



## White Paper

# Leverage a Modern SRM Solution to Reduce Storage Costs and Improve Service Levels

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## IDC OPINION

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Over the past two decades, storage infrastructure has seen massive transformation. Direct-attached storage (DAS) islands were replaced with both Fibre Channel SAN and NAS shared storage infrastructure. Dual controller midrange arrays complemented high-end monolithic systems, and unified storage systems offering both block and file services became status quo.

Driven by 3rd Platform computing, the storage landscape faces further change with the promise of software-defined storage and the decoupling of software from the underlying hardware. Write minimization techniques, together with the declining cost of flash, are enabling greater adoption of SSDs as a persistent storage media, while the insatiable need for performance is driving persistence and compute closer together. Together, these technologies are being used to build out next-generation cloud architectures, data lakes, and cloud-native infrastructure.

However, innovating in the core storage infrastructure is only part of the equation in economic and operational improvements. Mature infrastructure organizations are employing modern storage management solutions in combination with standard ITIL/ITSM processes, workflow automation routines, and best-of-breed storage platforms to reduce operating costs, automate infrastructure provisioning, mitigate human error, and ensure nondisruptive operations.

ViPR SRM is an example of a modern storage management solution used by organizations, including Boston Scientific, assure360, and CSC, for use cases such as ongoing capacity planning, storage capacity reclamation, and performance and problem management. The companion product of ViPR SRM is ViPR Controller, which automates storage procedures and centralizes and transforms storage into a simple and extensible platform. Both ViPR SRM and ViPR Controller are examples of modern SRM capabilities that automate and streamline datacenter operations by reducing storage costs by increasing utilization and reclaiming orphan storage, eliminating manual processes, optimizing performance, reducing operational costs, and improving SLA compliance.

*"We estimate we're saving well over \$200,000 per year, thanks to EMC ViPR SRM."*

Samuel Davis, enterprise solutions architect, assure360

## IN THIS WHITE PAPER

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This IDC white paper provides an overview of Dell EMC ViPR SRM, a modern storage management solution for hybrid cloud environments with heterogeneous storage. This document includes real-world metrics from ViPR SRM customer deployments, illustrating how SRM solutions like ViPR SRM can reduce storage costs and improve service levels.

## SITUATION OVERVIEW

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Consider the transitions that have occurred in the storage infrastructure over the past 20 years. The rise of Fibre Channel in the late 1990s displaced traditional DAS systems for mainframe and open system environments. The early 2000s saw the migration of workloads from high-end, monolithic to midrange modular storage architectures and the growing use of iSCSI SANs for midmarket customers. Applications that had previously leveraged block storage began to also rely on file-based storage, while object-based storage also emerged for rich media, cloud storage, and archive use cases. Enabled by deduplication, disk replaced tape for backup and operational recovery. All these innovations enabled greater efficiency, reduced cost, or improved service levels. Today, the industry is going through further transformation, with the adoption of new storage technologies and architectures from software-defined storage to flash and hyperconverged systems.

