

## ESG Solution Showcase

# Dell Fluid File System: Scale-out Unified Storage, Enhanced

**Date:** May 2015 **Author:** Scott Sinclair, Analyst

**Abstract:** Few forces are as pervasive in the IT industry as the massive growth in digital content seen over recent years, and the effects of this particular force are being felt across multiple industries and applications. In response to demands for greater scale, capability, and affordability to meet the demands of an ever increasing and evolving digital landscape, Dell recently augmented its Fluid File System scale-out NAS technology. This latest release, Dell Fluid File System Version 4, is available now on the FS8600 appliance and provides scale-out unified storage capability with Dell's SC storage. The ultimate result is a scale-out unified storage solution with the capability and scale to consolidate and serve multiple workloads, from file sharing, through virtualization, even to industry-specific digital content storage, such as storage for media and entertainment or life sciences.

## Overview

For several years now, a deluge of data has consumed the IT industry. Few organizations are immune—data growth is not just isolated to a few applications or workloads, but experienced at a pervasive level permeating a significant portion of the IT ecosystem. During the second half of 2014, ESG conducted an in-depth qualitative storage research project by participating in discussions with 25 senior IT executives responsible for their organization's data storage environments on a wide range of storage-focused topics. Out of these discussions, the number one most critical storage challenge identified was data growth and the associated costs of storing that data and managing the increasing capacity demands.<sup>1</sup>

External storage was designed to help curb storage management costs. Through centralization and protection of digital assets, organizations were able to decrease the amount of hardware they had to manage, protect, and secure. A key component of the value provided by this model was the ability to consolidate storage from multiple workloads on a single, unified storage platform. However, with the level of data growth expected to only accelerate in the future, many traditional storage solutions are already pressed beyond their limits.

Dell offers a solution to the problem of increasing workload storage demands in the form of its Fluid File System technology, which is integrated into its FS8600 appliance. Providing scale-out unified storage that combines linear performance scaling with automatic data migration across tiers, the FS8600 enables efficient use of hardware resources to deliver good performance (up to 500K SPEC SFS OPS) and independently scale system performance and capacity.

Recently, Dell augmented the capabilities of its FluidFS technology, improving control, security, scalability, and usability, along with an enhanced hardware platform that provides a hefty level of processing and memory for greater performance. Some examples of Dell's new file system capabilities include:

---

<sup>1</sup> Source: ESG Research Report, [Next-generation Storage Architectures](#), March 2015.

This ESG Solution Showcase was commissioned by Dell and is distributed under license from ESG.

© 2015 by The Enterprise Strategy Group, Inc. All Rights Reserved.

- Greater granularity of control:
  - Directory quotas, in addition to user, group, and users in a group quotas
  - Automatic home share creation
- Improved security:
  - File filters (e.g., no .exe files, no .mp3 files for SMB shares)
  - Restriction of share access and visibility to specific client networks
  - SACL auditing for SMB shares
  - Protocol enhancements, including IPv6, NFSv4.1, and SMB3
  - Volume management delegation
- Improved manageability and efficiency enhancements:
  - Snapshot retention control including snapshot archival at a disaster recovery site
  - VMware integration (VAAI): fast clones, full file clones, and extended statistics
- Updated hardware and greater scale:
  - Doubled single file system and namespace to 4 PB
  - File growth potential of up to 16 TB
  - Doubled battery-backed controller RAM to 48 GB for a total of 96GB per FS8600 appliance

Dell's latest generation of its Fluid File System technology offers a comprehensive list of security and control enhancements for file content and collaboration management, along with efficiency improvements for virtualization environments. With integrated SAN capabilities via Dell's SC series offerings, Dell's FS8600 appeals to a variety of workloads, including the more performance- and capacity-demanding applications found in industries such as media and entertainment or life sciences.

### **New Capability for Evolving Workload Demands**

Despite the surge in digital content, organizations must still operate within the budget and digital security boundaries defined by the organization. ESG recently conducted an in-depth research survey of 601 IT professionals concerning their organizations' IT spending plans and priorities for 2015. With a flurry of high-profile security breaches recently, it was not surprising that improved security and risk management was the most-cited consideration for justifying IT investments to organizations' business management teams. However, responses that focused on increasing return on investment, improving business processes, and lowering costs claimed three of the four top most-cited spots (see Figure 1).<sup>2</sup> As such, even in the wake of massive unstructured data growth, organizations continue to place a high priority on efficiency and cost savings.

---

<sup>2</sup> Source: ESG Research Report, [2015 IT Spending Intentions Survey](#), February 2015.

