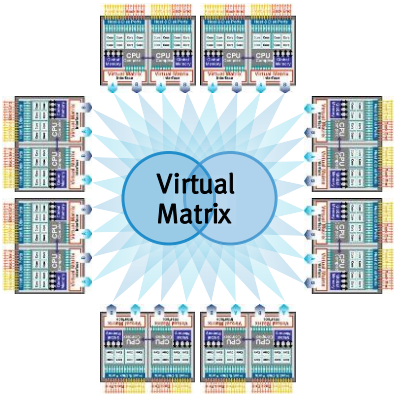
EMC VMAX 20K

Tier 1 Platform for Hyper-Consolidation, Cloud, and SDDC

ESSENTIALS

- Leverage VMAX 20K scale, functionality, and efficiency to deliver innovative IT services and high business value
- Gain unprecedented performance and scale for high-growth virtual data centers, hybrid cloud environments, and hyper-consolidation
- Consolidate critical online transaction processing (OLTP) and online analytical processing (OLAP) workloads to exceed service levels, streamline management, and reduce total cost of ownership (TCO)
- Use SRDF-S business continuity solutions to protect data and achieve 6 nines of data availability
- Increase performance and reduce costs automatically with EMC Fully Automated Storage Tiering for Virtual Pools (FAST VP)
- Simplify management and operations by consolidating external storage under VMAX control with EMC Federated Tiered Storage (FTS)
- Secure storage infrastructure with Data at Rest Encryption (FIPS 140-2 certified)
- Provision, manage, and monitor with ease using EMC Unisphere for VMAX

Enterprise-critical applications—those which drive the core of an organization—require the highest availability infrastructure to support the most stringent service levels. EMC meets this need with a high performing, functionally capable, and competitively priced high-end networked storage system—the EMC® VMAX® 20K system with the VMAX operating environment. The VMAX 20K scale-out architecture helps organizations exceed the performance and capacity demands of hyper-consolidation, cloud deployments, and all-virtual Software Defined Data Centers (SDDCs), while simplifying the costs of data management.



The revolutionary Virtual Matrix Architecture provides the foundation to scale to 100s of petabytes of capacity, supporting thousands of servers, and millions of IOPS delivered to that capacity, all flexibly deployed throughout a data center and able to be controlled through a single screen.

MEET THE DEMANDS OF HIGH-GROWTH HYBRID CLOUD AND BIG DATA ENVIRONMENTS

The EMC VMAX 20K with the VMAX operating environment supports enterprise customers' top IT priorities, including the transformation to the hybrid cloud and Big Data processing. The EMC VMAX 20K system builds on the revolutionary scale-out Virtual Matrix Architecture™ that features unprecedented performance, availability, functionality, and cost efficiency. The VMAX 20K is Powerful, Trusted, and Smart storage for multiple mission-critical open systems and mainframe applications.

POWERFUL

- Scale, performance, and capacity to support millions of virtual machines, high-demand online transaction processing (OLTP), and online analytical processing (OLAP) for enterprise data warehousing (EDW) and business intelligence (BI) applications
- Scalable bandwidth performance for lightning-fast batch processing and analytical queries

TRUSTED

- 6 nines data availability for 24x7xForever operations with SRDF-S
- Robust security with secure audit, secure access, and data encryption for hybrid cloud
- SRDF and RecoverPoint CDP to protect the same data, combining the gold standard for remote replication with RecoverPoint's unique operational recovery
- Award-winning EMC Global Services and Professional Support to ensure success

SMART

- Automation and efficiency in tiered storage environments with FAST VP
- VMAX services to consolidate and simplify operations with Federated Tiered Storage
- Ease-of-management and integration into virtual environments with Unisphere™ for VMAX
- Automated cache optimization to boost performance for latency-sensitive applications

THE VMAX 20K ENGINE

The VMAX 20K architecture provides a Virtual Matrix™ that can scale beyond the confines of a single system footprint. The core element of the Virtual Matrix is the VMAX 20K Engine. VMAX 20K Engines include up to 128 GB of cache memory per engine (for a maximum of 1,024 GB per array), front-end connectivity, and backend connectivity. The Virtual Matrix scales by aggregating up to eight VMAX 20K Engines as a single system with fully shared connectivity, processing, and capacity resources. Each Engine can support up to 16 CPU cores for a high-performance maximum of 128 cores. The VMAX 20K system also leverages the PCIe I/O bus to maximize bandwidth performance.

