EMC VMAX3 FAMILY
Enterprise Data Services Platform For Mission Critical Hybrid Cloud And Hyper-Consolidation

ESSENTIALS

- Achieve predictable performance at massive scale for extreme-growth hybrid cloud environments

- Consolidate mission-critical, high-demand transaction processing and Big Data workloads to reduce total cost of ownership

- Process millions of IOPS at sub-1ms latency via VMAX3 all-flash configurations

- Extend storage tiering across the data center with FAST.X

- Run VMware Virtual Volumes on VMAX3 and assign service level objectives per virtual machine (VM)

- Run powerful storage and application workloads on VMAX3; easily deploy via integrated storage hypervisor

- Enable embedded file services (eNAS) and reduce deployment costs by up to 33%

- Protect vital mainframe and open systems information at six-nines availability through SRDF remote replication

- Deliver rapid backup and restore with EMC ProtectPoint; backup directly from VMAX3 to Data Domain, eliminate app server overhead

- Rapidly provision VMAX3 storage and set service level objectives with one-click: diamond, platinum, gold, silver, and bronze

- Use EMC Unisphere to easily provision, manage, and monitor VMAX3 block and file storage

- Leverage Unisphere 360 to track and monitor up to 200 VMAX / VMAX3 arrays from a single screen

The EMC VMAX3™ is incredibly well suited to solve the CIO challenge of embracing a modernized flash-centric data center and hybrid cloud while simultaneously trying to simplify, automate and consolidate IT operations. VMAX3 isn't just bigger, better and faster – which it is – VMAX3 was designed as an enterprise data services platform that specifically addresses the new requirements of the modern data center while continuing to deliver the reliability and availability our customers have relied on for years.

With VMAX3, the industry's leading tier 1 array has evolved into a highly scalable hardware platform with a complete set of rich software data services servicing internal and now external block storage. VMAX3 data services are delivered by a highly resilient, scalable and agile hardware platform that offers global cache, CPU (processing) flexibility, performance and high availability at scale while meeting the needs of the most demanding mainframe and open systems storage infrastructures.

VMAX3 Family

POWERFUL
- Scale performance and capacity to support high-demand online transaction processing (OLTP), online analytical processing (OLAP) for enterprise data warehousing (EDW), and big data applications
- Multi-core SMP and flash-optimized design to start small and grow to cloud scale in an efficient footprint that scales from 1,000 to 40,000 virtual machines per VMAX3 array
- Predictable service levels at scale to ensure achievement of service level objectives for new and existing storage workloads

TRUSTED
- Always-on availability architecture with advanced fault isolation, robust data integrity checking, and proven non-disruptive hardware and software upgrades
- Six-nines availability for 24x7xForever operations using SRDF® software, the gold standard for multi-site remote replication
- Backup and rapidly restore directly from VMAX3 to Data Domain for reliable recovery and virtually no app server impact using EMC ProtectPoint
- Data at Rest Encryption (FIPS 140-2): secures data, meets regulatory requirements

AGILE
- 1-click service level assignment to simplify provisioning, with automated service level objective delivery across thousands of mixed workloads (mainframe, open systems, block and file)
- Easily extend VMAX3 enterprise data services to external arrays with FAST.X™, automating storage tiering across the data center and hybrid cloud.
- Gain better insight across your entire data center by using Unisphere 360 to aggregate, monitor, and report health checks for up to 200 VMAX / VMAX3 arrays, from a single screen

CONSOLIDATION AT CLOUD SCALE

As the industry's most reliable platform for cloud scale consolidation, the VMAX3 family enables organizations to dynamically grow, easily share, and cost-effectively manage massive amounts of mainframe and open systems storage. VMAX3 is the leader in maintaining consistently high performance levels while running thousands of mixed workloads concurrently on a single VMAX3 array—you'll be able to deliver predictable and responsive service, even at massive scale.

PURPOSE-BUILT FOR EXTREME PERFORMANCE

For enterprises that require petabyte-level scale, the VMAX3 family is purpose-built to easily manage high-demand, heavy-transaction workloads while storing petabytes of vital data. The VMAX3 hardware design features the turbo-charged Dynamic Virtual Matrix Architecture that enables extreme speed and sub-millisecond response time.

