



15-Minute Guide to  
**Storing More Efficiently**

Tiered Storage Consolidation  
Simplify Daily Storage Management  
Improve Energy Efficiency  
Increase Information Security

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## Storing More Efficiently with EMC

Enterprise IT organizations have been battling year-over-year information growth rates of 50 to 60 percent. This trend is expected to continue well into the next decade.

Now take those growth rates and apply them to an exponentially larger installed base measured in petabytes and exabytes. In addition to managing this growth, organizations are being asked to do more with less. Storage budgets and the number of resources needed to manage information are going down, not up.

Is there a way out of this dilemma? Just storing more is no longer an option. You need to store more efficiently. And that's why we've written this guide—to demonstrate that EMC is a brilliant choice when it comes to storing more efficiently.

Storing more efficiently also allows you to leverage new technologies to increase information security and protection.

## Optimize Resources, Lower Costs, Improve Service

Storing more efficiently allows IT organizations to consolidate multiple application tiers into a single common infrastructure. The goal? To optimize resources, lower costs, and improve service levels. A key benefit is reduced complexity. At the same time, your IT organization can simplify storage management across the enterprise by leveraging tools and capabilities for: Daily management, Performance tuning, Data mobility, Service and support.

In addition, by storing more efficiently, you can improve energy efficiency by reducing the number of storage systems and networks. The ability to provide more capacity and performance while reducing power, cooling, and footprint helps to significantly lower costs and efficiently support growth requirements.

As you approach the task of storing more efficiently, optimizing storage resources is a key challenge. Identifying utilization rates across the infrastructure—including storage systems and internal disk—can pinpoint areas where capacity is poorly utilized and uncover consolidation opportunities.

## Things to Do as You Begin

### Classify business value

Classify applications and data based on business value to identify information that can be moved to more cost-effective storage tiers. Managing information growth effectively can help lower costs and improve service levels. The rates of growth across different storage tiers can vary greatly. In many environments, most growth is absorbed by tier-one storage—the most expensive. Identifying inactive and static data and moving it from tier one to lower-cost tiers help manage growth while reducing costs.

### Look beyond the install

Ease-of-use capabilities enable IT to be efficient and do more with fewer resources. Many storage managers measure ease of use by how long it takes to install and set up the array. IT organizations need to look beyond the one-time install, though, and deploy ease-of-use tools throughout the entire product lifecycle—from performance tuning to moving and migrating data to routine service.

### Gauge energy consumption

Consolidation or technology-refresh projects require extremely accurate sizing of new power and cooling requirements. Gauge energy consumption through direct measurement after installation, or by using power calculations that look at very specific configurations under typical and maximum use conditions.

### Locate data that must be secured

Discover and catalog all the data that must be secured and the different levels of security required. Information can be spread across the enterprise in multiple places and in multiple formats. Gaining an understanding of the scope of the challenge will be important to designing the appropriate solution.

## Tiered Storage Consolidation

With storage growing at an annual rate of 50 to 60 percent, you need to improve productivity and asset utilization to lower costs and improve service levels. Many IT organizations do this through consolidation with a tiered storage strategy.

Tiered storage consolidation is designed to meet service levels for a wide range of application requirements, delivering cost-effective performance, availability, and functionality. Deploying tiered storage allows an organization to store data on the “right storage type” at the “right time.” This aligns capabilities to requirements and ultimately lowers total cost of ownership (TCO).

The first step to implementing a tiered storage strategy is to classify applications based on service levels and business impact. Key application criteria to consider are:

- Access times
- Applications availability
- Recovery point objectives
- Recovery time objectives
- Cost points

Figure 1 displays a five-tier storage model. The number of tiers deployed is dependent on the environment. Some may require fewer tiers, others more. You can create different service-level categories for primary storage, archival storage, backup and recovery, business continuity, and so forth. Depending on your environment, you can also factor in the costs associated with each category. You can now better understand the cost of information for each application and how to align the information infrastructure with what the business actually needs.

