Abstract

This ESG Technical Review documents hands-on validation of the PowerProtect X400 Appliance from Dell EMC. The goal of the report is to validate that the solution is easy to deploy and manage, supports business-critical data protection workloads and workflows, and scales protection capacity and performance in a linear fashion.

The Challenges

ESG research reveals that businesses feel that managing IT systems and applications isn’t getting any easier. In fact, two-thirds of businesses (66%) say that IT is more complex than it was two years ago. And, even though data protection is a longstanding IT discipline, it is not immune to this perception of complexity. Many factors are driving this increased complexity, including the number and type of endpoint devices, higher data volumes, and an increase in the number and types of applications. Businesses are also finding that increased complexity and capacity can make it more difficult for IT to manage application uptime requirements and deliver business-level SLAs for recovery.

Figure 1. IT Environment Complexity

In general, how complex is your organization’s IT environment relative to two years ago? (Percent of respondents, N=600)

- More complex than two years ago, 45%
- Equally complex as two years ago, 27%
- Significantly more complex than two years ago, 21%
- Significantly less complex than two years ago, 1%
- Less complex than two years ago, 5%

Source: Enterprise Strategy Group

Because of these challenges, ESG believes that scale-out data protection architectures like the PowerProtect X400 appliance from Dell EMC will play a major role in ensuring that IT organizations can reliably back up and recover their mission-critical applications, systems, and data and better meet their SLA objectives.
The Solution: PowerProtect X400 Appliance

The PowerProtect X400 is a fully integrated scale-out data protection solution from Dell EMC that supports full VM, instant access, file level, Oracle, and MS-SQL backup and recovery workloads. It is deployed as an appliance on Dell EMC PowerEdge technology. The initial configuration starts with a 2U core cube that hosts the PowerProtect platform and a 2U capacity cube that processes and stores backup data. The PowerProtect X400 incorporates a scale-out architecture that can be expanded by adding capacity cubes in 2U increments or by adding capacity within each cube by simply activating a license key. Available in hybrid or all-flash configurations, X400 enables users to customize their data protection environment to match their backup and recovery SLAs.

Figure 2. Architecture Overview

The key solution benefits include:

- **Scale-out and grow-in-place flexibility:** Organizations benefit from linear performance capabilities with scale-out cubes that increase compute, networking, and capacity as cubes are added to the environment and that leverage machine learning enabled load balancing of protection workloads across cubes.
- **Easy data protection management:** Simple data protection workflows minimize daily operation tasks, and the intuitive user interface provides straightforward management.
- **Workload support:** The PowerProtect X400 supports Oracle, Microsoft SQL, VMware, Windows filesystem, and Linux filesystem data protection and recovery workloads.
ESG Validated

ESG performed hands-on evaluation of the PowerProtect X400 by participating in two hosted proof-of-concept sessions at a Dell EMC facility in Hopkinton, MA, where we walked through the installation and configuration process of a pre-racked 4U PowerProtect X400 system. We also reviewed the scale-out and grow-in-place configuration options and configured and ran multiple backup and recovery jobs to validate support for different data protection workloads.

Deploying and Scaling the X400 Appliance

ESG started the evaluation process at the proof-of-concept (POC) data center by simply connecting a laptop with a predefined static IP setting to a port on a network switch in the data center that was connected to the PowerProtect X400 Appliance. As shown in Figure 3, we launched a web browser to connect to the PowerProtect X400 initial configuration screen. The configuration wizard walked us step by step through the entire setup. This process required only simple network settings like DNS, IP address, gateway, subnet mask, system credentials, a serial number for the capacity cube, and a license key. Once the required settings were added, the system started the automated configuration process. It took about 45 minutes to deploy the 96TB PowerProtect X400 appliance.

Figure 3. Deployment

Once the initial configuration was complete, we launched and logged into the PowerProtect Data Manager to explore the solutions management interface. We found that the HTML5 user interface is very responsive, with a modern look and feel; though this was our first time working with the PowerProtect X400 application, we easily navigated the administration screen and quickly understood the configuration management concepts. At a high level, to get a feel for administrating the solution, we walked through each of the navigation tabs on the left-hand side of the interface, starting with the dashboard view and finishing with the jobs view.
Next, ESG explored the scale-out capabilities of the solution by reviewing the process of adding capacity cubes to the appliance. As shown on the left side of Figure 4, we started with the base configuration of one platform cube and one capacity cube. We then added a second capacity cube to the environment, which increased the usable physical capacity of the solution from 96 TB, as shown in red callout box, number one, on the left side of Figure 4 to 192 TB of usable physical capacity, as shown in the red callout box, number two, on the right side of Figure 4.

