Up to 93% more IOPS*†
Support data-intensive workloads

129% greater data reduction*
Use storage more efficiently

94% faster bulk storage provisioning*
Save IT admin time and steps

Get the most out of your storage with the Dell EMC Unity XT 880F All-Flash array

This Dell EMC solution processed more IOPS and reduced data more efficiently than a competitor array

Businesses of all sizes struggle with aging gear and lack of storage. In fact, in a 2018 Enterprise Storage Forum survey, IT and business leaders cited these concerns as their two biggest storage infrastructure challenges.[1] But in mid- to enterprise-sized businesses, where every dollar counts, fixing these problems can feel like a tall order. If you're going to upgrade your storage, you need to make sure you're getting an efficient array that will help you maximize the value of your storage and your data.

We tested two storage arrays to see which could best help organizations meet these goals: the Dell EMC™ Unity™ XT 880F, and an all-flash offering in the entry-level market from a competitor ("Vendor A"). In our hands-on testing, the Dell EMC Unity XT array processed up to 93 percent more input/output operations per second (IOPS) in an 8KB 100% random read test and reduced 129 percent more data. It also carried out common management tasks faster, cutting the number of deployment steps in half and allowing us to complete bulk storage provisioning in 94 percent less time than the Vendor A array.

The Dell EMC Unity XT can help you maximize storage capacity, enabling you to serve more customers and potentially drive a higher return on your infrastructure investment.

*compared to the array from Vendor A
† in an 8KB 100% random read test

Dell EMC Unity XT 880F All-Flash array

According to Dell EMC, the Dell EMC Unity XT 880F array "delivers modern unified storage for the midmarket to the enterprise."[2] Powered by Intel® Xeon® Scalable processors, this all-flash platform is designed to "deliver high-speed access to business data with the ability to simultaneously run mixed application workloads, process inline data reduction, and provide data services with no performance overhead."[3] Learn more about the Dell EMC Unity XT 880F array: DellEMC.com/Unity.

A storage array designed for resource-constrained environments

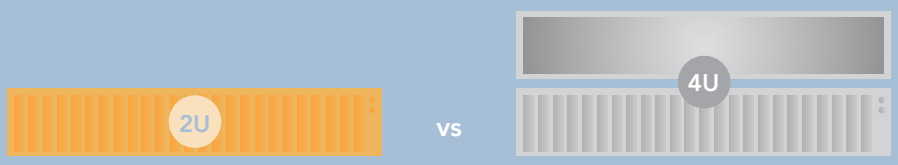
Dell EMC designed the Unity XT Series for IT professionals without enough time or resources.[4] These professionals could be working in a medium-sized business, or for a larger enterprise in a department that operates its own storage. Dell EMC says the Unity XT 800F array delivers "high-speed access to business data with the ability to simultaneously run mixed application workloads, process inline data reduction, and provide data services with no performance overhead."[5] Features include:[6]

- Support for block, file, and VMware® Virtual Volumes (VVols) in a single array
- Up to 16 PB of max raw capacity
- Dell EMC Unisphere™, a single HTML5 graphical user interface (GUI) for management, monitoring, and analysis
- An NVMe™-ready design

Read on to learn how the Dell EMC Unity XT processed up to 93 percent more IOPs, reduced 129 percent more data, and provisioned bulk storage in 94 percent less time compared to the array of Vendor A.

Maximizing your data center space with the Dell EMC Unity XT

Businesses are constantly looking for data center solutions that maximize performance while minimizing sprawl. The Dell EMC Unity XT packs its capacity and performance into just 2U of rack space. By contrast, the array from Vendor A takes up twice this amount of space (4U), despite its poorer performance on the tests we outline in the following pages. The Dell EMC Unity XT array can support more storage performance in a smaller footprint, helping organizations get the most out of their existing data center space.



Dell EMC Unity XT 880F | Vendor A array

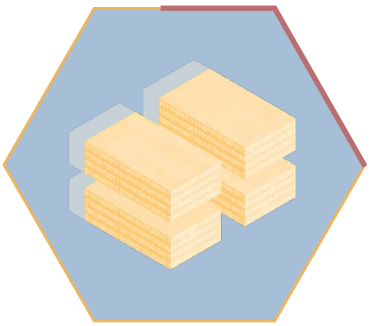
How we tested

We configured two identical testbeds, one each for the Dell EMC Unity XT 880F and the Vendor A array. For each testbed, we grouped six Dell EMC PowerEdge™ R740 servers into a single VMware vCenter™ 6.7 server cluster. We deployed an additional Dell EMC PowerEdge R740 server with VMware ESXi™ 6.7 as an infrastructure server. Following each vendor's best practices, we used default configuration settings on both storage solutions.