Figure 1.  
Common Tiered Storage Strategy

Tier 0, 1 Examples High-end mission-critical	Tier 2 Examples High-end/midrange Fibre Channel disk local replication	Tier 3 Examples ATA, low-cost Fibre Channel  Availability	Tier 4 Examples Content-addressed storage	Tier 5 Examples Tape
• Seconds to minutes	• Minutes to hours	• Hours	• Hours	• Hours to days
		Performance		
• Dynamic workload • Highest transaction volume	• High performance for constant workloads	• Moderate performance • Primarily read access	• Internet performance • Primarily read access	• N/A
		Recovery Point		
• Seconds	• Seconds to minutes	• Minutes to hours	• Up to 24 hours	• Up to 72 hours

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## Multiple Tiers in a Single Infrastructure

EMC offers flexible, tiered-storage solutions that allow you to align your data availability, protection, and performance requirements based on application needs.

There are different ways to approach storage infrastructure tiering. One common deployment option is to tier storage resources across different systems as shown in figure 2 (top). In this option, tiered storage systems are dedicated and optimized for specific service levels and applications.

On the other hand, you can also combine multiple storage tiers into a single storage system as illustrated in figure 2 (bottom). In this single-platform scenario, there is an incrementally scalable, tiered storage platform for consolidation. This enables you to simplify management and standardize on functionality across multiple application tiers.

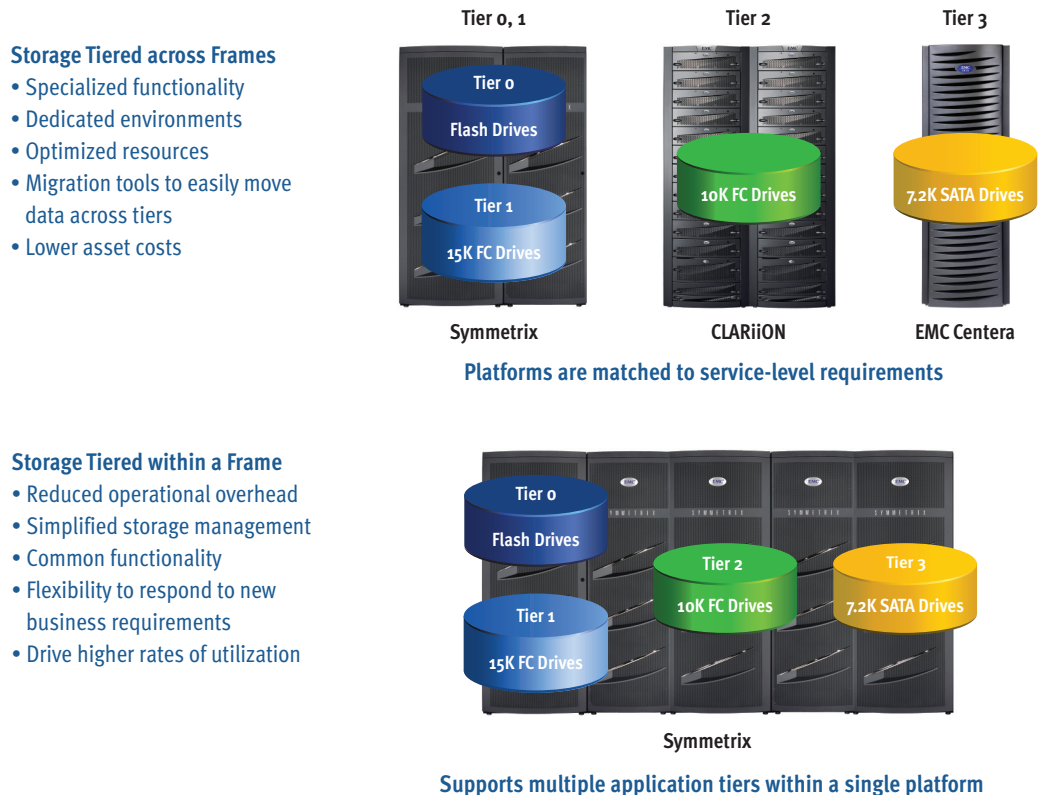
**Symmetrix DMX series** provides high-end storage capabilities to support enterprise-level consolidation. With Symmetrix, you can consolidate tier-one applications as well as support tier-two applications and disk-based backup operations.

**CLARiiON CX4 series** enables affordable, easy-to-use storage consolidation for midrange requirements.

**NS Series (NS20, NS40, NS80)** provides a powerful storage consolidation solution. It leverages the power of specialized, purpose-built NAS technology integrated with CLARiiON CX series storage to provide highly available, flexible, and easy-to-manage NAS systems.