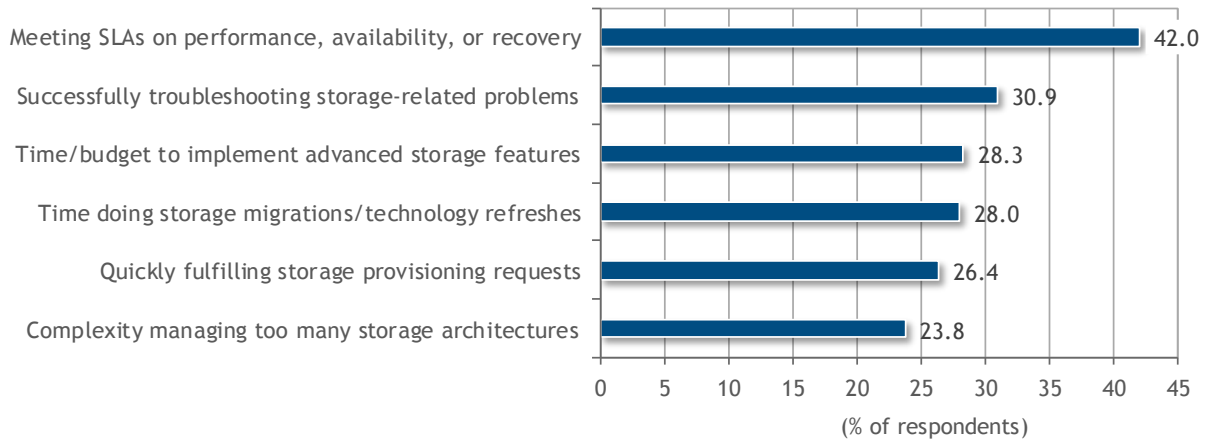
### Leading Storage Challenges

The adoption of solutions has in many ways exacerbated storage operations challenges. Many of the leading storage challenges today can be addressed by modern SRM and storage automation capabilities. These challenges manifest themselves in the need to meet more stringent service-level objectives, increase performance for specific workloads, automate provisioning and migration tasks, and reduce storage-specific capital and operating costs. In a recent IDC study of 307 storage managers and professionals in the United States, outside of managing data growth, leading storage challenges are both economic and operational in nature (see Figure 1). Key challenges include meeting SLAs, troubleshooting, implementing advanced features, managing storage migrations, quickly fulfilling provisioning requests, and reducing operational overhead by managing heterogeneous storage environments.

**FIGURE 1**

**Leading Storage Challenges**

*Q. Outside of data growth, which of the following are leading challenges in your storage environment?*



Source: IDC, 2016

**The Case for Modern SRM**

To achieve both capital expenditure (capex) and operating expenditure (opex) storage cost savings and improve service levels, infrastructure leaders are leveraging modern storage management solutions in combination with standardized processes, workflow automation routines, and best-of-breed storage platforms to reduce operating costs, automate infrastructure provisioning, mitigate human error, and ensure nondisruptive operations.

However, customers evaluating modern SRM solutions must use specific criteria and use cases to ensure that investment in an SRM solution is the right one. The criteria to use in evaluating modern SRM solutions must address many of the capabilities that led to the lack of adoption – or implementation challenges with earlier generations – of SRM. These criteria include but are not limited to:

- **Architectural scalability.** SRM solutions of the past reached architectural limits in terms of data collection and analysis, which forced less granular polling intervals or the need to deploy multiple SRM instances to keep pace with data collection and processing. Today's modern SRM solutions must scale to tens of thousands of hosts/virtual machines (VMs), multiple datacenters, and hundreds of arrays. The system should be designed to handle tens of millions of data points/metrics about the environment.
- **Automation/intelligence.** While reporting, dashboards, and alerts are all mechanisms to gain visibility into the environment, more is expected from today's modern SRM solutions. Previous solutions were good at pointing out issues but relied on the user to resolve them. In the era of machine learning, cognitive systems, and predictive analytics, SRM solutions need to provide what-if analysis capabilities, predict and correct abnormalities before they cause problems, and automate routine storage tasks using storage automation capabilities such as with ViPR Controller.

- **Service management.** In today's era of as a service and the ease with which infrastructure can be procured in the public cloud, IT organizations face increasing pressure to shift from managing infrastructure to offering services. This has given rise to the adoption of public clouds and the buildout of private clouds. Modern SRM solutions must span this hybrid cloud environment, providing infrastructure services on top of the environment. This also includes exposing infrastructure services through self-service portals and, programmatically, via APIs.
- **Discovery and data collection.** Traditionally, SRM solutions have required host agents be installed to gain visibility into the environment. This necessitated maintaining the agents and could frequently mean a disruptive reboot to the application/file server. In today's modern infrastructure, the application or file integration is done remotely. Discovery must be seamless, and collection and data presentation must be done in real time.
- **Price/economics and service delivery.** The benefits of a modern SRM solution are enormous, although, increasingly, users expect more and more features to be included. SRM offerings of the early 2000s were priced disproportionately high relevant to value and required both operating and capital expenditure costs. Today's datacenter environment seeks to shift costs to a recurring, subscription model and procure infrastructure management as a service. Thus modern SRM solutions should be available on-premises and via SaaS delivery.
- **Ease of deployment.** SRM solutions have historically been quite complex to deploy, starting with the creation of databases and the installation of host agents. For example, it was common for an SRM solution to involve many weeks of professional services for the implementation of storage arrays and switches (phase 1), hosts and applications (phase 2), and integration and automation (phase 3).
- **Ecosystem integration.** SRM solutions of the past required installation of loosely integrated SAN device management and host/application-level reporting modules individually. Today, the expectation is of a common software platform, with integration into heterogeneous environments across hardware, software, virtualization, management, and orchestration layers. As private clouds continue to build out, API's integration with modern management and orchestration layers is of paramount importance.

