FROM
CHAOS
TO
ORDER

UNIFYING SILOS

Dell PowerFlex Software-Defined Unified Storage
Platform with KIOXIA PM7 Series 24G SAS SSDs

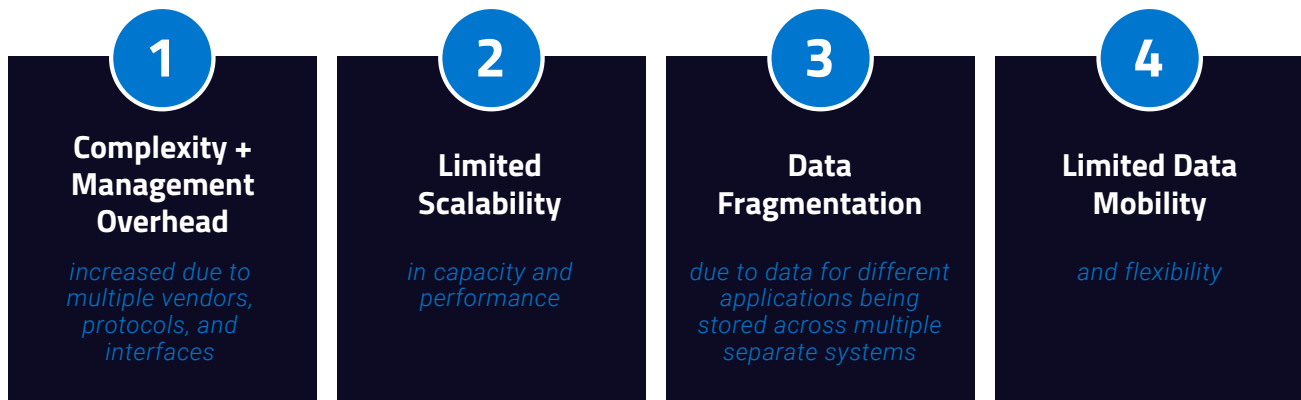**Managing data through a cluttered, complex, and siloed storage system leads to confusion and chaos, hindering efficiency and limiting the monetization of data assets.** The need for a platform where unstructured and structured data can coexist has never been greater. Ditching rigid, legacy, siloed storage architectures to adopt simplified, modern, unified storage will improve your data management and make data readily available on any platform for applications and services. This will allow efficiency and monetization to grow as the data management intelligently moves workloads between the edge, on-premise, hybrid, and multi-cloud environments.

MONETIZE DATA AT SOURCE. Delivering a unified storage approach is the foundation for achieving data access at the point of generation and use. To achieve this, a consolidated storage solution, built on top of several flexible shared-nothing nodes, is required. This software-based design allows for resource pooling and provides scalability to deploy solutions of any size at any location.

TRADITIONAL STORAGE CHALLENGES

Traditional block storage systems offer support for both Structured Data which includes databases spreadsheets, and json that demand predictable and consistent access patterns, and Unstructured Data, encompassing files, images, videos, and various non-standardized data formats. However, these systems operate in isolated compartments and encounter the following difficulties:

| 1	2	3	4
Complexity + Management Overhead	**Limited Scalability**	**Data Fragmentation**	**Limited Data Mobility**
increased due to multiple vendors, protocols, and interfaces	*in capacity and performance*	*due to data for different applications being stored across multiple separate systems*	*and flexibility*

SOLUTION

Managing structured and unstructured data in unified storage addresses these challenges. By centralizing storage resources and operations within a unified, centrally managed system, it becomes possible to dynamically allocate and scale the storage pool for block services and file services. This unified architecture improves resource utilization, enhances scalability, and enables seamless data movement and sharing across applications.