**Figure 4. Adding a Capacity Cube Overview**

We started the expansion process confirming the networking, cabling, and power prerequisites. Then, we opened the appliance UI, and from the dashboard view, we clicked on the appliance tab on the left side of the interface. It gave an overview of the configuration. The overview showed one capacity cube, maximum usable physical capacity, health status, licensed capacity, and the version of software.

**Figure 5. Adding a Capacity Cube Process**

Below the overview, the user interface gave a more detailed view of the whole system. It displayed information on each node in the platform cube and the information on the one capacity cube that was currently part of the configuration.

Next, ESG clicked the add capacity cubes tab. It launched the cube addition wizard. We reviewed and confirmed the prerequisites displayed on the page and clicked next. The wizard took us to a license page that confirmed the license had downloaded successfully and had been successfully applied. It also displayed a summary of the capacity and number of cubes that were now licensed and available to add to the configuration.
We advanced to the configuration page where we selected the number of cubes (one) to add from a dropdown list. Then, as shown in the red callout box, number two, at the bottom of Figure 5, we added the serial number of the new cube (FNM00188400870) and selected verify to validate the configuration. We advanced to the network configuration screen where we added two IP addresses for the new cube using the add address by range option because we had two consecutive addresses free. To finish the cube addition process, we confirmed the rest of the network settings including TCP/IP version, DNS, Netmask, and Gateway, and clicked the start cube addition tab. ESG monitored the configuration process from the jobs page, and when all the tasks completed successfully we confirmed the configuration from the infrastructure page, as shown by the before and after red callout boxes in Figure 5.

Finally, ESG reviewed the grow-in-place capabilities of the PowerProtect X400. The solution incorporates a scale-out architecture that can be expanded by adding scale-out capacity cubes in 2U increments or by adding grow in place capacity within each cube by simply activating a license key. As shown in Figure 6, ESG leveraged the base configuration from the POC test environment to add a license key and increase the usable physical capacity of the environment from 64 TB to 96 TB.

**Figure 6. Adding Grow in Place Capacity**

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**Why This Matters**

ESG research indicates that improving SLAs/RPOs/RTOs is the data protection mandate most cited by respondents. Combined with increased complexity, IT teams are finding it increasingly difficult to manage application uptime requirements and deliver the business-level SLAs that meet their leadership’s mandates.

ESG believes that the PowerProtect X400 is a great addition to the Dell EMC backup appliance lineup. We are especially excited about the scale-out data protection capabilities of the new architecture. It is also ESG’s belief that a scale-out architecture significantly increases the efficiency, extensibility, and bottom-line value of a consolidated data protection infrastructure solution. Last but not least, the initial release of the PowerProtect X400 includes machine learning (ML) technology for deduplication optimization. Moving forward, we hope to see the platform evolve to leverage more ML, perhaps based on backup policy optimization for different recovery scenarios.

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Data Protection Workflows and Workloads

In this section of the report, we explore the data protection workflow and workload capabilities of the PowerProtect X400 Appliance. The solution currently supports the backup and recovery of virtual machines, Oracle databases, Microsoft SQL databases, and Windows/Linux file systems. It leverages a combination of guest agents and VMware vSphere Storage APIs for Data Protection to deliver these capabilities.

ESG started its workflow/workload review by leveraging a crash consistent backup of a VM to do Live Virtual Machine recovery. As shown at the top of Figure 7, we selected a VMware API-based recovery point from the backup history of a windows VM named Win2016-IFT-4. Then, as shown in one of the five blue boxes on the recovery asset page of the PowerProtect UI, we chose Live Virtual Machine as the recovery type; other options such as restore to the original location or to a new location are also available.

Figure 7. Virtual Machine Recovery

The middle of Figure 7 shows a summary of the live recovery settings we selected for the task as well as a high-level diagram of the recovery workflow. The recover options that were selected included settings such as the type of recovery (Live Virtual Machine), the location of the restore (ESX Host x4-cl-101-0-0.chaos.local), whether or not to power on the VM when the recovery is complete, and whether or not to reconnect the NIC after recovery.