VMAX 20K CONFIGURATIONS

VMAX 20K with the scale-out Virtual Matrix Architecture can be configured with 48 to 3,200 drives for a maximum usable capacity of up to two PB. Each system provides up to 1 TB of memory and up to 128 FC ports, or 64 iSCSI ports, or 64 FCoE ports, or 64 FICON ports.

The VMAX 20K is a distributed multi-engine storage system that can non- disruptively scale from one to eight VMAX 20K Engines. Systems are configured around a central system bay and up to 10 adjacent storage bays integrating up to 240 3.5-inch drives or 400 high-efficiency 2.5-inch drives per rack for space or power-constrained data centers. Each drive array enclosure (DAE) can support up to 15 3.5-inch drives or 25 2.5-inch drives.

The VMAX 20K series offers a full range of drive options—from ultra-fast Enterprise Flash drives to the high-capacity 3 TB drives. Choose Enterprise Flash drives, for example, to support the most demanding workloads in smaller footprints and with less energy. Tiered storage helps you optimize system performance while reducing cost. VMAX 20K arrays support front-end 8 Gb/s FC, 8 Gb/s FICON, and 10 Gb/s Ethernet for FCoE, iSCSI, and EMC Symmetrix Remote Data Facility (SRDF®) connectivity.

The EMC XtremCache solution provides additional performance benefits by reducing latency and increasing throughput. The solution combines intelligent caching software with PCIe Flash technology to dramatically improve application performance. It accelerates reads and protects data by using a write-through cache to the networked storage to deliver persistent high availability, integrity, and disaster recovery. The EMC VMAX 20K can automatically determine which LUNs should be cached in order to achieve the maximum performance increase. The VMAX 20K also automatically optimizes its own caching when the EMC XtremCache solution is in use. XtremCache, coupled with array-based EMC FAST software, creates the most efficient and intelligent I/O path from the application to the data store. The result is a networked infrastructure that is dynamically optimized for performance, intelligence, and protection for both physical and virtual environments.

UNMATCHED AVAILABILITY AND BUILT-IN INFORMATION CENTRIC SECURITY

A revolutionary architecture and blazing performance are meaningless without uninterrupted information availability. VMAX 20K comes standard with non-disruptive everything. EMC's philosophy has always been to anticipate whatever might disrupt information access and prevent it. VMAX 20K take this philosophy to an even higher level, enabling 24x7xForever application availability and the ability to eliminate both unplanned and planned outages with fully non-disruptive operations and extended-distance replication with zero data loss.

VMAX 20K includes 100% internal redundancy to ensure that no single fault can stop the flow of data. Multiple redundant power supplies connected to independent power sources provide additional protection. Battery backup of all power systems ensures that all data in memory is safely written to the drive before the VMAX array initiates an orderly shutdown in the event of complete power loss. Additional reliability features include permanent spares, compensative cooling, and extensive environmental monitoring.

The VMAX operating environment offers unmatched availability and reliability. Non-disruptive operations and upgrades ensure no storage or application downtime. Non-disruptive upgrades of EMC software applications, non-disruptive storage configuration changes, and non-disruptive serviceability ensure that access to vital information is maintained and service levels are never compromised.

VMAX OS features continuous monitoring to ensure data integrity, as well as intelligent cache optimization and autonomous tuning of drive-read patterns to optimize application performance. VMAX OS enables simultaneous connection to all mainframe, IBM i, UNIX, Microsoft® Windows®, and Linux platforms—the most extensive connectivity choices in the industry, and all validated in EMC's interoperability labs. The result: you can do whatever you want with your information, at any time, and with fewer staff, greater speed, and high efficiency.

Securing sensitive information is one of the greatest challenges facing companies today, and the most important data security threats relate to the protection of the storage environment. VMAX OS provides the highest level of data integrity with integrated technology from RSA®, the security division of EMC, to deliver built-in security capabilities that make it easier to reduce risks to sensitive data and improve compliance efforts. The VMAX Service Credential, secured by RSA, prevents unauthorized service actions on the service processor. Integration with RSA enVision® provides automated, policy-based audit log management across the enterprise.

