlined storage administration through VMware integration

By offering tight integration with VMware management tools, the Dell Compellent Storage Center array facilitates essential storage administration tasks for the private cloud. For example, the Dell Compellent vSphere plug-in helps improve IT agility and the efficiency of managing a VMware vSphere™ environment. In many enterprises, the vSphere administrator must request

resources from the storage team to provision new VMs; this potentially time-consuming process can limit the ability of IT to respond quickly to business requests. The plug-in enables the vSphere administrator to provision and manage Dell Compellent–based storage for VMs directly from within the familiar vSphere interface, without needing to submit requests to the storage team. The virtualization team can manage data stores, assign snapshot profiles, take VM-consistent snapshots of running VMs, and view storage and server statistics without intervention of the storage team—and without the need to move between the vSphere and Dell Compellent Enterprise Manager interfaces.

Advanced storage monitoring capabilities within the Storage Center environment are designed to further simplify administration and facilitate capacity planning. Integration between Dell Compellent Enterprise Manager software and VMware vCenter™ Server management software enables the storage team to create volumes and map the volumes to VMware ESX Server hosts from within the Enterprise Manager interface. Enterprise Manager also can be set to map and rescan volumes automatically.

In addition, Enterprise Manager gathers statistics from vCenter about data stores, VMs, and associated volumes (see Figure 2), allowing the storage team to use a single interface to monitor how storage is being consumed across the virtualized data center. Enterprise Manager provides reports as well as alerts through e-mail or pager as thresholds are exceeded. As a result, storage administrators can manage performance and capacity, report showback of actual consumption by individual organizations, help ensure service levels are maintained, and anticipate and respond quickly to new storage needs.

These functions streamline storage management in the virtualized environment and provide a comprehensive view of storage
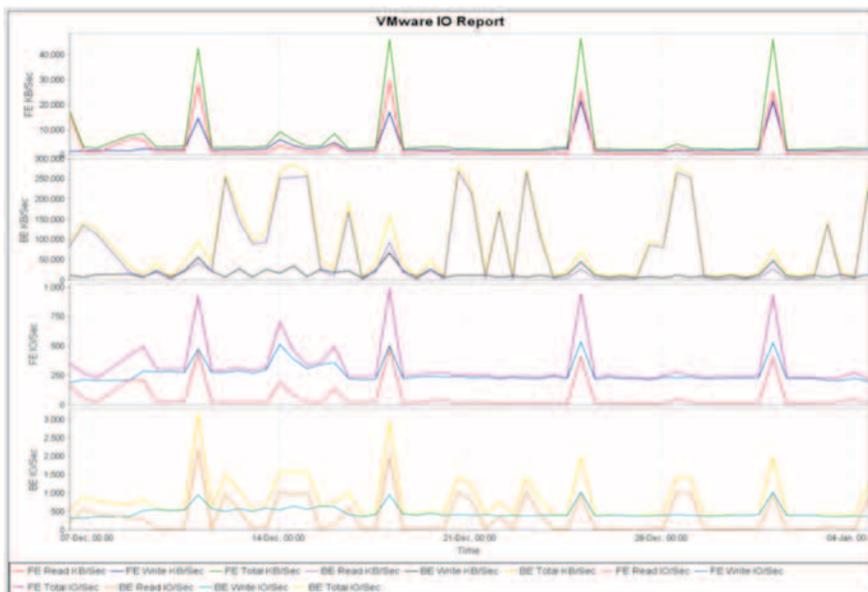

Figure 2. Dell Compellent Enterprise Manager provides robust reporting for VMware environments

resources. Moreover, automation helps reduce the risk of manual administration errors.

Efficient data protection for high resiliency

As organizations move mission-critical applications to the private cloud, IT groups must ensure continuous access to those applications and their associated data. The Dell Compellent Storage Center array includes a range of capabilities designed to protect data, deliver continuous availability, and facilitate rapid disaster recovery while minimizing additional storage footprint.

The Dell Compellent Server Instant Replay™ software tool is designed to protect data efficiently while reducing the capacity required to support a VMware virtualized environment. Creating a full clone of a VM can be a time-consuming process that uses significant storage space. With Server Instant Replay, administrators create space-efficient snapshots, or replays, of VMs without duplicating the allocated storage space. The software writes only the block-level data that has changed since the last snapshot, helping save backup time and storage capacity.

Dell Compellent Remote Instant Replay™ software replicates the space-efficient snapshots to remote sites as part of a disaster recovery strategy. This capability is integrated with VMware software through the Dell Compellent Storage Replication Adapter (SRA) for VMware vCenter Site Recovery Manager (SRM), which is available for download at no charge from the VMware Web site. The adapter provides administrators with a single point of contact—the VMware vCenter interface—through which they can implement robust disaster recovery plans using Compellent storage.

During a disaster, the adapter is designed to support automated failover and recovery of the Compellent storage array. The SRM software communicates directly with the array through the adapter, powering up VMs automatically in a predefined order.

Taking virtualization to the fast lane

To stay on the fast track to business efficiency, the IT group of Mazda North American Operations decided to test-drive a range of IT virtualization options. The IT group deployed a Dell Compellent Storage Center storage area network (SAN) array to provide a tiered and virtualized storage environment to support mission-critical applications virtualized with VMware software, including the company's SAP enterprise resource planning (ERP) applications.

Implementing a virtualized environment helped the company boost SAP performance while cutting annual server spending by 60 percent. The Compellent storage array allowed the company to leverage a dynamic, auto-tiered pool of storage resources shared by VMs instead of relying on the islands of storage associated with over 200 physical servers. By streamlining storage management, Storage Center also helped the IT group to refocus on more strategic, innovative projects.

To learn more about how Mazda leverages Dell Compellent storage, visit **qrs.ly/j61p9g6**.

In the case of planned outages, the Dell Compellent Live Volume software feature of the storage array helps organizations sustain availability. Live Volume enables VMs or physical servers to share a storage volume between two Compellent storage arrays in a semi-synchronous configuration. During a planned outage, administrators can designate the secondary system as the live volume and avoid user disruptions. In this way, IT groups can maintain availability, failing over quickly and efficiently without the need to move terabytes of data. In addition, administrators can use Live Volume with VMware vMotion™ software to migrate workloads over long distances in anticipation of weather events or other expected disruptions.

Integrated, virtualized storage for extended flexibility, scalability, and agility

As large enterprises build private clouds, virtualized storage has become a key component of the virtualized data center infrastructure (see the sidebar, "Taking virtualization to the fast lane").

By combining a virtualized storage architecture and management tools integrated with VMware software, the Dell Compellent Storage Center array offers a storage platform that helps organizations increase the flexibility, agility, and cost savings of their virtualized infrastructures. PS

Authors

Timothy Sherbak is director of storage solutions marketing in the Dell Enterprise Solutions Group.

Nicholas Sweere is a product marketing manager for Dell Compellent storage, focused on core applications and third-party integrations.

Vikram Belapurkar is a solutions marketing manager at Dell, focused on storage consolidation and virtualization solutions.

Learn more

Dell Compellent Storage Center:
dell.com/compellent

Dell Compellent and VMware alliance:
compellent.com/vmware