

EMC Tiered Storage for SAP: A New Way to Optimize with Use Cases for EMC Symmetrix VMAX with FAST and Virtual LUN

Applied Technology

Abstract

This white paper highlights the relevant applications of Fully Automated Storage Tiering (FAST) and Virtual LUN for SAP landscapes and summarizes why SAP solutions are good candidates for FAST on EMC[®] Symmetrix[®].

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Executive summary

Business case A new way to optimize will be vital to efficiently managing storage resources and sustaining your competitive edge. SAP enterprise business solutions allow you to implement the processes required to make quick and accurate business decisions. EMC® Symmetrix® VMAX™ with Virtual LUN and FAST provides an information infrastructure to facilitate the rapid business response necessary to maintain your business advantage. A storage infrastructure strategy that leverages tiering and EMC's "Storage Types" will promote optimal application development, performance for critical business processes, and cost-effective use of infrastructure assets. EMC provides technology to complement Storage Tiering by automating and easing the management of tiered storage infrastructures.

Information is the lifeblood of any organization and easily one of its most important assets. EMC's flexible, scalable, and secure information infrastructures provide the technologies and tools to empower customers to leverage their information.

An optimal application and information lifecycle for SAP involves placing the right data in the right place at the right time, and at the right cost. EMC provides the capability and technology to meet the demands of SAP production and non-production landscapes.

Product solution

Business requirements are not static; they are not determined once and then never modified. The business must respond to changes in market, new trends, business consolidations, and new features and functions available with their SAP solutions. From a strategic business point of view, quickly getting to market with enhancements will increase value and enable growth. The Information Infrastructure foundation used to deliver your business process must align with dynamic business needs; in many cases your EMC infrastructure foundation influences your corporate success.

EMC Symmetrix VMAX Fully Automated Storage Tiering (FAST) and Virtual LUN migration capabilities enable SAP teams to reduce costs associated with managing and optimizing their information while continuing to fully exploit its value for business advantage. Virtual LUN and FAST are complementary technologies. Both ease the management tasks required to move storage volumes to appropriate Storage Types based on business-driven quality-of-service criteria such as performance requirements or level of data protection.

Benefits

Leveraging Storage Types and tiering provides the following business benefits:

- **Improved SLA compliance** for business users by significantly reducing I/O wait time for the most critical applications
 - **Reduced TCO** by placing the right data on the right tier based on their usage patterns (for example, highly used "hot" data on fast devices, seldom used "cold" data on slower devices, and so on)
 - **Reduced operating costs** by using significantly fewer drives, reducing power consumption, and cooling and floor space requirements
 - **Reduced management costs** due to the automation provided by FAST
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Introduction

Purpose

SAP solutions and landscapes are business-driven. They are both dynamic and mission-critical. An SAP landscape also includes SAP instances that are not used in production. These instances will be governed by differing performance and data protection requirements (Service Level Agreements, or SLAs). As new information is added to SAP landscapes there is a continual change in the relevance of information throughout the lifetime of the SAP landscape. These characteristics make SAP landscapes very good candidates for FAST and VLUN technologies.

Scope

This paper discusses EMC Symmetrix VMAX FAST and VLUN as a new way to optimize an SAP infrastructure across the landscape.

The paper presents a use case to illustrate the use of Storage Types to complement the systems in a typical SAP landscape. In this case VLUN migration is used to establish tiers by Storage Type. This is complemented by FAST to simplify and ease the continued management.

In addition, two use cases are presented to illustrate the role of FAST as a new way of optimizing the infrastructure supporting an SAP landscape.

Audience

This white paper is intended for SAP Basis managers and database administrators as well as IT directors with responsibility for the infrastructure for SAP landscapes. This paper is also intended for those who seek an introduction to the rationale or use cases for tiering storage using EMC Symmetrix VMAX in support of an SAP landscape.

SAP-specific examples are applied to the EMC Symmetrix VMAX features such as FAST and Virtual LUN. A high-level understanding of SAP solutions, SAP landscapes, and tiering will benefit the reader.

Terminology

- **Enterprise Flash Drives (EFD):** Also known as solid state or FLASH drives. EFDs contain no moving parts, and thus provide best performance for applications sensitive to traditional magnetic disk drive latency.
- **Fibre Channel (FC):** Fibre Channel is a technology for transmitting data between computer devices. Fibre Channel is especially suited for connecting computer systems to shared storage devices and for interconnecting storage controllers and drives.
- **Fully Automated Storage Tiering (FAST):** FAST is a feature of Symmetric VMAX that automates the identification of data volumes for purposes of allocating or re-allocating SAP or other business application data across different performance and capacity tiers within the storage array.
- **FAST Policies:** Policies that manage data placement and movement across Storage Types to achieve service levels for one or more Storage Groups.
- **Logical Unit Number (LUN):** A unique identifier used to distinguish storage devices.