VMAX OS also makes it possible for z/OS customers using IBM HyperSwap (for mainframe continuous availability) to take advantage of VMAX 20K storage solutions.

DATA AT REST ENCRYPTION (FIPS 140-2 CERTIFIED)

VMAX Data at Rest Encryption (DARE) provides hardware-based, on-array encryption for VMAX 20K, protecting information from unauthorized access when drives are removed from the array or the array is 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 compliance with security and privacy standards. VMAX encryption offers intelligent key management that is easy for storage administrators to implement and maintain. Administrators can choose either automatic internal key management or integration with an RSA RKM/DPM key manager.

EMC is the first array vendor to build FIPS 140-2 certified Data at Rest Encryption for all drive types, with full support for auto-tiering. VMAX encryption is compatible with all EMC VMAX 20K features, providing encryption without performance degradation to existing applications.

VCE VBLOCK SERIES 720

Formed by EMC and Cisco, with investments from VMware and Intel Corporation, VCE, the Virtual Computing Environment Company, leverages best-in-class technology and service capabilities to meet the business and IT needs of customers. The Vblock® 720 Infrastructure Platform integrates compute, network, VMAX 20K storage, virtualization, and management components from trusted, industry-leading vendors—Cisco, EMC, and VMware—to deliver a tightly unified infrastructure that your business can rely on while simplifying IT operations. To see how your business can leverage the power of an integrated Vblock 720 solution, visit www.vce.com, or contact your EMC or VCE sales representative.

VMAX 20K: A Scalable High-End Storage Array—VMAX 20K can be configured with 48 to 3,200 drives for a maximum capacity of up to two petabytes. The multi- engine storage system can non-disruptively scale from one to eight VMAX Engines. Systems are configured around a central system bay and adjacent storage bays of up to 240 3.5" drives each or up to 400 2.5" drives.

FAST VP

VMAX 20K systems offer a broad array of functionality and tools that simplify storage management and reduce costs to help accelerate the transformation to the hybrid cloud.

EMC FAST VP software optimizes performance in multi-tiered VMAX 20K arrays by allocating and relocating application workloads based on service-level agreements. With granular tiering at the sub-LUN level, FAST VP can help optimize $ per IO and $ per GB. FAST VP reduces overall TCO by lowering acquisition costs, simplifying management, and reducing energy and space requirements. Highly responsive to dynamic-performance environments, FAST VP can help IT more quickly adapt to changing business needs and manage more resources with fewer staff. FAST VP intelligence can be leveraged across the entire data center including open systems, IBM i, and System z environments.

FAST VP extends its innovation with support for compression. FAST VP compression enables customers to optimize $/GB by compressing cold data in any tier associated with a FAST VP policy. FAST VP operates on four tiers, which reduces overall TCO by lowering acquisition costs. FTS is used

as one of the four tiers of FAST VP, enabling you to protect your storage investments by optimizing resources based on changing business needs.

FAST VP replicates tiering and statistics across SRDF 3-site and 4-site configurations. This extends EMC's leadership in both automated storage tiering and remote replication, and gives VMAX the unique capability to ensure consistent performance and tiering optimization in case of failover to the 3rd or 4th site. Cascaded, concurrent, STAR, and mainframe SQAR sites will all receive the data from the R1 site. Previously FAST automated tiering would only replicate data to a second SRDF site.

FEDERATED TIERED STORAGE

FTS enables the hybrid cloud by creating cooperating pools of resources and by enabling dynamic application and data movement—key functionality for delivering Infrastructure as a Service (IaaS). FTS technology allows you to leverage the benefits of EMC's trusted innovations across the entire hybrid cloud by consolidating, optimizing, and sharing both EMC and non-EMC storage resources. Using FTS, you can integrate legacy arrays to maximize efficiency, protect your storage investment, and simplify the management of your storage landscape.