The VMAX3 Dynamic Virtual Matrix Architecture can scale beyond the confines of a single system footprint to deliver extreme performance where needed. It enables hundreds of multi-core Ivy Bridge CPUs to be pooled and allocated on-demand to meet the performance requirements for dynamic mixed workloads. This is achieved though powerful multi-threading and the industry's first dynamic, user controlled core allocation so no workload is starved of resources.

The core element of the Dynamic Virtual Matrix is the VMAX3 engine. Each VMAX3 engine includes up to 2 TBs of cache memory (for a maximum of 16 TBs per array), front-end connectivity, and back-end SAS connectivity through two fully redundant director boards. The Dynamic Virtual Matrix scales by aggregating up to eight VMAX3 engines as a single system with fully shared connectivity, processing, and capacity resources. Each engine supports up to 48 CPU cores for blazing-fast performance scaling to a maximum of 384 cores per array.

Each VMAX3 array leverages the latest electronics to super-charge the most demanding dynamic environments. All VMAX3 models offer third-generation Intel multi-core processors based on the Ivy Bridge architecture, InfiniBand 56 Gb/s interconnect technology, PCIe Gen 3 I/O, and native 6 Gb/s SAS drive infrastructure.
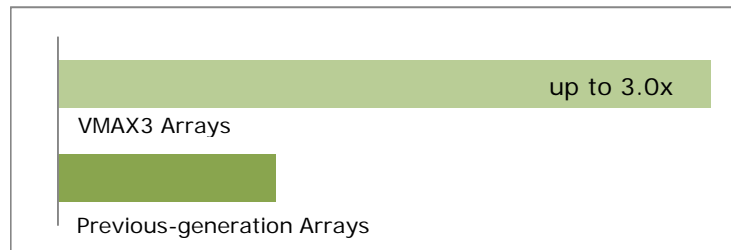
FLASH-OPTIMIZED BY DESIGN

Slow is not an option with the new VMAX3 family. Designed for flash, the VMAX3 family outperforms solutions that offer flash drives as add-ons to traditional arrays conceived for 15K RPM disk drives. Featuring a flash-optimized hybrid array design running FlashBoost™ technology, the VMAX3 eliminates bottlenecks to deliver the highest performance and the lowest latency for read-intense OLTP applications. In addition, EMC Fully Automated Storage Tiering (FAST™) technology and high-capacity NL-SAS drives down costs for storing inactive, less-critical data.

HIGH SPEED AND BANDWIDTH REDEFINED

The VMAX 400K is the new SPC-2 world record winner delivering 55GB per second of extreme bandwidth -- that's 30% more performance than the closest competitor. The VMAX3 combines the powerful Intel multi-core processors and the new Dynamic Virtual Matrix scale-out architecture for dramatic performance gains to meet the intense demands of today's and tomorrow's hybrid clouds. Configured with the maximum eight VMAX3 engines, ultrafast flash drives, and FlashBoost, the VMAX3 can achieve up to 3x the performance of previous generations so you can get up to three times as much work done. You also benefit from high bandwidth, with PCIe Gen 3 and InfiniBand 56 Gb/s providing larger connections for massive amounts of critical data to flow faster than ever.

VMAX3 PERFORMANCE

up to 3.0x

VMAX3 Arrays

Previous-generation Arrays

IDEAL FIT FOR YOUR DATA CENTER

The VMAX3 family introduces unmatched breakthroughs in performance density and packaging designed to reduce costs and fit all of your data center needs. VMAX3 arrays can store up to 720 high-density drives and deliver a complete VMAX3 engine on a single floor tile—that's an industry first of up to 1.7M IOPS in a single rack.