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- **Serial Advanced Technology Attachment (SATA):** A hard disk technology that focuses on greater data density, less power consumption and less cost, but that has lower data transfer rates.
 - **Storage Group:** The logical grouping of volumes (often by application) for common management.
 - **Storage Type:** A shared storage resource with common technologies.
 - **Storage Class:** A combination of Storage Types and FAST Policies to meet service level objectives for Storage Groups.
 - **Tiered Storage:** Tiered storage is the process of maintaining storage of varying performance characteristics, or protection requirements, within the same array or across multiple arrays. Tiered storage gives administrators the flexibility to utilize their resources effectively by aligning storage technology to the appropriate information value and access speed requirements.
 - **Virtual LUN (VLUN):** Virtual LUN technology enables migration of data between Storage Tiers within the same array. VLUN provides the ability to move data without disrupting SAP users or users of other business applications.
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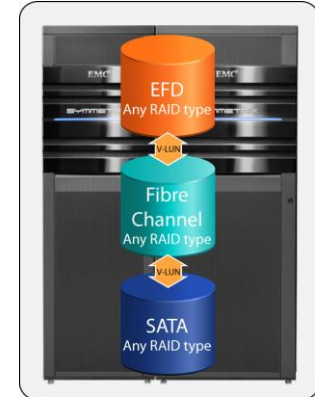
Technology overview

VLUN migration The Virtual LUN migration feature introduced with EMC Symmetrix VMAX provides the ability to transparently migrate database or file system volumes from differing tiers of storage, as well as from differing tiers of protection. All migration combinations of drive types and protection types are valid except for unprotected volumes. The figure demonstrates the VLUN migration capabilities.

The device migration is completely transparent to the host operating system and SAP users.

VLUN enables SAP technical teams to position a lower cost and reliable form of high-capacity storage for appropriate uses within their landscapes.

For further information about the technology of VLUN migration, refer to the white paper *Storage Tiering for SAP and EMC Symmetrix VMAX with Enginuity 5874*.



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FAST

EMC Symmetrix VMAX Fully Automated Storage Tiering (FAST) is Symmetrix software that utilizes intelligent algorithms to continuously analyze device I/O activity and generate plans for moving and swapping devices for the purposes of allocating or re-allocating application data across different performance/capacity Storage Types within a Symmetrix array. FAST proactively monitors workloads at the Symmetrix device (LUN) level in order to identify “busy” devices that would benefit from being moved to higher-performing drives such as EFD. FAST will also identify less “busy” devices that could be relocated to higher-capacity, more cost-effective storage such as SATA disks without altering performance.

Management and operation of FAST are provided by the Symmetrix Management Console (SMC), as well as the Solutions Enabler Command Line Interface (SYMCLI). Also, detailed performance trending, forecasting, alerts, and resource utilization are provided through Symmetrix Performance Analyzer (SPA). EMC Ionix™ ControlCenter® provides the capability for advanced reporting and analysis to be used for chargeback and capacity planning. These resources and the storage infrastructure information are generally available to storage managers. Information should be shared with the SAP technical teams.

The primary benefits of FAST include:

- Automating the process of identifying volumes that may benefit from Enterprise Flash Drives and/or may be kept on higher-capacity, less-expensive drives without impacting performance.
- Improving application performance at the same cost, or providing the same business application performance at lower cost. Cost is defined as space, energy, acquisition, management, and operational expense.
- Optimizing SAP deployments by allowing customers to dynamically allocate resources within a single array.
- Delivering greater flexibility in meeting different price/performance ratios throughout the lifecycle of the information stored.

When configuring FAST to operate on a Symmetrix VMAX, there are three types of components that need to be combined – Storage Groups, Storage Tiers, and FAST Policies.

- **Storage Groups** are a logical collection of Symmetrix volumes that are to be managed together.
- **Storage Tiers** are a combination of a drive technology (EFD, FC, or SATA) and a RAID protection type.
- **FAST Policies** contain a set of tier usage rules that can be applied on one or more Storage Groups.

The figure below illustrates leveraging Storage Types to enable tiering with Symmetrix VMAX.



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For further in-depth resources on the technology of FAST, refer to the white paper *Storage Tiering for SAP and EMC Symmetrix VMAX with Enginuity 5874*.