## DELL EMC VIPR STORAGE RESOURCE MANAGEMENT

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While standardization is a common objective in any datacenter, the reality is that today's large datacenters still have an overwhelming amount of heterogeneous infrastructure. It is not uncommon for infrastructure managers to say "we have a little bit of everything," or "we're a large shop; we have many different storage platforms." Even within Dell EMC's own customer base, there are a multitude of array types and architectures, from VMAX to VNX to XtremIO to Data Domain. It is exactly in these environments that Dell EMC ViPR SRM (and ViPR Controller) can offer the following benefits:

- Reduce the cost of managing heterogeneous storage.
- Mitigate storage outages resulting from human errors.
- Allocate storage faster to applications and line of business (with ViPR Controller).
- Automate storage provisioning via integration with automation/orchestration tools (with ViPR Controller).
- Reduce time in, and eliminate, manual storage capacity planning.
- Troubleshoot storage problems including performance issues.

Dell EMC ViPR SRM is a storage resource management software that enables IT to visualize storage relationships, analyze configurations and capacity growth, and optimize resources to improve return on investment (ROI) in traditional SAN/NAS and software-defined storage environments. ViPR SRM, a modern storage resource management architecture, supports both scale-up or scale-out growth to adapt to increases in datacenter server, switch, and storage, with minimal impact to the environment.

## ViPR SRM Architecture

ViPR SRM provides a multivendor view into an enterprise storage infrastructure to help visualize and optimize capacity and manage devices. The ViPR SRM management framework is a web-based application. The application provides reporting and monitoring services for Dell EMC and third-party storage infrastructure. Asset-specific SolutionPacks provide a user interface (UI) that supports platform-specific features. The typical installation of ViPR SRM consists of servers/vApps that host various operations for the system.

*"Today's CIOs are concerned with delivering to service-level agreements. ViPR SRM and ViPR Controller allow them to deliver to that service level, regardless of the diversity of the underlying infrastructure."*

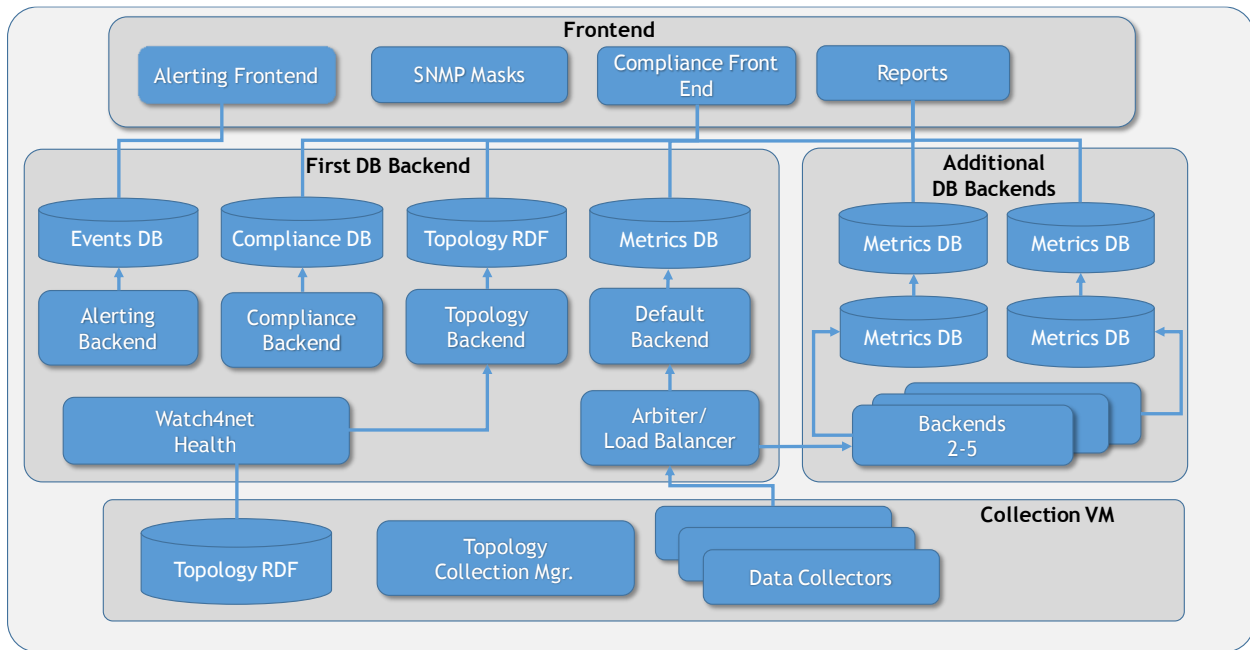
Chris Flaesch, GM Platform Offerings,  
CSC