Federated Tiered Storage provides the capability to put heterogeneous arrays behind VMAX 20K to consolidate and simplify operations in the hybrid cloud. With FTS, customers can use trusted VMAX features such as FAST VP, SRDF, EMC TimeFinder®, and VLUN to extend the life and value of existing storage arrays in the data center.

In a FAST VP configuration, the external array can be used as a lower tier, and FAST will automatically move data to VMAX 20K as additional performance is required from the application.

HOST I/O LIMITS

The VMAX 20K solution with the VMAX operating system features Host I/O Limits to simplify the management of performance service levels in cloud and multi-tenancy environments. VMAX Host I/O Limits enables users to set maximum performance quotas for IOPS and/or throughput on a per-Storage Group (including cascaded limits assigned to both parent and child) basis. This ensures that each application does not impact other applications' performance. Host I/O Limits enables:

- Users to manage their applications efficiently and predictably
- Users to provide greater levels of control on performance allocation in multi-tenant environments
- Service Providers to articulate service level characteristics, manage expectations, and sell new services
- Users to simplify their quality of service management by presenting controls in industry-standard terms of IOPS and throughput and set their IOPS or throughput based on application characteristics and business needs

The storage group performance dynamically balances across all available port groups and directors in the storage group's masking view. All volumes in a storage group share its performance quota. The VMAX monitors and manages I/O on each director in the masking view to ensure that the performance is not exceeded. When the limits are reached, VMAX will slow I/O to discourage additional transactions from that storage group. Bursts of I/O are tolerated if the storage group is below its quota.

WINDOWS SERVER 2012 AND ODX API SUPPORT

VMAX is ideal for customers that need to eliminate silos of information through application consolidation. Its multiple redundant controller architecture provides the ability to host multiple Microsoft applications (such as Exchange, SQL Server, SharePoint) simultaneously. It is also ideal for customers that have Windows-based application in the virtualized mission-critical application space. While FAST VP provides benefits for physical applications, it also provides benefits in a virtual server environment, as virtual machine files are subject to support varying application workloads.

VMAX 20K supports windows Server 2012 configurations including a 63-node Microsoft Cluster Server environment as well as supporting up to 4,000 virtual machines in a single cluster. And VMAX supports Microsoft Offload Data Transfer (ODX) to offload certain Hyper-V operations from Windows servers to the VMAX. Copy and clone operations can run up to 100x faster than before with ODX. This is similar to existing support for VMware VAAI, allowing VMAX to support efficient cloud and SDDC operations with the world's two most popular hypervisors.

MANAGEMENT ABSTRACTION FOR SIMPLICITY AND INTELLIGENT INTEGRATION INTO VIRTUAL ENVIRONMENTS

EMC Unisphere for VMAX is an intuitive management interface that allows IT managers to maximize human resources 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. Unisphere for VMAX V1.6 builds on top of the initially delivered functionality for the VMAX Family and adds support for the configuration, management, and monitoring of older DMX® arrays as well as all new features in the latest VMAX OS release. For customers who frequently build up and tear down storage configurations, Unisphere for VMAX V1.6 makes reconfiguring the array even easier by reducing the number of steps required to delete and repurpose volumes.

The Unisphere Performance Viewer facilitates detailed VMAX 20K system performance analysis—all done offline without the need for a live connection. REST APIs simplify programmatic performance monitoring from cloud management and data center orchestration tools. And Unisphere for VMAX V1.6 supports customer-replaceable units (CRUs) to enable fast replacement of a failed drive.

— EMC ProSphere™ provides end-to-end management and analysis of hybrid cloud environments, including compute, network, and storage resources.
— EMC z/OS Storage Manager (EzSM) is a mainframe software product for discovery and viewing of a VMAX environment connected to a z/OS host. EzSM provides facilities to handle volumes, data sets, catalogs, and detailed VMAX 20K functionality information.
— Microsoft Hyper-V operations can be offloaded to the VMAX 20K storage. The VMAX 20K platform supports Microsoft Offload Data Transfer (ODX) to enable certain operations—like copy and clone operations—to run up to 100X faster.
— VMware® vStorage APIs for Array Integration (VAAI) offload virtual machine (VM) operations to the array to optimize server performance. VAAI enables VMware vSphere™ to free up server resources by offloading certain operations. In VMware environments, VMAX 20K supports the following VAAI components:

• **Full Copy**—Offloads replication to VMAX 20K to enable much faster virtual machine deployments, clones, snapshots, and VMware Storage vMotion® operations
• **Block Zero**—Initializes file system block and virtual disk space more rapidly, with as much as 10 times less I/O for VMFS (Virtual Machine File System) formatting and relocation.
• **Hardware-Assisted Locking**—Enables more efficient meta data updates and assists virtual desktop deployments, allowing up to 10 times more virtual machines per data store.
• **UNMAP**—Enables more efficient space usage for virtual machines by reclaiming space on datastores that is unused and returns it to the thin provisioning pool from which it was originally drawn. UNMAP is supported with vSphere 5.0U1 and higher.
• **VMware vSphere Storage APIs for Storage Awareness (VASA)**—Allows VMware administrators to view VMAX 20K drive types (Flash, FC, SAS, or SATA) as needed; with VASA, VMware administrators have a single management view into both the virtualization and storage infrastructures

VIRTUAL PROVISIONING

Virtual Provisioning helps reduce cost, improve capacity utilization, and simplify storage management. Users can present a large amount of capacity to a host and then consume space only as needed from a shared pool. This improves TCO by reducing initial over-allocation of storage capacity. Virtual Provisioning also offers automated pool rebalancing, helping expand thin pools in small increments while protecting performance, as well as non-disruptive shrinking of thin pools to help reuse space to improve capacity utilization. Virtual Provisioning can help reduce labor costs by simplifying data layout and reducing the steps required to accommodate capacity growth.

Users benefit from data mobility and space efficiency when moving into and out of thin pools, and with TimeFinder/Clone, thick-to-thin replication that ensures only host-written space is copied to target thin volumes. In addition, users can automatically reclaim unused space when replicating among standard and thin volumes using EMC SRDF or migrating from standard to thin volumes using EMC Open Replicator.

LOCAL REPLICATION: THE TIMEFINDER FAMILY

The EMC TimeFinder family of software provides a local copy of data, independent of the host and operating system, application, and database. The EMC TimeFinder family of local copy software is the most field-proven, widely deployed, array-based, point-in-time solution in the world with tens of thousands of licenses shipped into the most-demanding IT environments. TimeFinder offers the most choice and flexibility to meet virtually any service-level requirement, while enabling cost control for increased competitive advantage.

EMC TIMEFINDER BASE PRODUCTS

• **TimeFinder/Clone**—Creates a functional, full-volume, independent host-addressable, local point-in-time copy of a VMAX production device, and allows up to 16 active clones of a single production device, all of which are immediately available for both read and write access and can use RAID 5 and/or RAID 6 protection schemes.

• **TimeFinder/Snap**—Creates a high-performance, space-saving, independent host-addressable, logical local point-in-time view of a production device, and allows up to 128 active snapshot copies of a single production device, all of which are immediately available for both read and write access and can use RAID 5 and/or RAID 6 protection schemes. Customers that use TimeFinder/Snap for test, development or reporting purposes will see more flexibility and less performance impact.

• **TimeFinder VP Snap**—Creates a space-efficient snap for Virtual Pool devices. TimeFinder VP Snap provides the efficiency of Snap technology with improved cache utilization and simplified pool management. Up to 32 VP Snaps per source volume can be created. Customers that use TimeFinder VP Snap and refresh their TimeFinder copies can see a reduction in overall TCO by lowering acquisition costs for storage used from the target devices storage pool. Customers that use TimeFinder VP Snap for test, development or reporting purposes will see more flexibility in their use of TimeFinder VP Snap. Customers that are migrating from TimeFinder Snap to TimeFinder VP Snap and want to retain protection of their source volumes will see transition improvements.

EMC TIMEFINDER ADD-ON OPTIONS

• **TimeFinder/Consistency Groups**—At no additional cost, the Consistency Groups option ensures dependent-write consistency of application data when creating a point-in-time image across multiple devices associated with an application within a single VMAX system or applications that also span multiple VMAX systems.