Move Faster

This software-defined storage platform reduces operational and infrastructure complexity, empowering organizations to move faster.
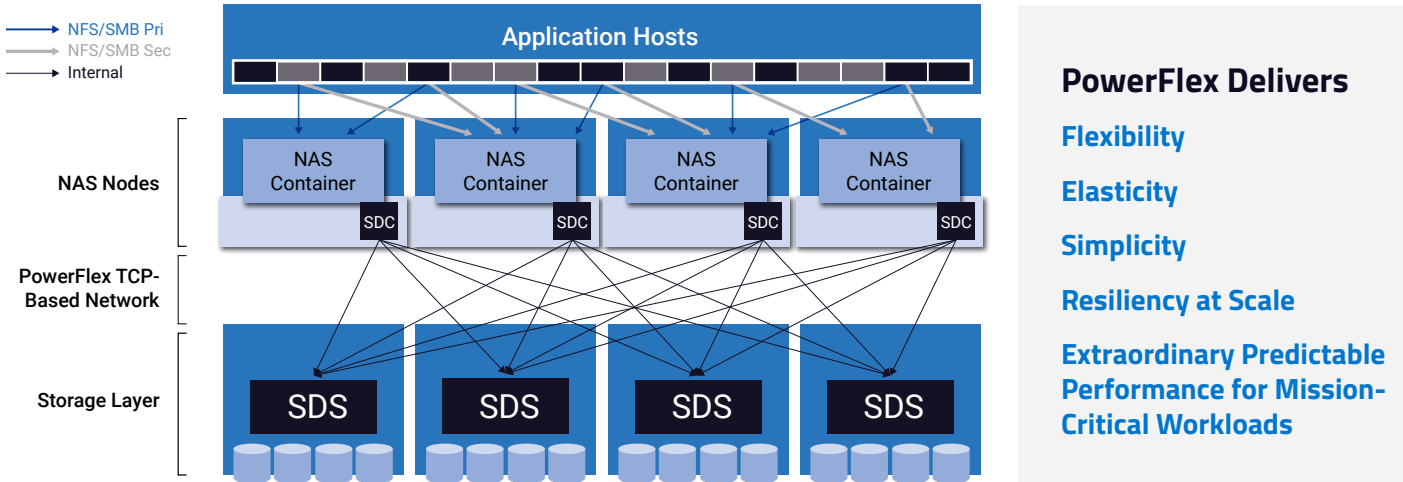
The PowerFlex family provides a foundation that combines computing and high-performance storage resources in a managed, unified fabric.

POWERFLEX 4.0 FILE SUPPORT

SDNAS (File) – Software-Defined File Services (NFS/SMB) as a supplement to the Block Storage services in PowerFlex

- **Performance and Scale:** Transactional databases and traditional NAS workloads
- **High Availability**
- **Fault Tolerance & Resiliency**
- **File Maintenance Mode:** Maintenance mode enables easy serviceability of nodes
- **Management and Monitoring:** UI and REST API, CloudIQ Integration, SNMP v2/v3 support

The integration of KIOXIA PM7 series SAS SSDs into the PowerFlex architecture allows Dell PowerFlex to optimize performance, facilitate scalability as well as capacity expansion, and streamline management in unified storage use cases.

RESULT: A unified storage environment that is highly efficient, adaptable, and dependable, effectively meeting the requirements of both file-based and block-based workloads.

KIOXIA PM7 SERIES SAS SSDs
Enhancing Dell PowerFlex Platform Performance

Less obvious components in this architecture are storage devices, even though storage is a critical part of any Block and File deployment. Arguably, the storage layer is the most important component of the infrastructure stack, after the database and file structures.

Dell PowerFlex software-defined platform incorporates the KIOXIA PM7 Series of dual-port 24G SAS SSDs. These enterprise solid state devices (SSDs) are suitable for high-performance Tier 0 server and storage systems that require high levels of performance and reliability. The PM7 Series is 24G Enterprise SAS SSD and optimized for read-intensive applications, including web services, transactional databases, data warehousing, and streaming media and video on demand.
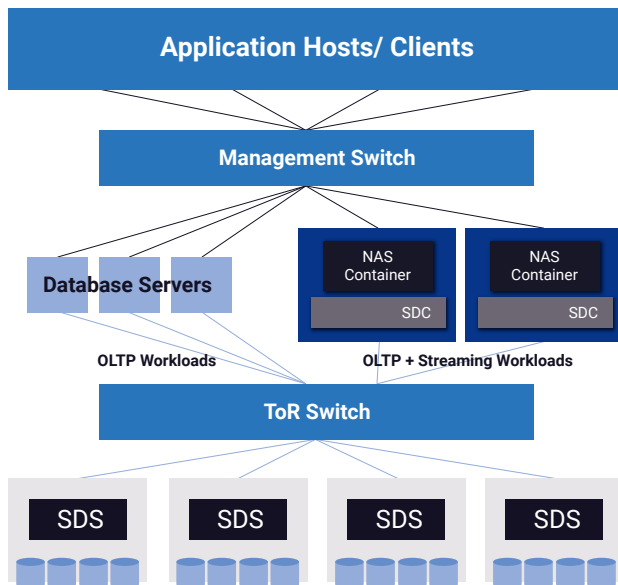
The series provides high levels of performance, reliability, and endurance. It is also designed to reduce the total cost of ownership.

KIOXIA
PM7
BiCS FLASH™
Enterprise   SAS SSD

Click for More Info

PROVING THE OBVIOUS
Test Overview

Cloud Evolutions conducted a series of tests on a PowerFlex Software Defined Storage Cluster. The requirements for these tests commissioned by Dell Technologies were unique. The goal was to demonstrate that the PowerFlex platform — which now supports Block and File — can maintain consistent performance while running mission-critical databases on its software-defined storage.

Application Hosts/ Clients

Management Switch

Database Servers

NAS Container | NAS Container
SDC | SDC

OLTP Workloads   OLTP + Streaming Workloads

ToR Switch

SDS   SDS   SDS   SDS

Cloud Evolutions simulated the demands of very large OLTP, OLAP, and streaming types of workloads. They examined throughput, latency, and IOPS, to prove that PowerFlex could handle the most demanding workloads. These tests involved performing block and file reads on user-generated data from two different applications, with transactions simulated using widely accepted industry testing tools.