Figure 2 shows the relationships between the following components in ViPR SRM:

- **Frontend** hosts the Tomcat web server and the ViPR SRM console. Users and administrators log onto the frontend server. All frontend services, including reports, alerting, and compliance, are integrated into a single UI on the console.
- **Primary backend** hosts the ViPR database and system processes and tasks, including the alerting engine.
- **Secondary backend** hosts additional database elements.
- **Collector manager** hosts the metrics collectors that receive information from the monitored storage devices.

FIGURE 2

## ViPR SRM Physical Architecture



Source: EMC, 2016

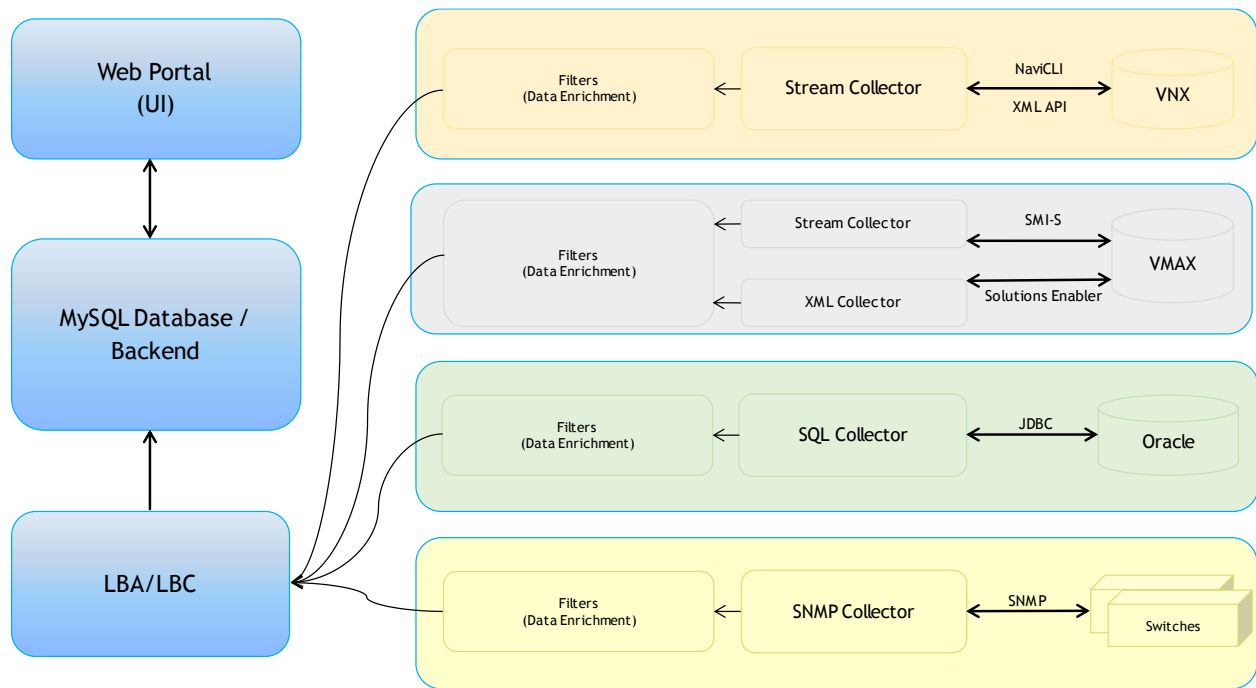
ViPR SRM also includes a set of SolutionPacks that adds storage-specific and device-specific functionalities. SolutionPacks essentially customize the ViPR SRM application to customer-specific infrastructure. As a result, an organization only installs the SolutionPacks it needs. A SolutionPack installs a metrics collector, reports, alert definitions, compliance policies, and many other components that enable reporting for a storage device type or a feature set. Over 20 different SolutionPacks are included with the purchase of ViPR SRM. For example, SolutionPacks for switches, storage arrays, and databases are included with ViPR SRM.