For storage provisioning, management, and monitoring on the Dell EMC Unity solution, we used Dell EMC Unisphere. For the solution from Vendor A, we used their recommended management GUI software. We measured each solution's input/output operations per second (IOPS) and usable storage capacity using Vdbench, which executes disk I/O workloads onto an array's SSDs to validate storage performance. We tested the peak performance of both arrays with data reduction off and on and then measured how each system handled data reduction based on the same performance loads. We also measured how well each solution performed on management tasks including array deployment and storage provisioning. As we outline below, the Dell EMC Unity XT 880F beat out the Vendor A array on every one of these tasks. For a more detailed review of our testing process, see the science behind this report.

Test 1: Storage performance with data reduction off

We first tested both solutions with data reduction turned off. (For an explanation of data reduction, see page 5.) Using Vdbench, we measured how many IOPS each solution could handle. We used a read-heavy test (which indicated how quickly the solutions could retrieve information from their disks) running 8KB and 32KB workloads. In the course of its daily data center work, a storage array will have to process many types of data. Seeing each solution's performance with these two different data-intensive workloads helps us understand how the solutions could handle workloads of different block sizes.



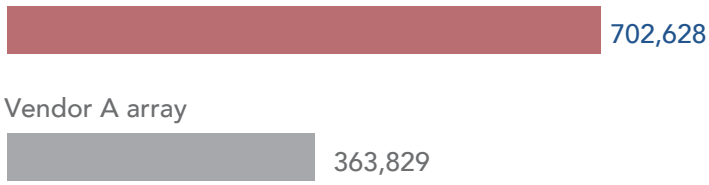
Support data-intensive workloads with up to

93% more

IOPS in an 8KB 100% random read test

In an 8KB 100% random read test, the Dell EMC Unity XT array supported 93 percent more IOPS than the solution from Vendor A. Here, IOPS serves as a useful storage performance measurement because it indicates the ability of the Dell EMC Unity XT solution to process a high volume of data. With a solution that can process more transactions, your data center could support more users, enabling your business to expand its customer base and potentially generate more revenue.

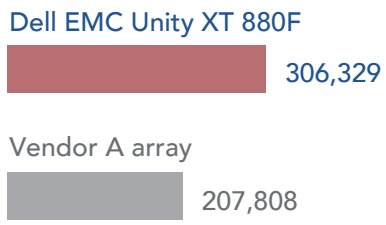
Storage IOPS performance with Vdbench (Data reduction off)
8KB 100% random read workload | Higher is better



93%
more IOPS

With a bigger, 32KB workload, the Dell EMC Unity XT solution processed 47 percent more IOPS compared to the other solution.

Storage IOPS performance with Vdbench (Data reduction off)
32KB 100% random read workload | Higher is better



47%
more IOPS

Data reduction on the Dell EMC Unity XT array

During a prolonged period of heavy storage utilization, storage on the Vendor A array would bypass data reduction and continue to take up valuable storage space. This could force an organization to purchase more storage to gain additional capacity, potentially increasing costs, infrastructure complexity, and management time. The Dell EMC Unity XT array reduces data in real time, all the time. The solution from Vendor A, by contrast, is more beholden to CPU utilization: in order to maintain performance, its array must wait to reduce incoming data until the storage CPU has available cycles.

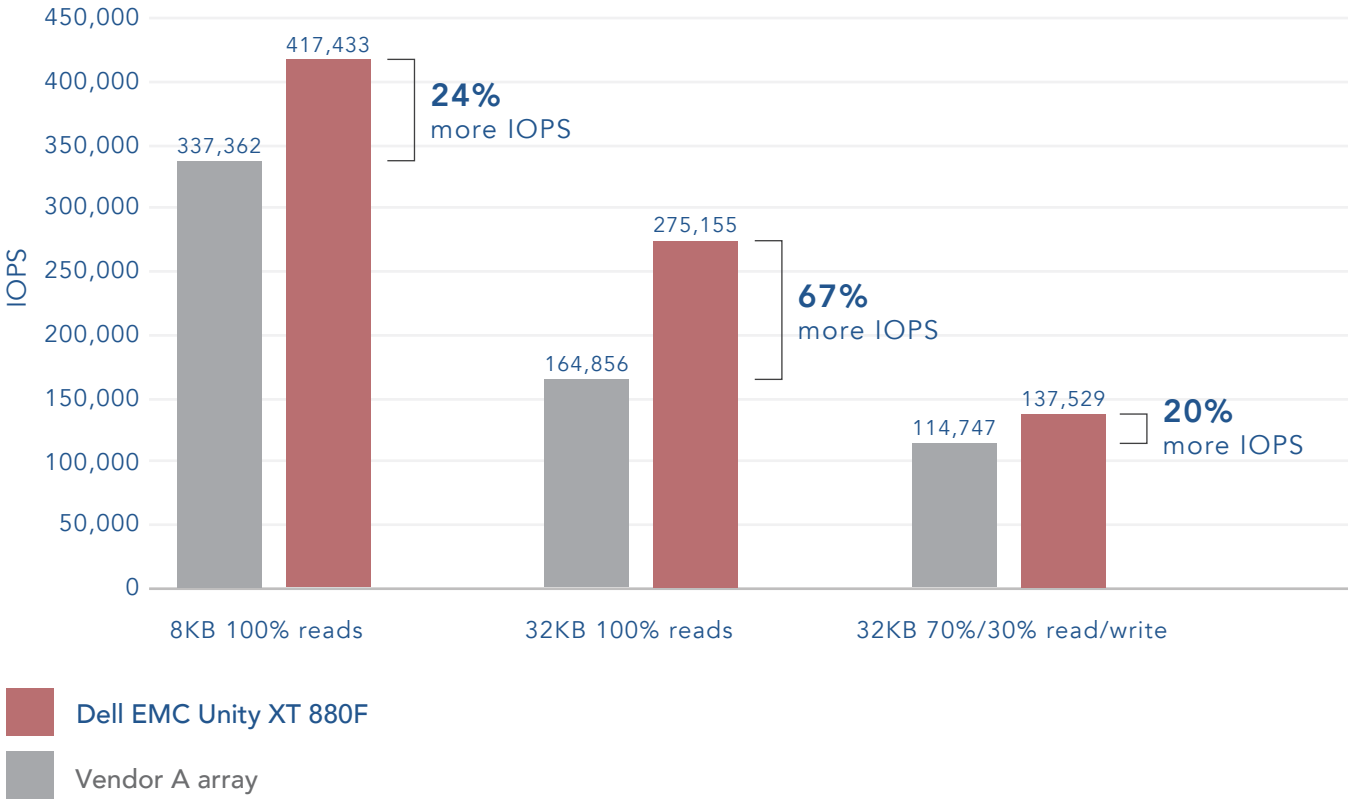
Test 2: Storage performance with data reduction on