Up to 120 Drives per Shelf

Flash Optimized Performance
FlashBoost delivers up to 100% faster read performance for high demand transaction processing workloads

Unmatched High Density
Each VMAX3 rack stores up to 720 drives with all system elements on a single floor tile

For maximum agility, VMAX3 racks can be separated by up to 25 meters to avoid columns and other obstacles in the data center without a need to ever reserve empty floor tiles for future array growth. And all VMAX3 arrays support industry standard 19-inch racks and optional third-party racking to conform to your data center infrastructure.

OPEN EXTENSIBLE VMAX3 HYPERVISOR THROUGH HYPERMAX OS

VMAX3 arrays introduce the industry's first open storage and hypervisor converged operating system, HYPERMAX OS. It combines industry-leading high availability, I/O management, quality of service, data integrity validation, storage tiering, and data security with an open application platform.

HYPERMAX OS features the first real-time, non-disruptive storage hypervisor that manages and protects embedded services by extending VMAX high availability to services that traditionally would have run external to the array. It also provides direct access to hardware resources to maximize performance. The hypervisor can be non-disruptively upgraded.

HYPERMAX OS runs on top of the Dynamic Virtual Matrix leveraging its scale out flexibility of cores, cache, and host interfaces. The embedded storage hypervisor reduces external hardware and networking requirements, delivers higher levels of availability, and dramatically lower latency.

VMAX3 UNIFIED STORAGE WITH EMBEDDED NAS

VMAX3 unified storage introduces embedded file data services that enable customers to consolidate islands of block and file storage, simplify management, and reduce deployment costs by up to 33%. Embedded NAS (eNAS) uses the hypervisor provided in HYPERMAX OS to create and run a set of virtual machines on VMAX3 controllers. These virtual machines host two major elements of eNAS: software data movers and control stations and are distributed based on the mirrored pair architecture of VMAX3 to evenly consume VMAX3 resources for both performance and capacity. All VMAX3 block and file resources are managed through the intuitive, easy to use Unisphere management interface. Common eNAS use cases include running Oracle® on NFS, VMware® on NFS, Microsoft® SQL on SMB 3.0, home directories, and Windows server consolidation.

EMBEDDED MANAGEMENT SAVES TIME & MONEY

The latest VMAX3 data service, embedded management (eManagement), also leverages the HYPERMAX OS hypervisor. This feature enables customers to further simplify management, reduce cost, and increase availability by running VMAX3 management software directly on VMAX3 arrays. Key elements of eManagement include running embedded Unisphere, Solutions Enabler, and SMI-S management software on VMAX3. Customers can continue to run VMAX3 management software on a dedicated server if they plan to manage several VMAX3 arrays from a single management console.

VMAX3 Embedded Data Services
HYPERMAX OS features the first real-time, non-disruptive storage hypervisor that manages and protects embedded storage and application services.

ALWAYS-ON AVAILABILITY (HA/RAS)

The VMAX3 family design and reliability, availability, and serviceability (RAS) features make it the ideal platform for mainframe and open systems environments requiring always-on availability. The VMAX3 family is architected to provide six-nines of availability in the most demanding, mission-critical environments. VMAX3 availability, redundancy, and security features are listed below.

ALWAYS ON WITH VMAX3

Eliminate Costly Downtime	Exceed Stringent Replication SLAs (RTO, RPO)	Eliminate Planned Downtime	Ensure 100% Data Integrity, Avoid Data Breach
Proven 6 Nines of Availability Advanced Fault Isolation, map-out faulty memory DIMMS, mirrored memory no single points of failure	**Gold Standard in Multi-Site Replication** Proven Disaster Recovery and rapid restart; 2-site, 3-site Replication, Active-Active SRDF	**Non-Disruptive HW and SW Upgrades** Continuous IO through parallel microcode NDUs, upgrade HYPERMAX O/S within seconds	**T10 DIF Data Coding** Single Bit Error Correction, validation checksum through T10 DIFF, Data at Rest Encryption

Hardware Encryption

- Encrypts all drives
- No performance penalty
- Automated key management
- Optimized for block and file

• No single points of failure—all VMAX3 components are fully redundant to withstand any component failure

• Completely redundant and hot-pluggable field-replaceable units (FRUs) to ensure repair without taking the system offline

• RAID protection levels 1, 5, and 6—that can all co-exist in the same array—to match different data protection requirements, with the RAID members distributed among power zones in disk array enclosures (DAEs) to assure high availability (HA) even if an entire power zone fails

• Mirrored cache, where the copies of cache entries are distributed to maximize availability

• Vault to flash with battery backup to allow for cache de-stage to flash and an orderly shutdown for data protection in the event of a power failure

• Active-active remote replication via SRDF/Metro with read/write access to both Site A and Site B ensures instant data access during a site failure.