Installation of a SolutionPack includes configuring a discovery process to look for the new device types. ViPR SRM discovers devices and initiates metrics collection from them, and those new devices eventually appear in the reporting infrastructure on the ViPR SRM console.

Figure 3 shows how metrics from various devices are collected, enriched, merged into a single database, and displayed in one user interface. The ViPR SRM Load Balancer Arbiter/Load Balancer Connector (LBA/LBC) manages collected data. The data collected is inserted into the database where it is available to the frontend for reporting purposes on the web portal UI.

**FIGURE 3**

**ViPR SRM Metrics Collection**



Source: EMC, 2016

**ViPR SRM Use Cases**

ViPR SRM can be used for a broad range of use cases to reduce storage costs and improve service levels. Leading ViPR use cases are discussed in the sections that follow.

***I/O Performance Management***

Ensuring IOPS are acceptable and latency is minimized is the single biggest imperative in today's virtualized environment. The proliferation of virtual machines created I/O bottlenecks and noisy neighbor conditions, which drove accelerated adoption of flash memory in both hybrid and all-flash arrays. However, managing performance of specific applications and troubleshooting performance issues are still a reality. ViPR SRM is used to analyze performance from the host, the array, and the switch perspective.

Without ViPR SRM, storage administrators have to bring up multiple tools and correlate statistics between host reports and storage array reports. With the performance trending and reporting in ViPR SRM and the powerful correlation engine, administrators can see an end-to-end view of the I/O path from virtual machines through the SAN to a specific LUN. Key performance indicators, such as average read/write response times, throughput, read/write IOPS, and cache utilization for a given object, give keen insight into probable causes. Operational time savings are achieved to quickly identify and remediate performance issues.

## Storage Capacity Reclamation and Optimization

Storage organizations have been overprovisioning storage for many years to achieve performance objectives. Overprovisioning capacity has been implemented using techniques such as short stroking disk drives because a given application owner overestimates the amount of capacity required. This leads to wasted and underutilized storage. Short stroking disk drives to gain performance benefits means that the overestimated capacity is never used. Thin provisioning has helped improve storage utilization through overprovisioning storage arrays, but thin provisioning does not remedy conditions of orphaned storage.

Separate application/server and storage infrastructure teams have often resulted in ineffective communication regarding the commissioning or decommissioning of host resources. As a result, islands of abandoned or orphaned storage are common. However, the challenge for the storage administrator is locating this orphaned storage. ViPR SRM identifies underutilized capacity and orphaned storage. ViPR SRM also allows for easy visualization of service levels (i.e., gold, silver, and bronze) for a given VM or device, which enables administrators to move applications to lower-cost storage without violating performance SLAs.

Without ViPR SRM, individual host and array reports would need to be run to gather a complete picture of storage allocated, provisioned, and in use. Using ViPR SRM's dashboard visualization, an administrator can easily see the host consumption of storage resources and how much of each type of storage is in use. Reports clearly identify storage that can be reclaimed or highlight where more storage needs to be provisioned, avoiding risk of downtime.

*"Boston Scientific has saved 1,500 man-hours per year using ViPR SRM. It has eliminated manual spreadsheet work, and we use it to streamline capacity and upgrade planning, ensure fabric health, and identify hotspots on storage frames."*

James Coder, technology architect, Boston Scientific

## Chargeback and Showback Reporting

While not all operations teams perform chargeback, the growing adoption of cloud computing has seen resurgence in accounting for infrastructure costs by department, organization, or other internal customer. A formal chargeback for infrastructure is not universally used, although a less stringent showback on costs is increasingly common. The challenges with chargeback have been in cost and billing management of diverse shared resources, with variances in dollar-per-gigabyte metrics over time.

ViPR SRM allows for the creation of custom chargeback reports, which can be used for showback or chargeback. Administrators can create customized groups, along with customized service levels, as a way to classify, analyze, and charge back for storage usage according to specific business needs and SLAs. To capture chargeback metrics for a specific customer, an application, or a business unit, the administrator defines a chargeback group that contains all of the hosts used by that customer, application, or business unit. ViPR SRM automatically generates a set of chargeback reports for the new group.