Users wanting to maximize storage efficiency and space will often enable data reduction. This is because, with an array with better data reduction capabilities, an organization can increase the amount of data it can store on its existing array without having to expand to an entirely new system. With data reduction enabled, we ran three different tests on the arrays of Dell EMC and Vendor A:

- 8KB 100% random read
- 32KB 100% random read
- 32KB 70%/30% random read/write

The Dell EMC Unity XT solution outperformed the Vendor A array in all three tests, providing up to 67 percent more IOPS even with data reduction enabled. On a 70%/30% read/write workload, which represents the mixed I/O a storage array often processes, the Dell EMC Unity XT handled 22,782 more IOPS than the Vendor A array.

Storage IOPS performance with Vdbench (Data reduction on)
Higher is better



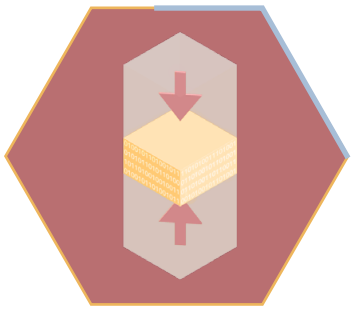
What is a LUN?

When end users access storage on an array, they draw storage resources from physical disks that the array has grouped into pools and presented using the iSCSI block protocol. We call these resources Logical Unit Numbers (LUNs).

Test 3: Data reduction

To gauge the data reduction ability of the two arrays, we provisioned storage LUNs and filled them with 29.2 TB of data. We used 60 LUNs, each of which contained a data set with a 4:1 compressible and 3:1 dedupable data reduction ratio. Next, we measured how well each solution deduplicated and compressed the data; that is, how much duplicate data it recognized that didn't need to consume physical space, and how much data it compressed, reducing storage utilization. We ran an 8KB 100% random write test at 70,000 total IOPS. We cut the maximum IOPS workloads in half to ensure that each array was performing at the same level, allowing us to more accurately determine storage efficiency. In this test, the Dell EMC Unity XT solution reduced 129 percent more data than the Vendor A array.

If your organization is heavily utilizing storage, you need a solution that can keep up with your demands while maintaining storage efficiency. As our testing demonstrated, the Dell EMC Unity XT array reduced data more efficiently, potentially providing more usable storage capacity.



Maximize storage capacity with

129% greater

data reduction

Storage consumption

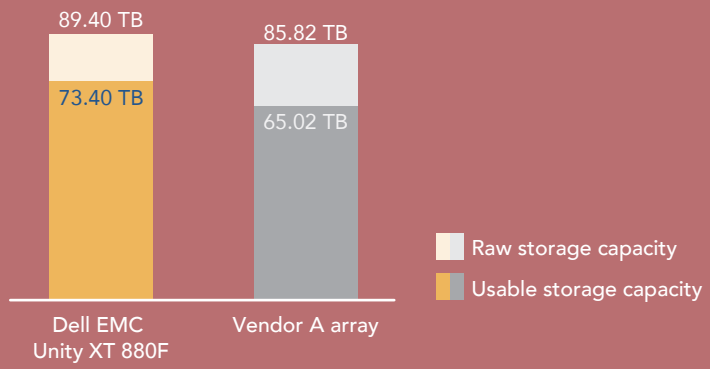
Lower consumption and higher data reduction is better

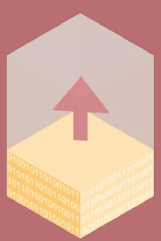
Test 4: Usable storage

When you're considering a new storage array, storage capacity should be top of mind. How much raw storage does a solution contain? And, more importantly, how much of this storage is usable? Any unusable storage is simply overhead—something that your company is paying for without being able to use.