**FIGURE 1. Most Important Considerations for Justifying IT Investments**

Source: Enterprise Strategy Group, 2015

While larger enterprise organizations have the luxury, to some extent, of being able to deploy distinct storage solutions for specific workloads, smaller and midsize environments are often not as fortunate. All IT decisions ultimately become business decisions. If cost was not an issue, each workload could have dedicated infrastructure with extensive performance and capacity headroom. That model, however, is not realistic. Due to either capital or operational budget constraints, multiple workloads are often deployed on the same storage system, requiring solutions that provide not only flexibility in performance and capacity scalability, but also enhanced levels of simplicity and ease of management. Dell's FS8600, with the innovations available with the latest version of the Fluid File System, provides the scale (up to 4 PB), performance (up to 500K SPEC SFS OPS), and functionality of more complex systems, with the simplicity demanded for midrange and smaller environments.

### Automated Flexibility of Scale-out Unified Storage

By integrating its scale-out Fluid File System technology with its Dell SC Storage innovations, Dell provides not just scale-out NAS but an integrated scale-out Unified Storage solution, the resulting benefits of which apply to industry-specific and general-purpose workloads alike. While other scale-out storage solutions tout linear performance scaling with a scale-out architecture, real-world application performance and capacity demands often do not scale in lock step. Dell's solution allows for performance and capacity to scale independently. With traditional storage solutions, when new information enters the system or old data gets stale, active data can get isolated or siloed onto a single component of the architecture. Dell's Fluid File System solution provides an answer by automatically migrating data to the right tier of storage. Active data

resides on the fastest tier of storage, while inactive content can remain archived or staged on lower tiers of storage. The net result allows organizations to save much needed capital and operational expenses. Finally, the FS8600 allows for a true single namespace, where any node is able to read any digital asset, preventing performance spikes to specific sets of data from bottlenecking the system.

### Elevated Bandwidth and Scale to Meet the Collaboration Demands of Multiple Industries

Data growth impacts a wide variety of organizations, and consequently IT budgets, across multiple industries. That growth, however, does not hit every organization equally. Industry-specific workloads such as those in media and entertainment, life sciences, university research, and video surveillance have all seen higher than average increases in information growth, generating added pressure to explore new or alternative solutions for storing data, along with data distribution or collaboration capabilities.

In the world of media and entertainment, for example, post-production workflows, whether for visual effects, editing, archival, or video on demand, are hard work and produce results often only through painstaking effort. Data outages and performance slowdowns can directly impact productivity and ultimately the bottom line. In terms of capacity growth, the advent of 4K content formats has increased the need for scalable lower cost storage options.

In response to these demands from multiple industries, Dell has enhanced the performance of its FS8600 to reach approximately 12 GB/s in aggregate throughput, with support for over 400 MB/s in a single stream, offering solid performance for industry collaboration or distribution workflows. The Fluid File System's ability to scale to up to 4 PB provides significant capacity headroom for midrange environments across these industries. FluidFS has been certified for Milestone video surveillance solutions and for several media asset management systems, including Front Porch, Adobe Anywhere, and Axle Gear. And to help deliver an integrated solution for picture archiving and communication systems (PACS), Dell provides products that are qualified with multiple PACS providers serving the medical imaging industry, including Merge PACs, Agfa IMPACS and ICIS, GE Centricity/Enterprise Archive, and Carestream PACS. Additionally, the file system's ability to support files up to 16 TB ensures that the system can handle even the largest of proprietary industry-specific data formats.

### Integration Services for Virtualization

Dell's combined scale-out unified storage solution, leveraging the FS8600 and Dell SC storage, offers a variety of storage options for virtual environments, with support for FC, FCoE, iSCSI, NFS, and SMB protocols. With the newly added support for VAAI primitives, VMware ESX hosts can offload tasks such as virtual machine cloning operations to FluidFS, enabling the rapid creation of thin clones of virtual machines. Such integration will offer benefits in use cases such as virtual desktop infrastructure (VDI), where multiple desktops may need to be rapidly deployed for users.

### Greater Simplicity and Control for File Sharing Environments

Recently, file-sharing environments have found themselves under pressure as business demands increase for greater availability of content. However, these requests are often beset by increased security concerns and the risk of lost data. In addition to these ongoing concerns, multiple organizations are facing a technology transition due to Microsoft's decision to retire Windows 2003, with the end of support date for Windows Server 2003 targeted for [July 14, 2015](#). When organizations are looking for a new answer, they will find that the Dell scale-out unified storage approach provides some advantages, including:

- **Scale-out unified storage consolidation:** Unified storage enables consolidation of SAN and NAS storage, eliminating the need to manage additional file servers. Additionally, Dell's scale-out architecture allows for performance to be

added after the fact. The entire system does not have to be designed and deployed on day one. When business needs change, the system can expand to meet those needs.