• Fully non-disruptive upgrades, including loading of new HYPERMAX Operating System software from small updates to major releases

• Continuous system monitoring, call-home notification, and advanced remote diagnostics

• Data at Rest Encryption with integrated RSA® key manager, FIPS 140-2 compliant to meet stringent regulatory requirements

• T10 DIF data coding, with extensions for protections against lost writes

• Detailed failure mode effects analysis (FMEA) during design of each component to ensure failure conditions can be handled gracefully

• No-compromise performance—VMAX3 maintains the highest levels of performance even in the event of component failures

• Extensive fault detection and isolation, allowing early wear-out detection and preventing the passing of bad data as good

• Service defined and scripted to ensure success, including color-coded cabling, cable positioning, scripted steps, and checks of key parameters in those scripts

• All flash cache data vault capable of surviving two key failures, ensuring that the system comes back even when something was broken before the vault and something else fails when returning from the power cycle

• Support for thermal excursions with graceful shutdown if, for example, a data center loses air conditioning

• Integrated VMAX3 data protection via EMC ProtectPoint backup and rapid restore, combining the gold standards in backup with industry leading VMAX3 replication technology

EMC SRDF Software:
The world's most powerful and trusted solution for remote replication, protecting mainframe and open systems storage.

TRUSTED REPLICATION AND SECURE SOLUTIONS FOR ALWAYS ON AVAILABILITY

EMC TimeFinder® and EMC SRDF software are the most powerful and trusted applications for local and remote storage replication available in the industry. These storage applications enable local and remote snaps and clones for rapid in-array backup and restore, facilitate parallel processing activities like application testing and development, and guard against primary-site disasters and outages.

New TimeFinder SnapVX software features zero-impact snaps, simple user-defined names, faster snapshot creation/expiration, cascading, compatibility with SRDF/FAST, and support for legacy replication capabilities like TimeFinder Clone, VP Snap, and Mirror (emulation mode). SnapVX reduces replication storage costs by up to 10x and is optimized for cloud scale with its highly efficient snaps and expansion of up to 16 million snaps per array. Customers can take up to 256 snapshots and establish up to 1024 target volumes per source device, providing read/write access as pointer (snap) or full (clone) copies.

The industry's first zDP for mainframe solution enables recovery from logical data corruption without the need to restore from a full offline backup or BCV (Business Continuance Volume, otherwise referred to as a "Gold Copy" among mainframe storage administrators). This unprecedented feature allows administrators to recover from logical data corruption within minutes versus days.
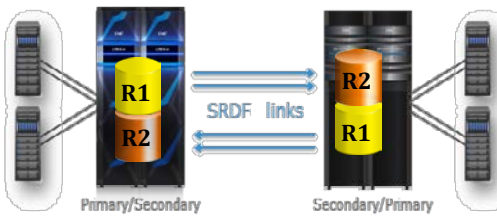
An enhanced version of SRDF delivers faster and more efficient replication for VMAX3 arrays, allowing customers to protect more capacity without having to add bandwidth. Enhanced SRDF combines new multi-core, multithreading techniques with powerful hardware compression to increase replication bandwidth and lower operational costs. And through FAST SRDF coordination VMAX3 supports different SLO levels at each end of the SRDF configuration.

SRDF/Metro delivers active-active high availability for non-stop data access and workload mobility – within a datacenter and across metro distance. It provides array clustering of the VMAX 100K, 200K and 400K enabling even more resiliency, agility, and data mobility. SRDF/Metro enables hosts and host clusters to directly access a LUN or storage group on the primary SRDF array and secondary SRDF array (Sites A and B). This level of flexibility delivers the highest availability and best agility for rapidly changing business environments.