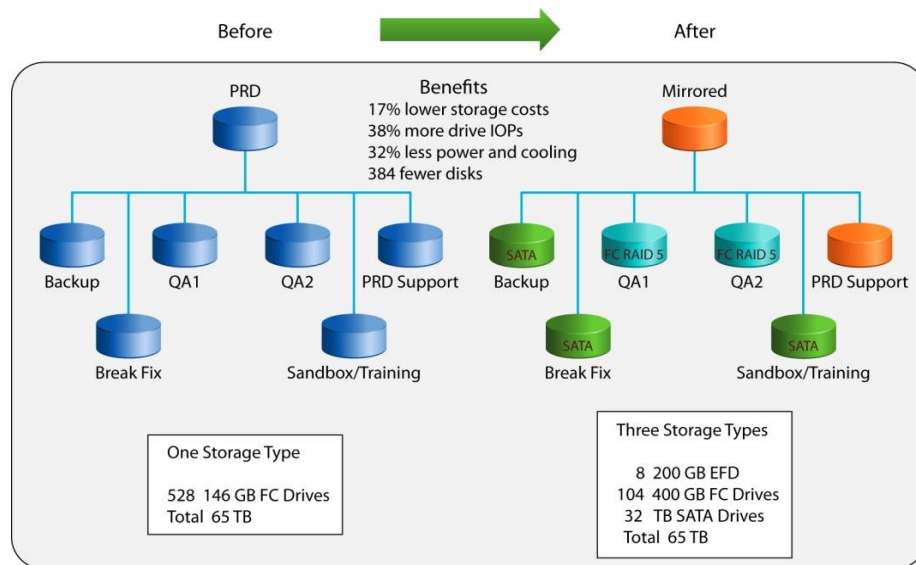
Virtual LUN and SAP

VLUN for SAP use case

Many SAP infrastructure designs do not take advantage of the cost-effective benefits of Storage Types. SATA and EFD are both relatively recent drive technologies. Incorporating these technologies into an infrastructure supporting an SAP landscape (or multiple landscapes) can be initiated by developing a Storage Type strategy and leveraging VLUN migration to assign the appropriate data protection tier or performance throughout the SAP landscape. The use case below discusses establishing a tiering strategy for SAP.

Establish a tiering strategy for SAP

In this use case, a tiering strategy may be initiated by matching SAP service level requirements for each SAP instance in the landscape to a Storage Type. This will create tiers. The following figure shows the effective use of Storage Types and tiering.



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As shown in the figure above, the infrastructure for the landscape begins with all SAP instances using the same data protection type, and all are FC drives. The end result is a landscape that aligns the needs of the SAP functional and technical teams with the protection and performance characteristics of a Storage Type. QA systems are now on FC drives with a RAID 5 protection rather than mirrored. The Production Support instance remains identical to actual production in terms of Storage Type. The sandbox, backups, and break-fix have been moved to SATA drives to further optimize and increase efficiency of the EMC infrastructure for SAP. Using Storage Types and a tiering strategy provides the same total storage and will reduce associated storage costs. Additional savings will be achieved by reduced maintenance and management costs; these savings will vary from one organization to another.

Once a tiering strategy has been defined and deployed, FAST can be used to determine which production LUNs should be moved to the best performance Storage Types (EFD or tier 0). FAST will also ensure the strategy remains optimal without significantly increasing storage administration resources to manage and maintain the tiered storage strategy.

FAST and SAP

FAST for SAP use cases

FAST for SAP landscapes can be thought of as a technology to optimize the landscape.

Manually managing the day-to-day tasks for an optimally tiered storage strategy will become increasingly more challenging as virtualization amplifies the dynamic component of an SAP landscape.

EMC provides the key components for tiering a storage infrastructure to align with business value or performance, and to ease management by dynamically placing data within the designated tiers according to policies.

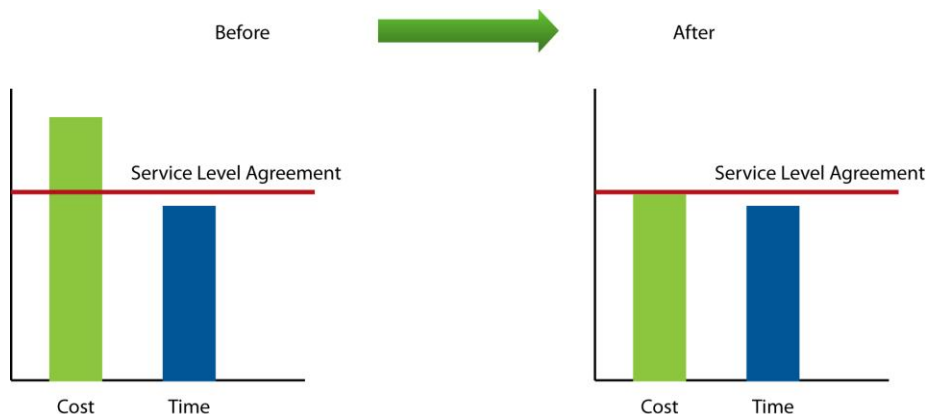
A new way to optimize an SAP infrastructure

As SAP functional and technical teams work through the various stages of projects or implementations many times the functional team will work with a sandbox type SAP instance.