To test the usable storage on both solutions, we configured both arrays with disks of the same capacity until they reached their maximum storage capacity. While usable storage of the Vendor A array maxed out at just over 65 TB, the Dell EMC Unity XT solution provided 73.4 TB of usable storage, or 82 percent of the raw storage capacity—a usable storage capacity improvement of 12 percent over the array from Vendor A. With more usable storage at your disposal, your organization will be able to maximize your current storage capacity for longer. This could lead to cost savings for your company, especially across multiple arrays, by allowing your organization to delay or forgo costly storage expansion.

Usable storage





Get the most out of your storage with

12% greater

usable storage capacity

We released a test report on a previous version of the Dell EMC Unity, the Dell EMC Unity 550F, in February 2019. We tested that solution against the same Vendor A array as in this study. The following section provides results from that February 2019 report. To read the report, visit https://facts.pt/1mmyay4.

Platform resiliency

For our February 2019 report, Maximize your storage capacity with the Dell EMC Unity 550F All-Flash array, we tested the platform resiliency of the Dell EMC Unity 550F against that of the array from Vendor A. We simulated a storage controller failure by pulling one controller from each system and measuring how quickly the remaining controller took over the failed controller's workload. We then plugged the controller back in and timed how long this controller took to restore to its full operations. Although the Vendor A array completed the initial takeover in less time than the Dell EMC Unity array, the Dell EMC solution performed better on the takeback test, resuming normal operations in under two minutes. The array from Vendor A, by contrast, took almost three minutes. With faster takeback times, your storage arrays could return to their full power sooner, ensuring that users could continue their business as usual.

Crucially, the Dell EMC Unity array also maintained drastically faster VM disk response times (78 percent) throughout the failover and recovery process. By contrast, latency on the array from Vendor A spiked throughout the test, meaning it took longer to respond. (For a visual representation of this process, see the graph in the report link below.) On the Dell EMC Unity solution, users would be unlikely to experience high wait times, even in the event of a storage controller failure. The benefits of having a robust and responsive system are numerous. In a 24-hour workplace like a hospital or call center, time spent waiting is time in which core operations slow down, possibly missing completion windows or service-level agreements. Any downtime could cost your organization in lost labor, revenue, or both. By contrast, faster response and recovery times allow users to quickly access important information.

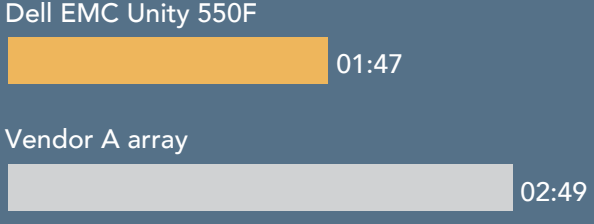
For more information on the testing process, platform resiliency, and latency on the Dell EMC Unity 550F, read the February 2019 report: https://facts.pt/1mmyay4.

Scaling on the Dell EMC Unity XT 880F

The Dell EMC Unity XT groups its disks into a single unified storage pool, while the Vendor A array splits its disks into multiple smaller pools. Admins managing the Vendor A array would need to manage these pools individually. By contrast, on the Dell EMC Unity XT solution, admins would need only manage one storage pool. For organizations scaling up their arrays to meet growing storage needs, the architecture of the Dell EMC Unity XT solution could translate to less time and hassle for IT admins.

Time to return to normal operations

min:sec | Lower is better | Results from February 2019 report



Test 5: Everyday management tasks

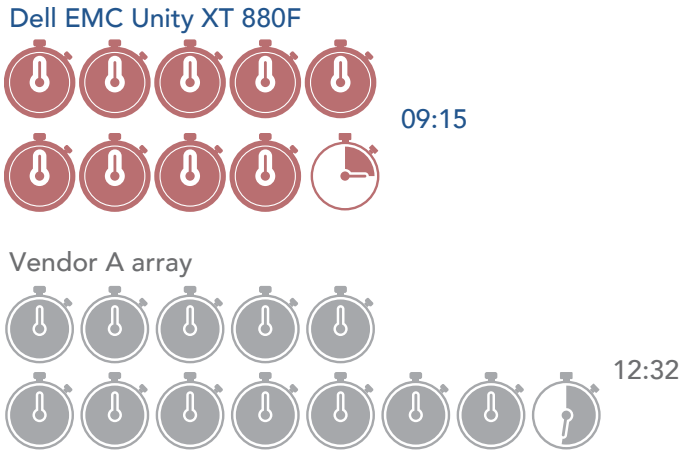
Deploying and provisioning hardware is a common management task—one that smaller IT departments with limited resources want to make as quick and painless as possible. We tested two everyday management tasks: deploying a storage array and provisioning storage. While admins would generally only deploy a storage array once, they might provision storage on a daily basis; together, these tasks give us important insight into the efficiencies the Dell EMC Unity XT solution can offer to IT departments. To test these tasks, we used the Dell EMC Unity XT solution's graphical user interface (GUI), Unisphere. Non-technical or new customers are more likely to use GUIs, so it's important to have a GUI that is easy to use and manage. Dell EMC Unisphere is a single GUI that does not require specialized knowledge, making it a good choice for overstretched IT generalists in the midmarket space.