**NS Series NAS Gateways (NS40G, NS80G, NSX)** provide a cost-effective way to consolidate enterprise NAS requirements into an existing EMC CLARiiON or Symmetrix SAN environment.

Figure 2:  
Tiering: Two ways to deploy



EMC storage platforms such as Symmetrix, CLARiiON, and Celerra offer a range of tiered storage options.

**EMC Centra** provides cost-effective online access to fixed content. Consolidation with EMC Centra greatly simplifies management, protection, and distribution of large amounts of fixed content and provides major TCO, time-to-market, and return-on-information benefits.

**EMC Disk Library** combines the power of EMC storage platforms, high-capacity low-costs disks, and 100-percent-compatible tape library emulation to make backup to disk easy to implement and deploy.

**EMC Consulting** follows a business-oriented approach where business requirements drive IT architecture. This means identifying application service requirements, building a corporate service catalog, and then aligning IT to deliver the required service levels.

**A Classification and Policy Services** engagement is an integral first step to execute an information lifecycle management strategy and optimize business processes.

Figure 3 shows the dramatic “before and after” effects of a tiered-storage implementation. The implementing IT organization also enjoyed these additional benefits of tiering:

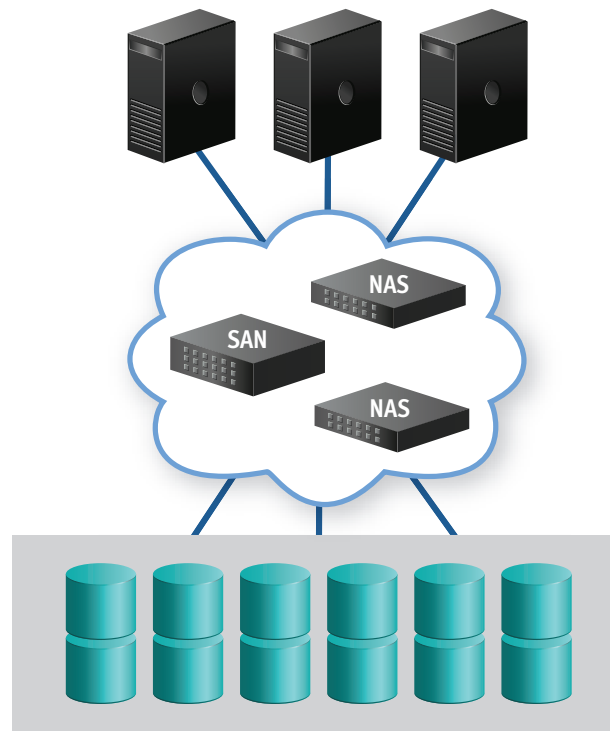
- A service catalog of standardized solutions, aligned with business needs
- Optimized service levels and asset utilization
- A cross-functional architectural process
- Quality Assurance methods and documentation templates

Figure 3: Tiered Storage Implementation “Before and After”

Before 2 tiers		After 4 tiers		Result
Raw capacity	1 PB	Raw capacity	750 TB	25% reduction
SAN fabrics	63	SAN fabrics	20	70% SAN reduction
Switches	70	Switches	44	37% SW reduction
DAS arrays	102	DAS arrays	2	Eliminate DAS
High-end array 115 drives		High-end array 31 drives		73%
Midrange array 90 drives		Midrange array 24 drives		73%

**Benefits:**

- Service catalog of standardized solutions
- Alignment w/business needs
- Optimized service levels and asset utilization



