EMC's Latest VMAX and VPLEX Features Continue to Build the Cloud

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Management Summary

During the recent EMC World event in May, EMC announced enhancements to its *Symmetrix VMAX* networked storage platform and *VPLEX* information mobility and access solution. For the last two years running, the main theme of EMC World has been cloud computing. It also is the company's overarching strategy. So, it would be natural to ask: *How do the recent VMAX and VPLEX enhancements stack up to the cloud vision?* And, the short answer is: *In many ways.* Please read on for details.

Toward Cloud Computing

Cloud computing is a metaphor for delivering IT as an on-demand service over a network. Instead of building discrete systems and rigid, stationary silos of computing, cloud computing envisions a fluid, cohesive, efficient, precise, and cost-effective approach for delivering IT services to customers.

A good analogy is the electric grid. When you plug in a lamp or toaster at home and turn it on, it just works. You expect it to work and expect to receive a bill from the electric company for the exact number of kilowatt-hours consumed. You do not think about whether the electricity comes from a coal or natural gas fired plant or hydroelectric dam or solar panel or windmill. Neither do you think about the miles of cable and wire through which the electricity traveled to reach your house. You just depend on the power to live your daily life and trust it will be there nearly 100% of the time.

Cloud computing takes a similar service-oriented, utility approach. In this case, services are applications and computing platforms with particular levels of performance, availability, and pricing. The cloud is the infrastructure behind the scenes that generates and delivers the services. The industry broadly recognizes three types of clouds – *private*, *public*, and *hybrid*. A private cloud is the infrastructure your enterprise owns and operates in its data centers. A public cloud is one operated by an external service provider that serves multiple customers. Finally, a hybrid cloud is a combination of public and private, where an enterprise delivers services from its own data centers while leveraging service providers to satisfy certain requirements, such as meeting peak demands or archiving data or maintaining a remote failover site. A hybrid cloud implies data and even applications can shift securely and easily between private and public clouds.

You have probably heard that cloud computing is a journey because it is a strategic vision that reality moves toward in an evolutionary way. As technology develops and enterprises implement it, the cloud materializes. But make no mistake – *the cloud is now*. The technology for cloud computing is well advanced, if not yet perfect, and real benefits come to those who implement it. In fact, whether or not a person knows it, every organization and individual is moving toward cloud computing. It is inevitable. The difference is that those who are thoughtful and proactive will reap early benefits and the rest will arrive late.

Then what does a cloud look like? Opinions on this topic are varied, but we believe the fundamental characteristics of a cloud are as follows.

- **Virtualized** – In a cloud infrastructure, a logical abstraction layer allows computing resources to be allocated independently of the underlying physical assets. Virtualization enables fast and dynamic provisioning, multi-tenancy, higher utilization, efficiency, and lower costs.

- **Automated** – Through automation, a relatively small number of IT personnel can manage a large infrastructure. Automation minimizes the cost of management as well as the variable costs associated with growing an infrastructure. Capabilities include discovery, mapping, monitoring, analytics, diagnosis, and policy-based execution. Self-service provisioning by consumers, where appropriate, also is facilitated by automation.

- **Elastic** – Elasticity means effortless and non-disruptive provisioning of resources. This includes provisioning new virtual machines, storage volumes, network links, platforms, and application instances as well as growing and shrinking capacity allocations.

- **Tiered and metered services** – The cloud is not *one-size-fits-all*, but *one-infrastructure-fits-many-needs*. Consumers choose from a catalog of IT services with different tiers of performance, availability, recoverability, and cost. Capacity and resource consumption is tracked at a granular level and billed accordingly. Thus, consumers do not pay for servers, storage arrays, or network switches, but for CPU cores, megabytes of cache, I/Os, gigabytes of storage, network bandwidth, and so forth per unit time. Tiered and metered services enable IT to meet needs more precisely and instill more accountability and moderation in the consumption of IT resources.

- **Secure** – Data and application logic are protected from internal and external threats. This includes authentication, access control, encryption, and protection from malicious software and attacks.

- **Mobile** – Mobility is often associated with accessing applications and resources remotely or with mobile devices, like laptops or smart phones. However, mobility in the cloud also means applications and data can move between systems, between data centers and around the world according to business requirements and in response to failover events. Computing is not tied to a particular system in a particular data center. In the cloud, applications and data move and migrate, as needed, with little or no disruption to user access.

An infrastructure with these characteristics is a cloud that delivers more powerful, flexible, and efficient computing and remains aligned with evolving business objectives.

EMC's Cloud Strategy

EMC has embraced cloud computing as a unifying corporate strategy. All of the company's products and services are intended to advance and promote the cloud in one aspect or another. Recently at EMC World in Las Vegas, EMC announced the latest enhancements to its Symmetrix VMAX networked storage platform and VPLEX information mobility and access solution. In light of its commitment to cloud computing, how do these latest features stack up?

Symmetrix VMAX Fits into the Cloud

Symmetrix VMAX is EMC's flagship enterprise storage system. The VMAX system is highly scalable, optimized for virtual environments, and offers a menu of advanced data protection and management capabilities. It supports up to eight VMAX engines (i.e., clustered storage controllers), 192 GB/second of Virtual Matrix bandwidth, 128 front-end host ports, and 2 PB of raw capacity. VMAX is EMC's premier storage system for cloud computing because it is *virtualized* with *secure* multi-tenancy, *elastic* provisioning and expansion, *automated* management, *tiered service levels* with chargeback reporting for *metered* delivery.