In our testing, we found that the Dell EMC Unity XT 880F could allow IT staff to spend 26 percent less time and half as many steps on deployment versus the Vendor A array (using the Vendor A GUI). While we needed only 9 minutes and 18 steps to deploy the Dell EMC Unity XT solution, deploying the array from Vendor A required 36 steps and over 12 and a half minutes.

Additionally, we measured how long it took to provision a single storage LUN. We used the Unisphere GUI on the Dell EMC Unity XT, while on the Vendor A array we used their GUI solution. The Dell EMC Unity XT beat the array from Vendor A, enabling us to provision a single LUN 41 percent faster, in just 30 seconds.

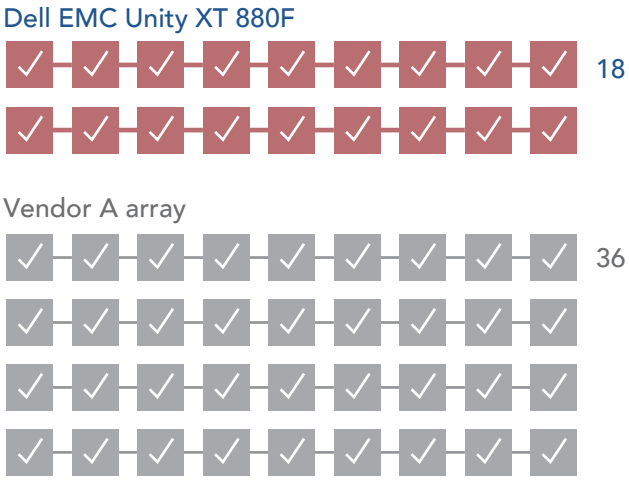
Time to deploy storage array

min:sec | Lower is better



Steps to deploy storage array

Lower is better



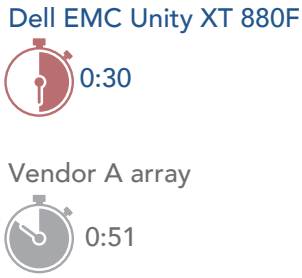
About Unisphere for Dell EMC Unity

With its simple HTML5 interface, Unisphere helps users provision, manage, and monitor storage on their Dell EMC Unity XT arrays. Unisphere allows users to configure and schedule protection for stored data, and includes advanced features like replication, Quality of Service, and performance analysis.

When we expanded our testing to bulk LUN provisioning, the Dell EMC Unity XT outstripped its competitor dramatically. To provision 60 LUNs at once, we used a Dell EMC feature called consistency groups, which allowed us to deploy multiple LUNs with minimal steps. This feature helped yield substantial time savings: The Dell EMC