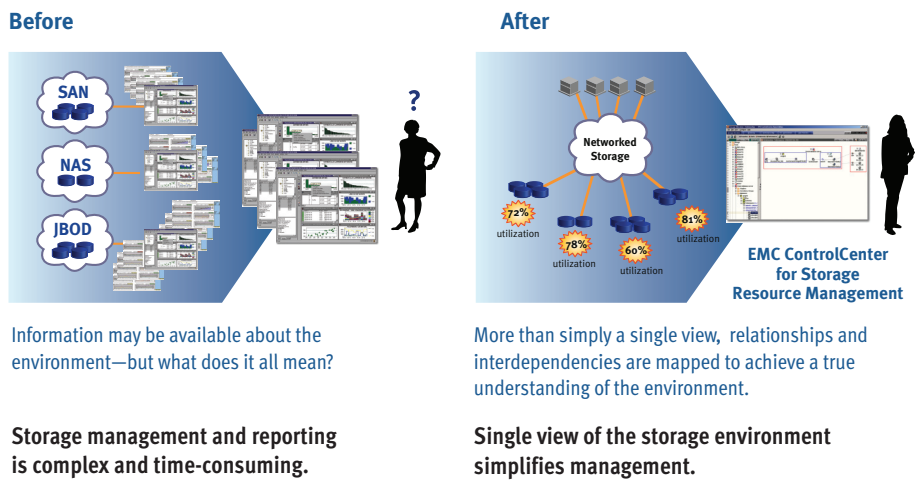
## Simplify Daily Storage Management

As storage environments continue to grow, IT organizations are faced with the challenge of efficiently and effectively managing the infrastructure. Many organizations struggle to manage data growth with flat budgets, fewer storage administrators, and a lack of simplified management tools. Utilization rates across the storage infrastructure are low or—what’s worse—unknown. Data must be gathered from multiple sources and correlated manually. The complex and time-consuming tasks of infrastructure management are compounded by a proliferation of tools required to accomplish individual tasks. The people costs associated with storage management are significant and, according to some analysts, can range from four to seven times the cost of the storage.

Simplifying storage management is a key requirement for IT organizations of all sizes. Larger data centers have teams to support the infrastructure but must deal with turnover. They need to bring new employees up to speed quickly as well as ensure existing skills do not become dated and stale. Smaller operations need to be proficient in many areas of storage and don’t have the time or the resources to manage complex storage tasks. Common challenges include the following:

- Daily storage tasks (discovery, monitoring, reporting, configuration, and tuning) take hours
- Optimizing application performance by service levels is difficult
- Upgrades and migrations require downtime and lengthy planning processes

Figure 4:  
Simplified Management of the  
Storage Infrastructure



## There's more to ease of use than just a simple install

EMC offers a range of storage management services to help you get a handle on storage management. An enterprise storage resource management (SRM) strategy enables your organization to define policies and processes and helps identify management gaps in order to develop strategies for operational improvement. Figure 4 illustrates how consolidation of device management, monitoring and reporting, and planning and provisioning improves utilization and streamlines management. In the “Before” picture, storage management and reporting are complex and time-consuming. After consolidation, a single view of the storage environment simplifies management with relationships and interdependencies mapped and integrated.

EMC has invested heavily in developing new and improved tools that meet user requirements to simplify storage management and improve ease of use across all platforms for:

- Installations
- Device management
- Configuration changes
- Performance tuning
- Data mobility
- Upgrades
- Support and service options

The EMC ControlCenter family of storage resource management (SRM) software provides a unified management environment for multi-vendor tiered storage and addresses three key storage-management areas:

**SRM Planning and Provisioning:** You need to manage your tiered storage environment in the most cost-efficient way while meeting or exceeding businesses expectations.

**SRM Monitoring and Reporting:** It's important to understand what information you have—automatically—so you can improve usage of your multi-vendor tiered-storage assets, analyze their performance, and plan for changes. Then you need to monitor it all. Should something need attention you need to respond, isolate the problem, and correct it before it affects service levels.

**Storage Device Management:** This allows you to effectively and easily configure and optimize your EMC storage platforms.

Ease-of-use capabilities enable IT to be efficient and do more with fewer resources. While many vendors typically measure ease of use by how long it takes to install and set up the array, EMC looks beyond the one-time install to deliver ease-of-use tools throughout the entire product lifecycle. This includes tools for performance tuning, moving and migrating data, and routine service.

See *A Guide to Automating Data Center Operations* for more information on how to better manage your environment.

Symmetrix Management Console allows you to configure and provision a terabyte (TB) of storage in about one minute. Navisphere Task Bar for CLARiiON reduces the number of steps required to configure and manage storage by as much as 70 percent. And Celerra Start-up Assistant allows systems to be installed and ready for use in less than fifteen minutes. The new and improved capabilities are available to existing users and, in many cases, are available at no charge, providing true investment protection for their storage infrastructure. Table 1 presents an overview of ease-of-use capabilities across storage platforms and lifecycle management tasks.