As the configuration for the business process comes to life in phases this sandbox may eventually have additional “power users” from the business experimenting with possibilities for SAP business functions. Eventually the sandbox instance may be used as a training system for users new to SAP, or those users looking to gain experience with new business functionality planned for a go-live.

In this case FAST may be the mechanism to allow the sandbox to begin on cost-effective, inexpensive disk. Over time, as the use of LUNs within storage for the sandbox receive more I/O traffic, FAST may determine those LUNs would benefit from moving from SATA to FC disk. FAST would make this recommendation and await approval to execute, or could be configured to automatically make this change.

Further into the project, as the functional teams prepare and rehearse for go live, this same SAP sandbox instance may be less relevant and FAST may recommend or automatically move it to a more appropriate tier. Though the original sandbox is less frequently used, integration testing processes are ramping up, FAST may make recommendations or automatically migrate the appropriate LUNs for the rehearsal system to a higher-performing tier. The following figure illustrates that with FAST and a tiering strategy there is no reason to overspend on infrastructure in order to reduce the resource time required for managing the storage.



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Finally, there is a great advantage to using FAST in the non-production landscape. Each SAP customer's implementation has different characteristics. Leveraging FAST for non-production will create the opportunity for SAP teams to experience FAST in their own environment. This is always the first step toward implementing a technology into an SAP production landscape.

**Optimize
performance of
SAP file
systems**

FAST can be beneficial to SAP solutions for more than the database data. If you run critical systems that rely on SAP TREX, you might want to consider allowing FAST to optimize those TREX LUNs.

As the data ages or evolves, and searches change over time, the TREX file systems will be dynamic. FAST can provide a means to ensure the infrastructure supporting TREX is continuously meeting expectations for performance in cases where turnaround time for information is critical.

Conclusion

Summary

FAST and VLUN are complementary; both are useful to optimize SAP performance, and facilitate cost-effective use of storage in Symmetrix VMAX arrays. VLUN migration enables the nondisruptive migration of volumes between storage tiers with different performance, capacity, or protection characteristics. FAST provides automated analysis and movement based on defined policies to accomplish a new way to optimize infrastructure for SAP landscapes.

The use case for VLUN migration provides a method to begin implementing tiering and Storage Types across the infrastructure supporting SAP landscapes. This implementation can be optimized and maintained by FAST.

The use cases for FAST address the characteristics of SAP landscapes and provide a means to meet SLAs while efficiently and optimally leveraging your EMC Symmetrix VMAX infrastructure.

SAP customers who plan to leverage FAST and VLUN may want to consider having their arrays configured with EFD, Fibre Channel, and/or SATA disk drives to create storage tiers with different performance levels, as well as tiers by protection (RAID type).

Rather than leave SAP instances and data statically configured to reside on one single tier, VLUN and FAST will enable execution of definitions and policies necessary for automating data movement from tier to tier according to current data usage and established policies.

Benefits

Tiering storage with Symmetrix VMAX offers the following TCO advantages:

- Lower cost per GB
 - Maximum utilization of infrastructure resources by better aligning resources with workloads
 - Reduced footprint
 - Unified management
 - Improved energy efficiency by reducing power and cooling consumption
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Key points

The table below summarizes key storage management challenges and how EMC Symmetrix VMAX with VLUN and FAST technologies can address them.

Challenge	EMC Symmetrix VMAX with VLUN and FAST
Introduce or manage Storage Tiers without host-side changes	Storage Types or tiers can be dynamically changed with no impact to SAP. This eases Change Control concerns in mission-critical SAP environments.
Optimize SAP performance with no impact to users	FAST applies the appropriate policies, and changes are made to the underlying storage with no impact to file system mount points, business continuance, DR, or backup/recovery strategies.

Spend no SAN, host, or SAP resources to maintain and manage the tiering strategy	LUN movement is accomplished using storage resources.
Implement tiering changes without affecting replication strategies	Movement between tiers with FAST or VLUN will have no impact to local or remote replication technologies such as SRDF® or TimeFinder®

References

Related documentation

For additional information, see the documents listed below.

- EMC white paper: *Storage Tiering for SAP and EMC Symmetrix VMAX with Enginuity 5874*
 - SAP Solution white paper: *EMC Tiered Storage for SAP – Automated Storage Optimization Enabled by EMC Symmetrix VMAX and FAST* (coming soon in 2010)
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