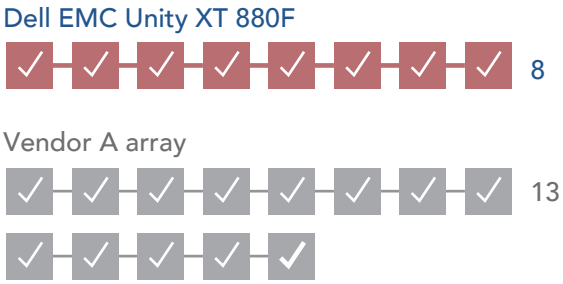
Time to provision a single LUN

min:sec | Lower is better



Steps to provision a single LUN

Lower is better

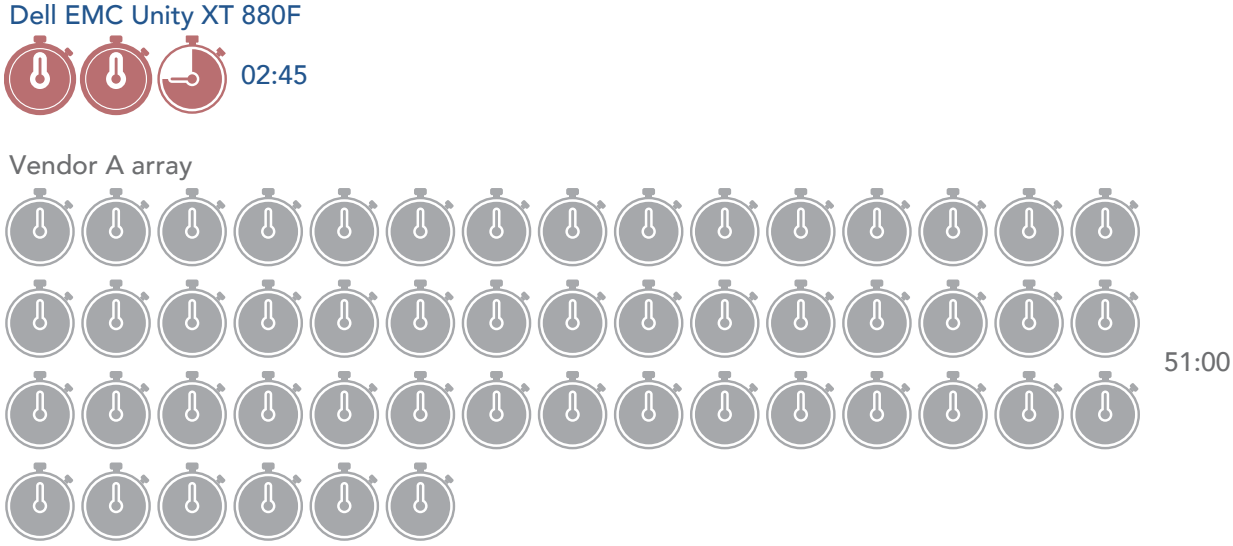


Unity XT array enabled our admins to complete the task in under three minutes, compared to over 50 minutes on the array from Vendor A, making the Dell EMC Unity XT solution 94 percent faster. This greater efficiency also held true for the number of steps involved. The Dell EMC solution required only 12 steps compared to 780 on the Vendor A array, a difference of 768 steps.

With the Dell EMC Unity XT solution's time savings mounting each time your admins perform routine tasks, such as deploying storage arrays and provisioning LUNs, your admins can turn to the work that matters—like implementing strategic measures that make your data center run more efficiently. And, with fewer steps involved in both processes, your IT staff will encounter fewer opportunities for error and inefficiency.