Table 1.  
Ease-of-Use Capabilities across Primary  
Storage Platforms and Management Tasks

	Symmetrix	CLARiiON	Celerra
<b>Installations</b>	<ul style="list-style-type: none"> <li>Includes installation and set up by EMC</li> </ul>	<ul style="list-style-type: none"> <li>Optional user installation</li> </ul>	<ul style="list-style-type: none"> <li>Power up to production in 15 minutes</li> </ul>
<b>Manage and Configure</b>	<ul style="list-style-type: none"> <li>Simplify device and replication management</li> <li>Configuration flexibility and simplicity when consolidating heterogeneous hosts</li> </ul>	<ul style="list-style-type: none"> <li>Centralized web management interface</li> <li>Simplified storage provisioning and configuration</li> </ul>	<ul style="list-style-type: none"> <li>Simplified storage management</li> <li>Simplified and accelerated storage provisioning</li> <li>Simplified capacity planning using historical data</li> </ul>
<b>Tune Performance</b>	<ul style="list-style-type: none"> <li>Advanced QoS performance management when consolidating workloads</li> <li>Self tuning and automated load balancing based on user-set policies</li> </ul>	<ul style="list-style-type: none"> <li>Optimized performance based on application requirements and performance service levels</li> <li>Simplified performance reporting and analysis</li> </ul>	<ul style="list-style-type: none"> <li>Performance issue monitoring and identification</li> <li>Automated performance optimization and balancing</li> <li>High-performance file sharing</li> </ul>
<b>Move and Migrate online</b>	<ul style="list-style-type: none"> <li>Non-disruptive, in-the-box data mobility</li> <li>Data mobility and migrations across heterogeneous storage arrays</li> </ul>	<ul style="list-style-type: none"> <li>Non-disruptive, in-the-box data mobility</li> <li>Data mobility and migrations across heterogeneous storage arrays</li> </ul>	<ul style="list-style-type: none"> <li>Policy-based file movement for archived data</li> <li>Automated file distribution and mobility</li> </ul>
<b>Support and upgrade</b>	<ul style="list-style-type: none"> <li>Non-disruptive hardware and software upgrades, systems maintenance, and configuration changes</li> </ul>	<ul style="list-style-type: none"> <li>Non-disruptive hardware and software upgrades</li> <li>Optional user hardware and software upgrades</li> </ul>	<ul style="list-style-type: none"> <li>Non-disruptive hardware and software upgrades</li> <li>Validated configurations prior to upgrades to minimize risk</li> </ul>
<b>Service and maintain</b>	<ul style="list-style-type: none"> <li>Predictive Monitoring and Call Home to simplify service and support</li> <li>EMC Direct service and support</li> </ul>	<ul style="list-style-type: none"> <li>Predictive Monitoring and Call Home to simplify service and support</li> <li>Customer replaceable components and tiered support options to meet specific support requirements</li> </ul>	<ul style="list-style-type: none"> <li>Predictive Monitoring and Call Home to simplify service and support</li> <li>Tiered support to meet specific support requirements</li> </ul>
<b>Storage Resource Management</b>	<ul style="list-style-type: none"> <li>Monitoring and Reporting for health, utilization, and performance to help meet service-level agreements, use storage assets more effectively, and isolate performance problems</li> <li>Planning and Provisioning providing views of the SAN topology, health, and performance</li> <li>Centralizes active SAN management, and accelerates SAN planning and design</li> </ul>		

New choices for storage management enable you to reduce complexity and simplify management with a complete range of solutions and services.

New choices for storage management enable you to reduce complexity and simplify management with a complete range of solutions and services. An enterprise storage resource management strategy defines policies and processes, as well as identifies organizational gaps. This helps you develop strategies for operational improvement, including establishing the required metrics to optimize the environment. EMC offers a range of storage management services to help get you started.