REMOTE REPLICATION: SRDF

For replication between VMAX systems, the EMC SRDF family of software provides remote mirroring independent of the allocation type (thick or thin), host and operating system, application, and database. SRDF remote mirroring helps companies manage planned and unplanned outages. With 24x7x365 data availability, businesses can focus on maximizing revenue generation and customer support opportunities, improving productivity, and controlling or reducing costs for increased competitive advantage.

EMC SRDF BASE PRODUCTS

• **SRDF/Synchronous (SRDF/S)**—Maintains a realtime synchronized mirror of a VMAX production data device to a secondary site VMAX data device, providing a recovery point objective of zero data loss.

• **SRDF/Asynchronous (SRDF/A)**—Maintains a near real-time synchronized mirror of a VMAX production data device to a secondary site VMAX data device, providing a recovery-point objective that could be as minimal as a few seconds.

• **SRDF/Data Mobility (SRDF/DM)**—Provides for the transfer of a VMAX production data device to a secondary-site VMAX data device that can be at any distance, permitting information to be periodically mirrored for disaster restart, information sharing for decision support or data warehousing activities, or for data migration.

EMC SRDF ADD-ON OPTIONS

• **SRDF/Extended Distance Protection (SRDF/EDP)**—Enables lower-cost achievement of zero data loss at an out-of-region site. The two-site disaster restart solution uses the cascaded SRDF model of operation, combined with the use of the driveless R21 device in the intermediate site, allowing the intermediate site to provide data pass-through to the out-of region site.

• **SRDF/Star**—Enables resumption of SRDF/A with no data loss between two remaining sites, providing continuous remote data mirroring and preserving disaster-restart capabilities. SRDF/Star offers a combination of continuous protection, changed-data resynchronization, and enterprise consistency between two remaining sites in the event of the workload site going offline due to a site failure, fault, or disaster event.

• **SRDF/Automated Replication (SRDF/AR)**—Enables rapid disaster restart over any distance with a two-site, single-hop option using SRDF/DM in combination with TimeFinder, or a three-site, multi-hop option used in combination with SRDF/S, SRDF/DM, and TimeFinder.

• **SRDF/Cluster Enabler (SRDF/CE)**—Enables automated or semi-automated site failover using SRDF/S or SRDF/A with Microsoft Failover Clusters. SRDF/CE allows Windows® Server 2003, Windows Server 2008 Enterprise and Datacenter editions and Windows Server 2012 running Microsoft Failover Clusters to operate across a single pair of SRDF-connected VMAX arrays as geographically distributed clusters.

• **SRDF/Consistency Groups (SRDF/CG)**—At no additional cost, SRDF/CG ensures application dependent-write consistency of the application data being remotely mirrored by SRDF in the event of a rolling disaster—across multiple VMAX systems or across multiple devices within a VMAX—providing a business point of consistency for remote site disaster restart for all identified applications associated with a business function.

RECOVERPOINT REPLICATION FAMILY

The VMAX 20K system also supports the EMC RecoverPoint solution for local replication using continuous data protection (CDP), synchronous and asynchronous continuous remote replication (CRR), and concurrent local and remote (CLR) data protection, all with point-in-time DVR-like recovery capabilities. The VMAX 20K has integrated RecoverPoint Splitter functionality.

The RecoverPoint family helps protect companies from data loss due to common problems such as server failures, data corruption, software errors, viruses, and end-user errors, while also protecting against catastrophic events that can bring an entire data center to a standstill. RecoverPoint enables replication among EMC storage families, as well as between EMC and non-EMC arrays. Leveraging RecoverPoint across EMC block platforms—VMAX 10K, VMAX 20K, VMAX 40K, DMX, VNX®, and VPLEX®—can help reduce wide-area network (WAN) costs, regardless of the distance between private and public clouds.

RecoverPoint delivers dramatic cost savings by eliminating complex, non-performing data protection schemes, and application-specific point products in favor of deploying a single, easy-to-manage local and remote replication solution.

RecoverPoint supports application bookmarks, instantaneous recovery, and bi-directional local and remote replication. A unique clustered architecture provides linear scalability to support the most demanding environments. Support for heterogeneous storage, hosts, networks, and SANs enables storage investment protection, enhances business continuity, and facilitates storage consolidation. RecoverPoint includes technologies to make the best use of available network and storage resources, including bandwidth reduction and data compression, journal compression, and snapshot consolidation.