DATA AT REST ENCRYPTION

VMAX3 Data at Rest Encryption provides hardware-based, on-array encryption, protecting block and fie storage from unauthorized access when drives or arrays are removed from the data center. This technology eliminates the need for disk erasure services and allows for rapid decommissioning and repurposing of arrays, while helping achieve regulatory compliance. VMAX3 encryption offers intelligent key management that is easy to implement and maintain. Administrators can leverage automated embedded key management since there is no manual user intervention required to manage VMAX3 encryption keys.

EMC ProtectPoint:
Virtually eliminate backup impact on database servers.

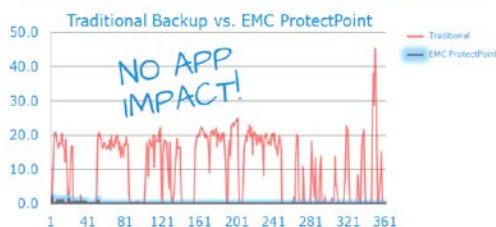# EMC PROTECTPOINT INTEGRATED BACKUP FROM VMAX3 TO DATA DOMAIN

EMC ProtectPoint provides faster, more efficient backups while eliminating backup impact on application servers. By integrating VMAX3 with Data Domain storage, ProtectPoint reduces cost and complexity by eliminating traditional backup applications while still providing the benefits of native backups. Key customer benefits include: Achieve faster, more frequent backups; Instantly access application backups from Data Domain for simple recovery; Virtually eliminate backup impact on application servers; Eliminate the need for a dedicated backup server.

Service Level Provisioning:
VMAX3 delivers unmatched ease of provisioning for your specific service level objectives.
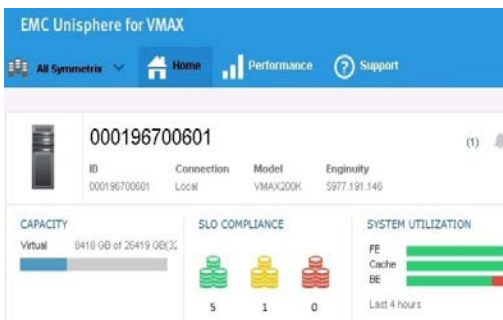
EMC Unisphere:
An intuitive management interface that allows IT managers to greatly reduce the time required to provision, manage, and monitor VMAX3 storage assets.
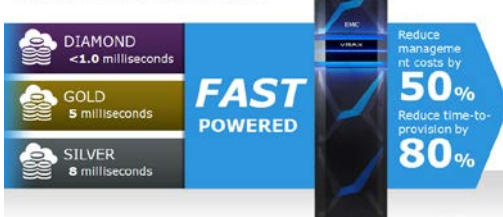
AGILE AUTOMATION WITH 1-CLICK SERVICE LEVEL PROVISIONING

The VMAX3 family delivers unmatched ease of provisioning for your specific service level objectives. In fact, you are just a click away from provisioning storage to meet service level objectives from sub-ms to 20+ms.

These VMAX3 service levels are tightly integrated with EMC's FAST software to optimize agility and array performance across all drive types in the system. EMC Fully Automated Storage Tiering technology improves your system performance while reducing cost by leveraging the lightning fast speed of flash drives combined with cost effective high capacity drives.

EMC FAST dynamically allocates workloads across storage technologies, non-disruptively moving workloads to meet stringent service level objectives. FAST technology moves the most active parts of your workloads (hot data) to high-performance flash disks and the least-frequently accessed storage (cold data) to lower-cost drives, leveraging the best performance and cost characteristics of each different drive type. FAST delivers higher performance using fewer drives to help reduce acquisition, power, cooling, and footprint costs.