- You can begin with an **EMC Operations Assessment** to identify storage management policy, process, and organizational gaps; define a plan for operational improvement; and establish metrics to optimize the environment.
- **EMC ControlCenter Planning and Design** service is an on-site consulting service that provides an in-depth understanding of storage management processes and procedures. It is based on best practices and designed to maintain a highly efficient information infrastructure that reduces complexity and automates storage management.
- **EMC ControlCenter Health Check Assessment** service provides a detailed assessment of existing ControlCenter infrastructures. It provides a comprehensive assessment of the infrastructure, business, and operational environments emphasizing their storage resource management (SRM) practices.

EMC Consulting delivers a rapid analysis of the current state of your storage-management environment including existing storage-management policies and processes. The analysis is used to identify potential issues and to define a plan with established metrics and goals that optimizes the environment and helps address areas such as:

- Provisioning management
- System availability and performance management
- Data protection and recoverability management

## Improve Energy Efficiency

Already contending with data growth and rising capacity demand, IT organizations are also challenged to improve energy efficiency. Underutilized assets waste power and cooling resources, for example, servers with internal storage at 20-percent capacity. High-density blade servers pack more compute resources into a smaller footprint, but require exponentially more cooling resources. What's more, rising power costs and insufficient supply in large metropolitan areas force many organizations to redesign or even relocate their data centers. Everyone talks about saving energy, but how do you really do it?

### Reduce power and cooling needs to lower costs and support growth

The EMC approach to storing more efficiently includes a number of energy-efficiency components from planning tools that accurately calculate power requirements to best practices for configuring storage systems.

In addition, new service offerings provide a holistic approach to assess, plan, design, and build energy-efficient data centers along with strategies for consolidation, virtualization, and tiering. EMC storage products can also help improve power and cooling efficiency. The Symmetrix DMX-4, for example, provides environmental efficiencies that can be an important factor in storage upgrades and consolidation.

EMC Power Calculator takes the guesswork out of estimating power and cooling requirements.

**EMC Energy Efficiency Services** provide a complete approach to evaluate IT infrastructure and data center efficiency. Assessments look at two areas: the IT infrastructure (server, storage, and network energy consumption, utilization, and configurations) and the data center (facilities conditions).

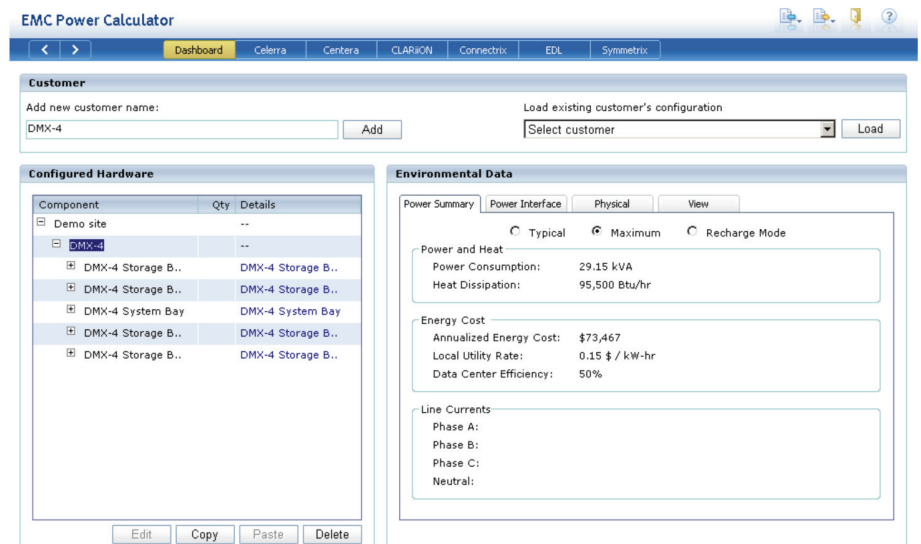
Recommendations may lead to:

- Consolidation (storage and servers)
- Virtualization (server virtualization with VMware, storage virtualization with Rainfinity and Invista)
- Archiving (single-instancing)
- Tiering (higher-density drives)

These services will appeal to many larger IT organizations experiencing energy supply and/or cost constraints inhibiting data center growth. IT organizations planning to upgrade their current environment and improve environmental efficiencies will benefit as well.

**The EMC Power Calculator** is a tool that provides a power and cooling estimate based on actual configurations for EMC storage platforms. It takes the guesswork out of estimating power and cooling requirements and helps simplify facility planning and optimize energy efficiency.