The diagram to the left of the summary shows the data protection workflow for a crash consistent VM backup/recovery. The left side of the diagram represents a VMware environment being protected and a live recovery/instant access VM highlighted in blue. The right side of the diagram shows the X400 platform that is managing the protection process. The two dashed arrows between the VMware environment and the X400 show the VMware vSphere Storage APIs for Data Protection sending protected data to the X400 and an instant access mount of a VMDK image supporting the live recovery.
process. The bottom of Figure 7 shows an active instant access session. It should be noted that with instant access, a VM can be quickly booted and run directly from a backup image stored on the X400. This process can be used for tasks such as test/dev, dev/ops, or VM recovery validation. It should also be noted that the instant access VM can be migrated to a primary datastore using VMware Storage vMotion if the system is needed for production operations or deleted when it is no longer needed right from the PowerProtect UI.

Next, as shown in Figure 8, ESG explored the process of backing up and restoring an MS-SQL database using a PowerProtect database agent. The PowerProtect database agent enables granular management of the database backup process including proper management of DB log data. As shown by red callout boxes one and two at the top of Figure 8, ESG leveraged the protection policy (SQL cn0228 PLC) to demonstrate the restore of SQL_VM1 database data from a backup copy (Aug 16, 2019 10:45:17 AM) to an alternate location with a new DB name. It should be noted that all MS-SQL database restores are run from the Microsoft SQL Server Management Studio or equivalent MS-SQL database utility even though MS-SQL database backups can be managed and run from the PowerProtect user interface. Red callout boxes three and four, at the bottom of Figure 8, show the MS-SQL database schema before and after SQL_VM1 database data was restored to the new database named SQL_VM4 in a different location.

Why This Matters

Not all production data is created equal. And there is no one-size-fits-all workflow for data protection. Just because you can do a crash consistent recovery of a VM from a snapshot does not mean that data residing in a database on that VM is recovered to the level a business requires. Different data types usually require different protection schemas to ensure the integrity of the recovered data.

It’s clear with the release of the PowerProtect X400 solution that Dell EMC understands the data protection workload and workflow challenges of its customers. ESG confirmed that the X400 solution, with its seamless integration of VMware vStorage APIs for Data Protection, Oracle, and Microsoft SQL database agents and Windows/Linux filesystem agents, enables customers to tailor their data protection workflows to meet their business requirements.
The Bigger Truth

Businesses today create, collect, store, and use a tremendous amount of data. A lot of this data has not changed much over the years by type; After all, it’s just ones and zeros, right? Business still use database, filesystem, application, and system data. However, the amount of this data can be staggering. In fact, managing high data volumes is cited by ESG research respondents as one of the biggest reasons IT believes managing their environment is getting more complex.3

Access to this data is critical to a business’ ability to deliver quality services to its customers. And having a reliable and complete backup or copy of this data in the right place is critical to quickly recovering a business when disaster strikes. Successful recovery after an event depends on the completeness of the overall data protection solution, not just the protection application. Key attributes of efficient recovery such as content awareness and intelligent placement of protection data cannot be achieved if the underpinnings of the solution can’t support it.

This is where the PowerProtect X400 from Dell EMC comes into the picture. It is a fully integrated scale-out data protection solution from Dell EMC that supports full VM, instant access, file level, Oracle, and MS-SQL backup and recovery workloads and is deployed as an appliance on Dell EMC PowerEdge technology. The PowerProtect X400 incorporates a scale-out architecture that can expand by adding capacity cubes or by adding capacity within each cube. Available in hybrid or all-flash configurations, X400 enables users to customize their data protection environment to match their backup and recovery SLAs. The PowerProtect X400 architecture is designed to eliminate the typical performance bottlenecks associated with data protection environments at scale because data is sent directly to the capacity cubes over 10 or 25 gigabit ethernet connections. This means that backup and recovery data is never routed through the platform cube. Also, as cubes are added for scale, so is CPU, memory, networking, and storage capacity.

In fact, ESG is in the process of producing a performance-focused companion paper to this report that will further explore the performance capabilities of the X400 solution and how the hybrid and all-flash version of the solution enable customers to better align their data protection environments with their data protection workloads.

ESG believes that if you are looking for a data protection solution that will help you keep up with the tremendous amount of data growth in your production environments, the PowerProtect X400 is worth a serious look. ESG also believes that every vendor in the data protection space today has their hands full addressing these data growth challenges. It is going to take solutions that leverage intelligent data management, ML, and automation to keep pace. We look forward to seeing how Dell EMC expands these capabilities in the X400 solution as the solution evolves.