In January of this year, EMC released the newest 5875 version of the Enginuity operating environment – the software microcode running inside VMAX. More than 1,000 VMAX customers have adopted it so far – an adoption rate four times faster than the prior 5874 release. The main reason for this success is FAST VP, an automated storage tiering feature that optimizes performance and cost by non-disruptively moving data between flash, FC and SATA drives. FAST VP operates at the sub-LUN level (typically 8MB increments) and migrates data based on heuristic analysis of I/O patterns and user-defined and site-specific policies.

FAST VP is one of those rare feats of technology that deliver greater performance at a lower cost without adding complexity because the process is automated. *Automation* is an important cloud characteristic, as is the storage *virtualization* that enables FAST VP to support both thick and thin volumes. FAST VP can also apply different policies to storage groups, for instance, minimum or maximum allocations across ultra-fast flash, high-performance FC, and low-cost SATA drives. This is a means for establishing *tiered* storage service levels – another feature of the cloud.

EMC is expanding Federated Live Migration (FLM), a technology refresh tool with zero down-time introduced in Enginuity 5875. FLM migrates data from older Symmetrix systems to VMAX systems without disrupting applications and without

loading special software on the hosts. It solves the old problem of having to take production applications offline temporarily during a storage system upgrade and workload migration. FLM uses a Symmetrix capability called Open Replicator to move data between Symmetrix systems and, initially, relies on EMC PowerPath to manage host access during the migration. This summer EMC will expand support for third-party path management software, such as Windows MPIO and Symantec DMP (part of Volume Manager). For the use case of Symmetrix technology refreshes and workload migrations, FLM delivers the cloud characteristics of data *mobility* and *elasticity* in provisioning of new storage platforms non-disruptively.

EMC added support for FCoE (Fibre Channel over Ethernet), a protocol for converging FC and Ethernet networks with 10GigE infrastructure. It is used for network consolidation in environments with FC SANs and Ethernet LANs. Previously servers used a NIC and HBA to connect to both networks separately. FCoE allows new servers to connect to both the SAN and LAN using a single converged network adapter and 10GigE switches. With regard to cloud computing, FCoE is a form of network *virtualization* because it creates a way to run FC frames as well as standard TCP/IP packs over Ethernet.

Data-at-Rest Encryption (D@RE) was introduced in *Enginuity* 5875 and recently added support for the *RSA Data Protection Manager*. D@RE encrypts data as it is written to drives in the VMAX system using a 256-bit AES-XTS block cipher, and each drive has its own security key. Encryption does not affect performance because it is handled by specialized hardware chips. The encrypted data is *secure* (hint: cloud characteristic) even if unauthorized persons gain access to the drives. In the initial version of D@RE, encryption keys resided in a secure repository in VMAX service processor. Now the keys can reside in the RSA key management solution along with all other enterprise security keys.

VPLEX Geo Stretches the Cloud

EMC VPLEX is an advanced technology for concurrently accessing the same data within, across, and between data centers. In other words, VPLEX allows consistent copies of the same data to be read and written to in multiple locations – each as if the data were owned locally. The magic of this technology is sophisticated distributed cache coherence. A VPLEX appliance inserts a layer of intelligent cache between servers and heterogeneous storage systems. VPLEX appliances are federated and mutually aware of data reads and writes. Each maintains a current index and data changes are passed

between them, so the data appears consistent no matter where it is accessed. In 2010, EMC launched VPLEX *Local* and *Metro*, which provide concurrent access to data within data centers and over synchronous distances, respectively.

Most recently, EMC announced the next extension to this family, VPLEX *Geo*, which extends data mobility and access over asynchronous distances. More precisely, it supports a 50ms roundtrip delay, and the corresponding distance depends on the speed of the network and application, though it is in the range of thousands of kilometers. EMC also introduced VPLEX *Witness* to enable high-availability stretch clusters up to 100km apart (Metro and Geo configurations). VPLEX Witness monitors the heartbeat of federated VPLEX appliances and initiates a failover automatically if a system failure or network outage occurs.

VPLEX Geo use cases include:

- **Application and data mobility** – When used in conjunction with Microsoft *Hyper-V Live Migration,* applications can be moved to a remote site in seconds. This enables load balancing, resource sharing, and even transferring workloads between private and public clouds, such as leveraging a service provider to handle temporary, peak application demands.
- **High availability** – In concert with VPLEX Witness and server cluster software like *Windows Cluster Server*, it enables high-availability applications with fast, automatic failover.
- **Distributed collaboration** – When used in conjunction with a cluster file system like Sanbolic *Melio* or Quantum *StorNext*, data can be shared and accessed across remote sites, for instance, to facilitate distributed R&D with development teams in different countries.

VPLEX Geo is a unique, next-generation technology for cloud computing. Its distributed cache coherence delivers a form of data *virtualization* over distance that facilitates application and data *mobility*. VPLEX Witness also provides *automated* failover over distance.

Conclusion

Rome was not built in a day, but it was built one block at a time. The cloud is not built in a day, but it is built one technical feature at a time. The latest EMC Symmetrix VMAX capabilities represent an advancement toward the cloud, and the release of VPLEX Geo is a big step forward. EMC is serious about the cloud. *How about you?*

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