Figure 5.  
How EMC Delivers the Solution



Server Consolidation using virtualization with VMware can save over 80 percent on power consumption by optimizing resources and eliminating underutilized hardware.

Storage Consolidation exploits tiering, archiving, and virtualization technologies. Tiering optimizes storage resource performance, availability, and cost based on different application service levels. Archiving allows fixed content and inactive data to be moved transparently from primary storage to a lower-cost storage tier while remaining on line.

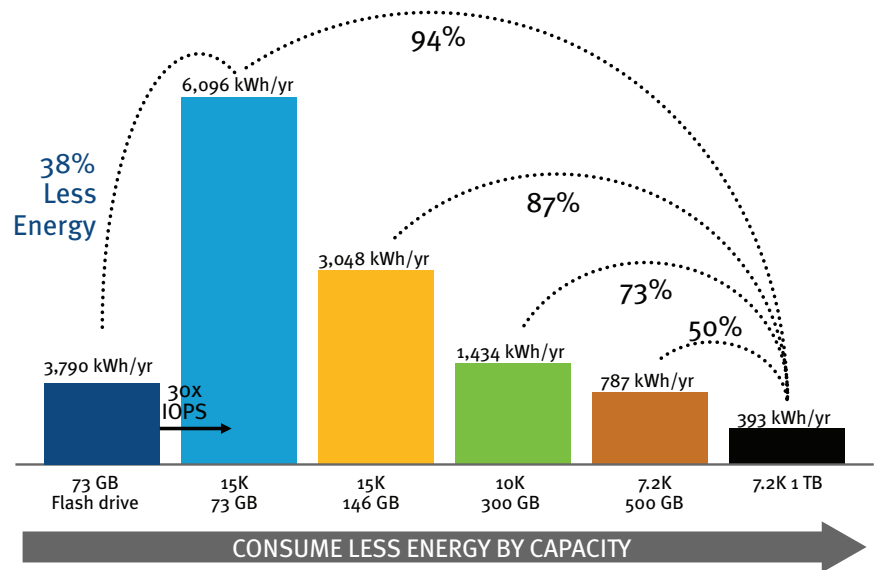
Storage Virtualization allows resources to be pooled and shared to drive higher levels of utilization. These strategies help manage growth with fewer—or more cost-effective—infrastructure resources to lower energy requirements.

Leveraging high-density storage options allows you to save energy by implementing higher-capacity disks for applications that are not performance sensitive or have low-to-moderate workload requirements. As illustrated in figure 6, the energy savings associated with higher-density disks can be significant.

Figure 6.  
Energy-efficient Storage Design

## Today: Energy-Efficient Storage Design

### 1 TB Data on Different Capacity/Performance Drives

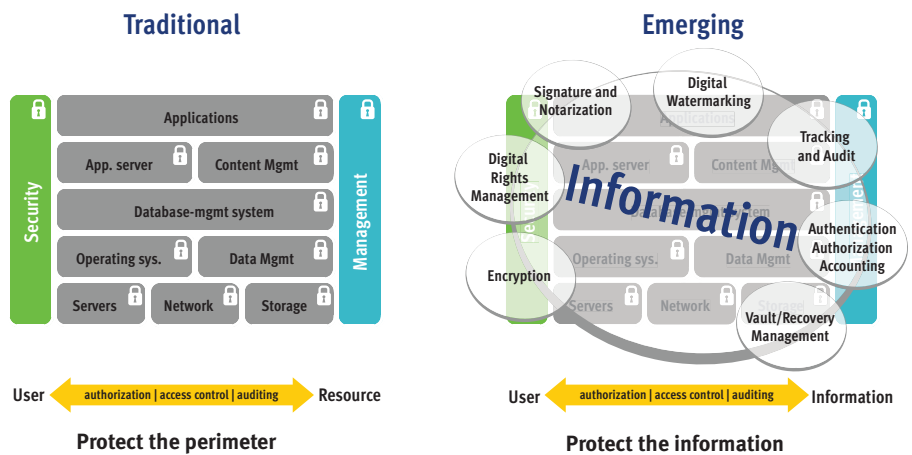


## Increase Information Security

IT organizations face mounting regulatory and legal pressure to secure critical information assets. Industry-specific regulations and government statutes mandate protection of certain types of sensitive information. Organizations that fail to comply face stiff penalties. Even in non-regulated industries, the consequences of a data breach or theft are significant. Many organizations struggle to devise the appropriate strategies and policies for protecting their critical information.