- **Granular control and automation for file services:** Dell's most recent set of innovations adds an additional level of control for file sharing and serving environments. The addition of directory quotas to already supported user and group quotas provides an additional level of granular management. This capability allows administrators who leverage file system structure as part of their data management process to more closely control how large those directories scale. In addition to controlling size, the implementation of file filters allows IT administration to restrict certain capacity-stealing file types, such as .mp3, from taking up space on the file system and impacting backups. The addition of automatic home share creation saves time when deploying large user home share environments.
- **Protocol advances and enhanced security:** By upgrading protocol enhancements with NFSv4, IPv6, and SMB 3, Dell's FS8600 embeds a number of security enhancements, such as NFS v4 ACLs, SACL auditing for SMB shares, etc., in the next-generation protocol versions. Additionally, the Fluid File System adds the ability to restrict share access and restrict visibility by client network as another layer of protection to ensure that unauthorized systems are not allowed to access the file shares. The addition of volume management delegation allows for IT organizations to delegate file share creation activities to entry-level personnel without risking the security of the more sensitive file shares.

## Scale-out Technology Options and Trade-offs

Scale-out storage technology has been available in multiple forms across the industry for some time now. For file system environments, it is often seen in the form of an N-way scale-out solution, deployed either as appliances or as a software-defined storage solution. These solutions differ from Dell's implementation, with each technology type providing its own set of advantages and challenges. N-way scale-out technologies are often coupled with massive levels of capacity support. For example, it is not uncommon to see N-way capacity support reach to tens of petabytes. Also, for survivability, some solutions offer the ability to support multiple failures, where a multi-system cluster can lose two, three, or even four nodes without sacrificing data availability.

These solutions, however, can add greater levels of complexity, and in some instances, higher cost. Also, these solutions often scale as an appliance, combining compute and storage together. This model typically requires organizations to scale performance with capacity, which may not be ideal based on the workload. Additionally, these solutions are often available for file only, with some exceptions that also offer iSCSI, limiting the ability to consolidate multiple types of workloads.

While Dell's solution's scalability of up to 4 PB in a single namespace may not reach the extreme heights of some N-way solutions, Dell's solution provides significant scalability for many mid-sized organizations. Dell is also able to scale performance and capacity separately, allowing for the more granular control of additional capacity or performance. The result allows the system to more closely follow the application requirements of your environment. By coupling the technology with Dell's SC series storage, the Dell solution has become a unified storage offering, consolidating scale-out NAS and SAN technologies in a single solution. Allowing for consolidation of Fibre Channel and higher performance workloads in the same solution can provide significant manageability benefits for smaller organizations. Additionally, the design allows for the Fluid File System to support automatic data migration across tiers, allowing for solid-state performance at a more efficient cost point by leveraging a hybrid solution.

## The Bigger Truth

In this era of perpetual data growth, scalability is a must, but it isn't the only IT concern when it comes to storage. Affordability, performance, manageability, and security all must scale and evolve to meet the increased demands that stem from higher storage capacities. While some larger organizations are able to afford the luxury of deploying unique storage solutions for each type of workload, smaller or even midsized firms are not as fortunate. Unified storage is designed to enable organizations to save time and money by consolidating multiple types of workloads on the same storage infrastructure. Dell's scale-out unified storage, with the capabilities of Dell's SC platform, evolves the idea of unified storage, providing the ability to scale performance, capacity, or both non-disruptively while automatically migrating data to the right tier of storage, maximizing performance while keeping costs affordable. For file-based workloads, Dell augments the file functionality, providing increased levels of control, manageability, and security while upgrading the appliance for advanced performance and greater scale. The resulting solution offers a blend of functionality and adaptability, making it appealing to a wide variety of environments.

All trademark names are property of their respective companies. Information contained in this publication has been obtained by sources The Enterprise Strategy Group (ESG) considers to be reliable but is not warranted by ESG. This publication may contain opinions of ESG, which are subject to change from time to time. This publication is copyrighted by The Enterprise Strategy Group, Inc. Any reproduction or redistribution of this publication, in whole or in part, whether in hard-copy format, electronically, or otherwise to persons not authorized to receive it, without the express consent of The Enterprise Strategy Group, Inc., is in violation of U.S. copyright law and will be subject to an action for civil damages and, if applicable, criminal prosecution. Should you have any questions, please contact ESG Client Relations at 508.482.0188.



**Enterprise Strategy Group** is an integrated IT research, analysis, and strategy firm that is world renowned for providing actionable insight and intelligence to the global IT community.

© 2015 by The Enterprise Strategy Group, Inc. All Rights Reserved.