VMAX customers can use SRDF and RecoverPoint CDP together to protect the same volume, combining the gold standard for remote replication with RecoverPoint's unique operational recovery, providing DVR-like recovery to any point-in-time. This gives total data protection for critical applications, which no other storage vendor offers.

INFORMATION MOBILITY AND MIGRATION

VMAX 20K enables online data mobility and migration while minimizing complexity and disruption. Move data between four storage tiers, platforms, and sites—quickly, efficiently, and without disruption. The VMAX Migrator package is a suite of mobility and migration solutions that provide organizations with choice and flexibility to use the right tool at the right time to deliver the right service level:

• Federated Live Migration (FLM)—Eliminates the complexities of host-based or SAN-based migration strategies by leveraging the intelligence of the arrays themselves, affording the first and only truly non-disruptive migration solution—one that does not require "insertion" or addition of new hardware or software to the organization's SAN or hosts, and supports combinations of migrating thick-to-thick, thick-to-thin, and thin-to-thin data, as well as consolidating multiple systems onto one VMAX system.

• EMC Open Replicator for VMAX—Enables both data mobility and data migration to and from VMAX and other heterogeneous arrays in a number of sophisticated configurations.

• EMC z/OS Migrator—Enables host (mainframe) migrations from any vendor's storage array to VMAX without any application downtime or disruption to business continuity readiness.

• EMC Open Migrator/LM—Provides host-based, non-disruptive data migration/data mobility—at the volume level—for Microsoft Windows, Linux, and UNIX servers.

• SRDF/Data Mobility—Delivers high-performance, array-based data mobility and migration of data from one VMAX to another VMAX anywhere in the world.

EMC Global Services provides extensive assistance performing mobility or migration operations. The EMC Total Migrator service offering automates migration planning with event management, migration methodologies, and auditing to streamline migrations and reduce risk. EMC E-Lab™ Advisor provides online remediation and validation including health, EOL/EOSL, and compatibility checks against E-Lab's ESM and migration best practices.

MAXIMIZE VMAX 20K BENEFITS WITH EMC GLOBAL SERVICES

EMC delivers a full complement of services for EMC VMAX 20K hardware and software to ensure that your VMAX 20K performs as expected in your environment, while minimizing risk to your business and budget. Expert planning, design, and implementation services help you quickly realize the value of your hardware and software in your environment, no matter how simple or complex.

After implementation, EMC's data migration services can help you plan, design, and safely migrate your critical data over any distance to your new system. EMC will also help you integrate your new system into your information architecture and applications such as VMware, Microsoft Exchange and SQL Server, Oracle databases and applications, and SAP, and manage your new environment when it is complete. Extensively trained professional services personnel and project management teams, leveraging EMC's extensive storage deployment best practices, and guided by our proven methodology, accelerate the business results you need without straining the resources you have.

EMC Global Services delivers results to our customers throughout the IT lifecycle: Plan, Build, Manage, and Support. Strategic information and storage consulting services from EMC Consulting help companies achieve the maximum value from their information, at the lowest total cost, at every point in the information lifecycle. EMC Technology Solutions professionals deliver product-specific point solutions in addition to comprehensive custom planning, design, implementation, and integration services for EMC technology—everything from consolidation of your current resources to a transformation of your environment to achieve information lifecycle management.

EMC Customer Service—six-time winner of the SSPA STAR Award for outstanding mission-critical support—helps you keep your information available 24x7 with an array of services available whenever, wherever, and however you need them. Our eServices capabilities and remote support offerings mean support is just a call or click away.

WARRANTY AND MAINTENANCE SUPPORT

VMAX 20K platforms include a three-year Premium support warranty, providing 7x24, same-day onsite support. The VMAX 20K operating environment software warranty includes 90 days defective media replacement*. Warranties can be extended with an EMC Service Agreement.

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

CONTACT US

For more information on the uncompromising performance, unequaled functionality, and exceptional economics offered by the EMC VMAX 20K, contact your EMC sales representative or authorized EMC value-added systems integrator. You can also visit our website at www.EMC.com.

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