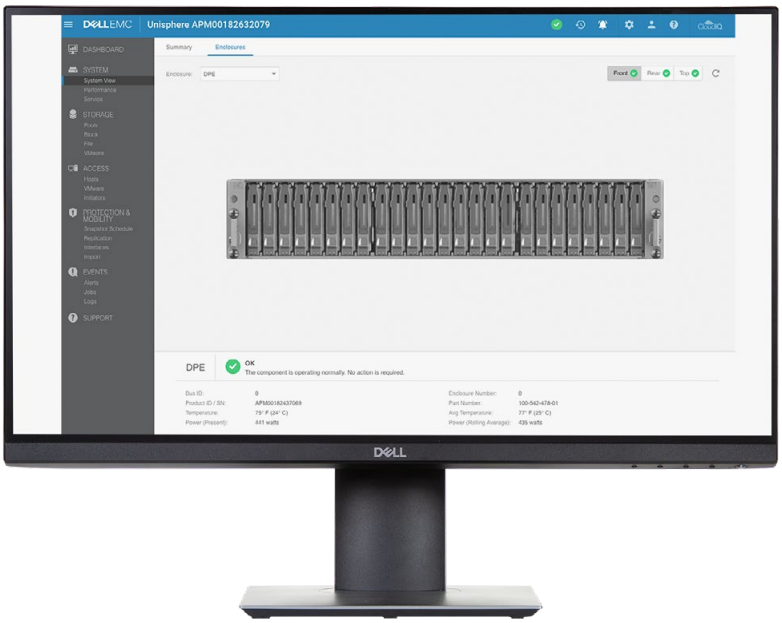
Time to provision 60 LUNs

min:sec | Lower is better

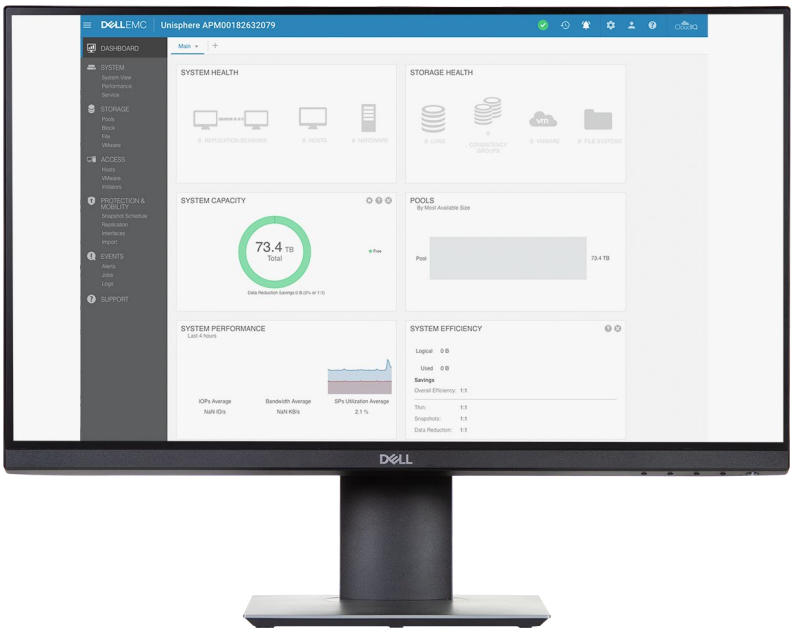


A modern interface for the modern IT department

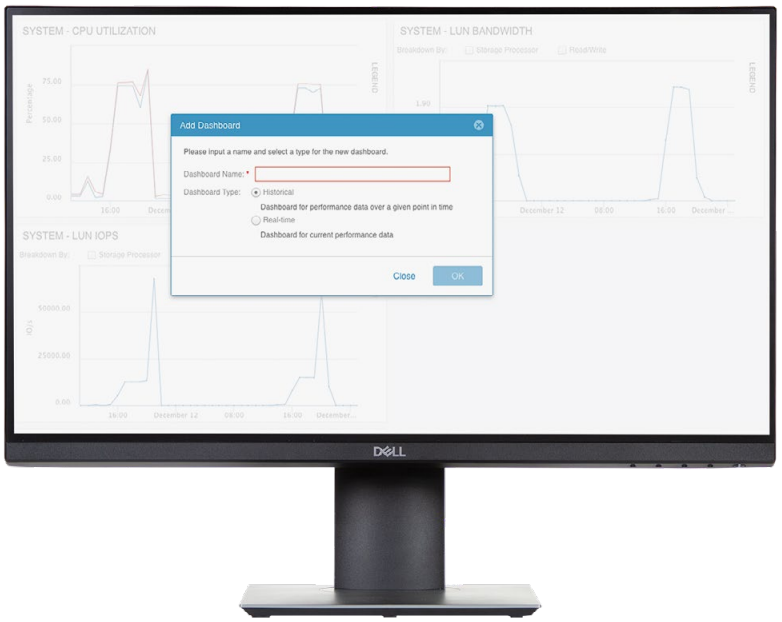
We administered and managed the Dell EMC Unity XT solution using a single GUI (Unisphere), although users could also carry out management tasks via command line interface or REST API. Unisphere allows users to securely manage Dell EMC Unity XT storage systems using a web browser that supports HTML5 technology.



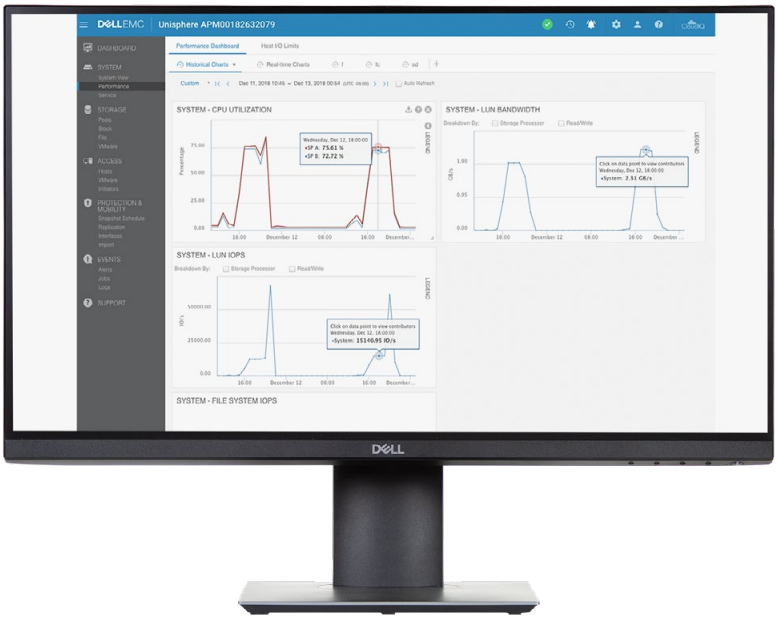
Unisphere presents a complete view of all relevant information needed to assess storage health and performance. The intuitive navigation pane allowed us to visualize content, while the sub-menus let us quickly access multiple storage features and configuration options. With Unisphere, we could efficiently view the storage system status, retrieve system notifications, and display alarm details from the main dashboard.