Until recently, much of the focus on information security has been “perimeter-centric”—protecting the enterprise network perimeter from threats such as viruses, malicious e-mail, and website attacks. These protective technologies include firewalls, virtual private networks, and intrusion-detection software. Increasingly, though, security concerns are causing many IT organizations to adjust their security strategies. Now they are focusing more directly on “information-centric” security—protecting the information assets and the supporting infrastructure on which their businesses depend. Figure 7 compares perimeter-centric and information-centric security.

Figure 7.  
Comparing Perimeter-centric and Information-centric Security



EMC capabilities such as those listed above allow you to secure people, infrastructure, and data more completely.

## Information-centric security built in

EMC gives you a wide range of data protection solutions, protecting every type of data at every point in its lifecycle. This requires an inherently secure information infrastructure with security built into the storage systems. EMC uses integrated technology from RSA, The Security Division of EMC, to deliver built-in security features for storage platforms and provide unique capabilities to protect information and access.

- EMC professional services help you develop strategies and policies for effectively deploying appropriate data protection solutions.
- EMC discovery and classification solutions help you identify all the information that needs to be protected.
- EMC technology solutions protect data at-rest and in-flight, at the application layer, at the file layer, at the device layer, and at the media layer.
- A comprehensive key and policy management framework ensures that you can deploy encryption pervasively and effectively across the enterprise.
- Media protection services ensure that data is properly removed from storage arrays and disks at the end of their deployment lifecycle.

Symmetrix DMX-based security features reduce risk and protect information. They enable you to authenticate, authorize, and audit activities on Symmetrix systems and devices, and eliminate the risk of data loss on retired or repurposed disks.

These features also enable compliance with internal policies and regulatory requirements. Here are some of the security capabilities available with Symmetrix DMX:

- **Secure Access: Symmetrix Service Credential, Secured by RSA**, prevents unauthorized service actions by integrating industry-leading RSA technology into Engenuity. Symmetrix Access Control enables users to control server actions. Device masking ensures that only permissible host machines can see Symmetrix devices, while **Symmetrix Access Control** ensures those hosts can only perform permissible actions, such as local or remote replication.
- **Secure Data: EMC Certified Data Erasure** of full array and disk eliminates the risk of data exposure when you change infrastructure components. This includes a certifiable record that data has been overwritten in accordance with the Department of Defense specification 5220.20-M. EMC Certified Data Erasure also helps satisfy regulations such as the Payment Card Industry Data Security Standard (PCI), the Health Insurance Portability and Accountability Act (HIPAA) and the Fair and Accurate Credit Transactions Act of 2003 (FACTA).
- **Secure Audit: Symmetrix Audit Logs** ensure that service and host-initiated actions on the Symmetrix are recorded in a tamper-proof log to assist with compliance efforts. Logged event contents cannot be altered, and only authorized users can access them. Status alerts provide additional integrity safeguards for the rotating log file. **Audit integration with RSA enVision** provides automated, policy-based audit log management and administration to help you meet compliance requirements. RSA enVision analyzes Symmetrix events and other events in your environment to understand and help respond to security threats.

See *A Guide to Securing Critical Assets* for more information on how to better secure your environment.

## 15-Minute Guides to:

- Storing More Efficiently
- Next-Generation Backup, Recovery, and Archive
- Accelerating Business Value for Microsoft Environments
- Making Protection Effective and Affordable
- Automating Data Center Operations
- Accelerating Business Value for SAP Applications
- Virtualizing Information Infrastructure
- Leveraging Content for Competitive Advantage
- Securing Critical Assets
- Accelerating Business Value for Oracle Environments

### Take the next step

For more information on specific ways EMC can improve the operation of your information infrastructure, contact your EMC sales representative, call 1-866-464-7381, or visit our website at [www.EMC.com](http://www.EMC.com).



#### EMC Corporation

Hopkinton  
Massachusetts  
01748-9103  
1-508-435-1000  
In North America 1-866-464-7381  
[www.EMC.com](http://www.EMC.com)

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