MANAGEMENT ABSTRACTION FOR SIMPLICITY

EMC Unisphere for VMAX is an intuitive management interface that allows IT managers to maximize human productivity by dramatically reducing the time required to provision, manage, and monitor VMAX storage assets. Unisphere delivers the simplification, flexibility, and automation that are key requirements to accelerate the transformation to the hybrid cloud. For customers who frequently build up and tear down storage configurations, Unisphere® for VMAX makes reconfiguring the array even easier by reducing the number of steps required to delete and repurpose volumes.

Unisphere 360 software aggregates and monitors up to 200 VMAX / VMAX3 arrays across a single data center. This solution is a great option for customers running multiple VMAX3 arrays with embedded management (eManagement) and who are looking for ways to facilitate better insights across their entire data center. Unisphere 360 provides storage administrators the ability to view site level health reports for every VMAX or coordinate compliance to code levels and other infrastructure maintenance requirements. Customers can leverage the simplification of VMAX management, now at data center scale.

FAST.X EXTENDS STORAGE TIERING ACROSS THE DATA CENTER

FAST.X delivers automated tiering across the data center, extending VMAX3 enterprise data services to EMC and third party platforms by delivering service level objectives from VMAX3 to external storage devices. Predetermined service levels enable VMAX3 to automatically move workloads between storage tiers within or external to VMAX3 to meet stringent performance targets. And storage management across the data center and cloud can now be done in a matter of minutes without extensive IT storage training. FAST.X preserves external data volumes and extends SLO management to a broad set of external arrays including: VMAX (5876), VNX2, HDS VSP including G1000, IBM DS8000, and HP 3PAR.

FAST HINTING OPTIMIZES DB PERFORMANCE

EMC FAST Hinting bridges the gap between storage administrators and database administrators by leveraging new SLO-based management techniques to achieve SLO targets and optimal performance. FAST Hinting provides Oracle and SQL users a way to accelerate mission critical processes based on business priority and Service Level Objective. FAST Hinting is application aware and leverages the intelligence of EMC Database Storage Analyzer and Performance Analyzer to monitor the read/write status of the current workload and sends hints to the array for data that is likely to be accessed in a given period of time. The VMAX3 FAST engine adjusts the response time of external information (Hints) according to the business priorities.

VMWARE VIRTUAL VOLUMES

Not all VVol storage support is created equal. While VMware Virtual Volumes simplify management and provide per-VM storage control, the revolutionary VMAX^3 takes VVOL integration to a whole new level. Not only was VMAX^3 designed to support the scale of VVol storage – up to 64,000 virtual volumes today and many more in the future – but the VMAX^3 service level objective management paradigm that has radically simplified storage management realizes the full value of VVol storage polices. By matching policies to Service Level Objectives (SLOs), VMAX^3 provides the highest levels of availability, data protection and performance directly to the VM. And, customers can manage VMware storage at a much more granular level (Virtual Machine datastores) providing even greater efficiency.

VMAX HOST I/O LIMITS

VMAX3 Host I/O Limits support defining limits to enforce service levels and make application performance even more predictable. Users can set maximum IOPS and/or throughput limits on a per application basis. VMAX3 automatically balances the limits across directors and ports. VMAX3 supports two levels of cascaded limits to simplify performance management in multi-application, multi-tenant, and cloud environments.

EMC GLOBAL SERVICES

VMAX3 platforms include three years of Premium hardware warranty*, providing 24x7 access to technical expertise, Online Services, remote monitoring and problem resolution, and when necessary, onsite assistance. VMAX3 software includes a 90-day defective media replacement warranty. Premium software maintenance provides 24x7 access to technical expertise and rights to new releases of the software at no additional charge.

EMC Global Services provides the strategic guidance and technology expertise that organizations need to address their business and information infrastructure challenges and to derive the maximum value from their information assets and investments. Our 16,000+ professional services and support services experts worldwide, plus a global network of alliances and partners, leverage proven methodologies, industry best practices, and experience and knowledge derived from EMC's information-centric heritage to address the full spectrum of customer needs across the information lifecycle: strategize, advise, architect, implement, manage, and support. Ask your EMC sales representative about the specific services that can benefit your organization.

*Warranties may vary outside the United States. Contact your EMC representative for local warranty and service terms and conditions.

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