This paper focuses on different performance metrics, including IOPS, TPS, latency, and throughput, which were demonstrated by Dell PowerFlex unified storage platform.

Test Scenarios

Measuring PowerFlex's performance and capability, we considered two scenarios.

GENERIC RANDOM READ/WRITE WORKLOAD This test involves generating a mix of random read and write operations to assess the storage system's ability to handle random I/O requests. The focus was measuring the system's latency, IOPS, and throughput.

OLTP DATABASE, OLAP, AND STREAMING WORKLOADS Databases, such as OLTP or OLAP systems, generate a mix of read and write operations with varying block sizes. Testing this scenario involves running database benchmarks or workload generators that simulate realistic database access patterns. The performance metrics of interest include transactional throughput, latency, and response times. It helps evaluate the storage system's ability to handle database-intensive workloads efficiently.

Results Matter

Performance benchmarking simulated TPC-C-like OLTP database workloads on both block and file devices, using industry-standard tools. Transactions of critical databases revealed that, on a 4-node storage cluster, Dell PowerFlex with KIOXIA PM7 Series SAS SSDs could sustain:

- **Over 1.3 million IOPS***
- **With sub-millisecond latency.***

Furthermore, OLAP and streaming operations were performed on file devices located in the same small-footprint software-defined storage lab environment. Moreover, when simulating OLAP operations, we achieved a data rate exceeding **15 gigabytes per second**.
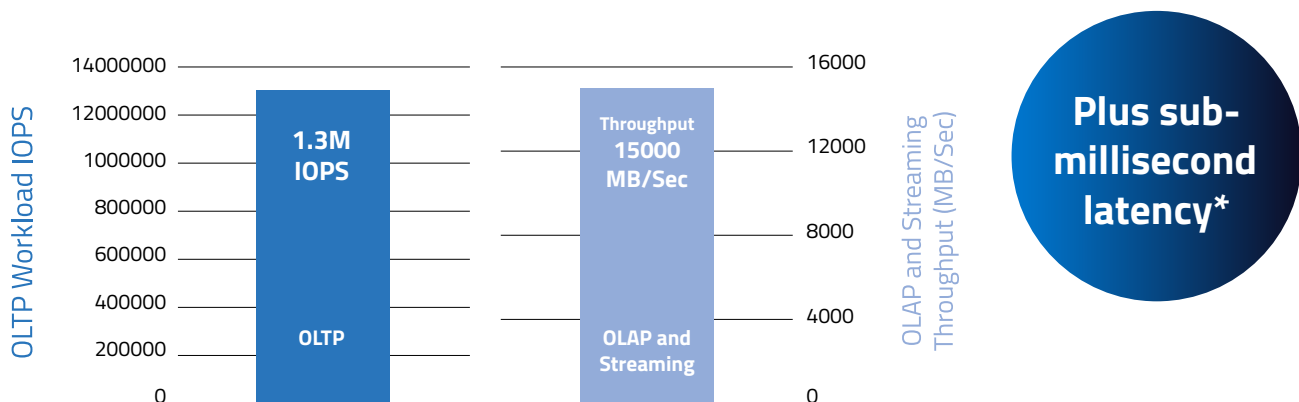
These results demonstrate how the PowerFlex platform, from as low as a 4RU storage footprint, delivers exceptional performance and value that customers can rely upon as their organizations grow.

BENEFITS OF POWERFLEX

Dell PowerFlex unified storage is a versatile and powerful storage solution that combines the benefits of traditional block storage with the flexibility and scalability of **block and** file storage. It offers a unified platform that can support diverse workloads, making it suitable for a wide range of applications and environments.

PowerFlex Architecture is designed to support both file-based and block-based storage protocols within a unified architecture. This means organizations can consolidate their storage infrastructure and simplify management by using a single platform for diverse workloads. PowerFlex makes handling traditional file shares, virtual machine storage, databases, and other applications a seamless operation, reducing complexity and improving operational efficiency.

PowerFlex enables linear scalability, allowing organizations to start small and grow storage capacity as needed by adding additional nodes and drives.

CONCLUSION

Dell PowerFlex is a unified storage platform from Dell Technologies that supports both block and file on a single storage architecture. This solution gives PowerFlex users what they need without compromising on performance. It consolidates server and storage, as well as balancing performance and capacity for enterprise database and application environments. Tests demonstrated superior performance and extensive benefits as PowerFlex unlocks the value of data while ingesting, transforming, and updating data at blazing speeds.

This agility and its scalability ensure that unified storage environments can meet increasing demands without compromising performance. PowerFlex utilizes distributed architecture and intelligent data placement techniques, such as tiering and caching, to optimize performance and provide high throughput for diverse workloads.