## SLA Compliance Monitoring and Reporting

Public cloud computing has challenged internal operations teams to deliver the same, if not better, infrastructure services than can be procured in the open market. This has brought about an increasing focus on service levels in not only developing but also monitoring them for compliance. However, as the old adage goes, you cannot monitor what you cannot measure. SLAs are typically associated with



performance, availability, and recovery. Performance SLAs are measured in IOPS, availability is measured in service uptime, and recovery is measured in RTO and RPO metrics.

ViPR SRM allows administrators to ensure SLAs are met by responding to automated service-level deviation alerts and reporting through custom thresholds and dashboards across heterogeneous storage. Stressed arrays and ESX host can be identified, while data protection compliance monitoring isolates recovery exposures through backup success rates and backup failures. On an application basis, administrators can ensure backup and replication jobs are complete and analyze replication performance and obsolete recovery points.

## **Storage Capacity Planning**

Storage is consuming an increasing component of any infrastructure budget. Data continues to grow unabated, and while storage efficiency and thin provisioning have helped, storage capacity planning remains an essential part of any large storage environment. Planners need to identify optimal periods for procurement and procure the right volume of media at the right price. To achieve this effectively, historical information must be visualized and reported on in a variety of ways. Moreover, information must be up to date and accurate.

The ViPR SRM provides analysis of capacity growth and consumption across heterogeneous arrays in multiple datacenters to identify who is using capacity as well as how much capacity they are consuming and the time frame when more capacity will be required. Administrators can also track media consumption by HDD/flash technology, RAID type, array model, or SLO to understand where and how capacity is being consumed. ViPR SRM also tracks consumption of thin pools and storage groups to predict when more capacity will be required, thereby mitigating capacity outage events. Rich capacity reporting optimizes purchasing decisions that reduce capital storage costs.

## **End-to-End Infrastructure Correlation**

Infrastructure operations teams have faced a long-standing challenge of lack of visibility across the infrastructure. Historically, server or application administrators were able to access host-level information about performance and capacity, while storage administrators accessed device-level or array-centric information. Further complicating the picture were application, switch, or VM-centric tools. Each team used its own respective tools to conduct utilization analysis, troubleshooting, and the like. This resulted in an ad hoc, highly manual process of piecing together information from disparate tools and spreadsheets to develop a complete picture of the environment from the application to the spindle.

With ViPR SRM's sophisticated correlation capabilities, administrators can see a view from the host or virtual machine to the data store, through the fabric to the array to a given LUN and device. Administrators can see relationship dependencies and get an end-to-end configuration picture in a single place versus developing this picture manually and on a case-by-case basis, with information quickly becoming outdated. This correlation is essential for performance and capacity management. Identifying the end-to-end path for a given virtual machine or host, highlighting the issue, and being able to deep dive to see statistics allow for quick remediation of issues.

*"Organically, CSC has over 175PB of addressable storage, growing 20% per year. ViPR SRM and ViPR Controller together allow us to improve our FTE-to-storage ratio by a factor of four to five times."*

Chris Flaesch, GM Platform Offerings, CSC

## CHALLENGES/OPPORTUNITIES

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Driven by 3rd Platform computing, including cloud, mobility, social, and big data and analytics, datacenter infrastructure is in a state of transition and evolution. The challenge for environments today is managing existing infrastructure while shifting it to more modern approaches over time. This involves keeping legacy infrastructure under control while migrating legacy systems to modern architectures. The use of a modern SRM solution can help bridge the old and the new, providing visibility into both environments as this transition occurs.

## CONCLUSION

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Like the customers identified in this document, storage environments can materially benefit from a modern SRM solution. Infrastructure teams reduce storage costs by increasing utilization and reclaiming orphaned storage. The same organization can increase performance – reduce operational costs and improve SLA compliance. ViPR SRM offers these benefits across Dell EMC and third-party storage environments. However, if you are looking for a modern SRM solution, Dell EMC is unique as a storage supplier in having made investments at not only the infrastructure tier but also the management tier. This provides an overall result of helping customers as they transition from the 2nd Platform to the 3rd Platform computing models.

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