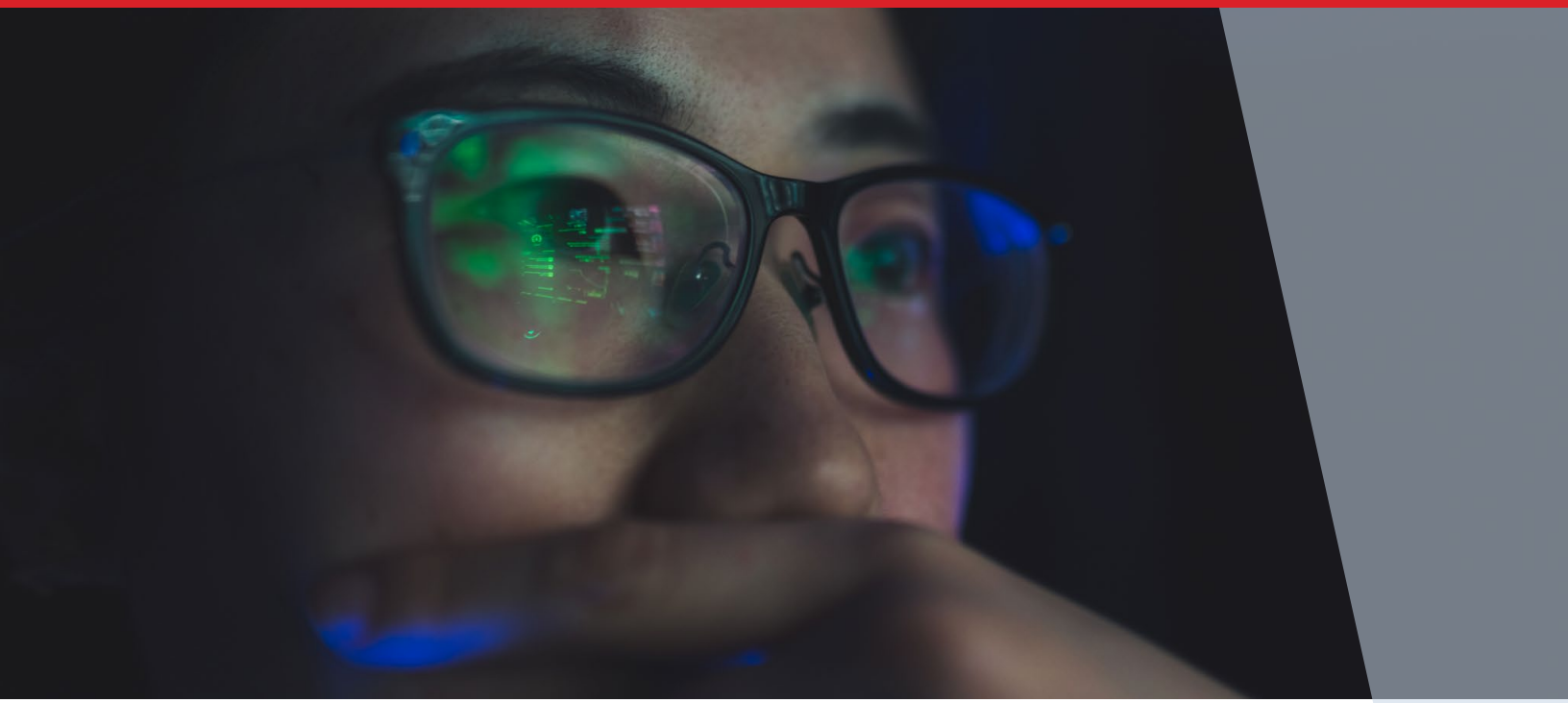


The main dashboard is fully customizable, allowing users to organize the display into blocks of information that let them easily view what they care most about. These blocks can include storage usage statistics, the health of the storage system and resources, system alerts, and overall performance.



Admins can further analyze storage performance in the Unisphere GUI by interacting with dynamic charts that display historical and real-time performance metrics. The charts, which show detailed network traffic, bandwidth, and throughput data, can display data at various granular levels. While the Vendor A array requires admins to install additional software and use multiple panes to view performance statistics, the Dell EMC Unity XT solution allows admins to view performance statistics in one place. Admins can also export data to a .csv file for analysis or customize the performance dashboards to efficiently assess storage performance.





Conclusion

In our testing of the Dell EMC Unity XT 880F against the Vendor A array, the Dell EMC Unity solution supported more IOPS and reduced data more efficiently. Dell EMC Unity Unisphere management software also enabled us to deploy the Dell EMC solution in half the steps of the Vendor A array. For mid- to enterprise-sized businesses seeking to address the day-to-day challenges of storage provisioning, supporting multiple workloads, and scalability, the Dell EMC Unity XT offers a solution that can help maximize performance and efficiency.

To learn more about Dell EMC Unity, visit DellEMC.com/Unity.

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1 Enterprise Storage Forum, "Survey Reveals Tech Trends Reshaping Data Storage," accessed June 12, 2019, https://www.enterprisestorageforum.com/storage-management/survey-reveals-tech-trends-reshaping-data-storage.html.

2 Dell EMC, "Dell EMC Unity XT 880F All-Flash Storage," accessed June 12, 2019, https://shop.dellemc.com/en-us/Product-Family/Dell-EMC-Products/Dell-EMC-Unity-XT-880F-All-Flash-Storage/p/DellEMC-Unity-XT-880F-Storage.

3 Dell EMC, "Dell EMC Unity XT 880F All-Flash Storage."

4 Dell EMC, "Dell EMC Unity XT All-Flash Unified Storage," accessed June 12, 2019, https://www.dellemc.com/en-us/storage/unity.htm.

5 Dell EMC, "Dell EMC Unity XT 800F All-Flash Storage."

6 Dell EMC, "Dell EMC Unity XT 880F All-Flash Storage," accessed June 12, 2019, https://shop.dellemc.com/en-us/Product-Family/Dell-EMC-Products/Dell-EMC-Unity-XT-880F-All-Flash-Storage/p/DellEMC-Unity-XT-880F-Storage.

Read the science behind this report at http://facts.pt/rfw0v87 ▶

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This project was commissioned by Dell EMC.