



Solution Brief

Go beyond traditional file servers

Grow capacity without diminishing returns on performance

FluidFS offers an optimal combination of performance and scalability for environments with:

- File-intensive user shares
- Highly available NAS and unified storage in SMB and public sector deployments
- Virtual server environments with extensive NFS data and enterprise-level storage consolidation projects.

Traditional approaches to handling file data growth have proven costly, hard to manage, and difficult to scale effectively. Part of the Dell Fluid Data™ architecture, Dell Fluid File System (FluidFS) is designed with a flexible architecture that enables organizations to scale linearly, without diminishing returns on performance. The FluidFS technology is enterprise-class and standards-based. FluidFS supports multiple protocols including CIFS and NFS, and incorporates innovative features for high availability, performance, efficient data management, and data protection.

High utilization of storage hardware

FluidFS separates users' data and access from the underlying hardware configuration so that servers, CPUs, cache memory, and disk drives are optimally utilized. As data gets written, it is distributed across internal file servers, and eventually to all disks connected to the storage cluster.

Seamless file sharing among heterogeneous clients

FluidFS provides fully interoperable multi-protocol file sharing for UNIX, Linux, and Windows® clients using standard CIFS and NFS file access protocols and authentication methods (Active Directory, LDAP, NIS).

On-demand virtual storage provisioning

FluidFS enables administrators to provision storage as needed, so that capacity can be allocated independently of physical storage configuration.

Speedy restoration of large volumes of data

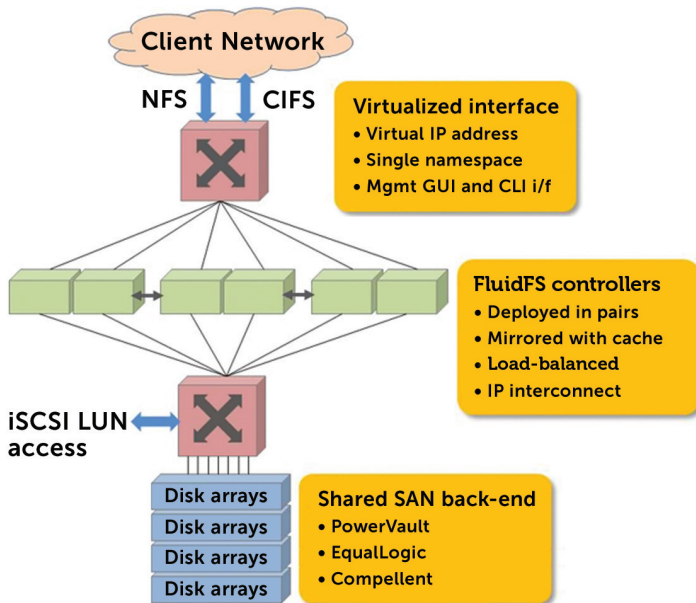
FluidFS helps administrators easily recover large data sets (terabyte scale), eliminating long file copies and the need for free space for the recovery process. It enables end users to restore previous versions of files directly, without contacting IT.

Simple and easy management

Managing terabytes of NAS storage is simpler with FluidFS administrative functions. From installation and initial configuration to ongoing monitoring and storage operations, all functionality is provided via easy-to-use screens and wizards.

FluidFS technology

FluidFS's active-active controllers are deployed in pairs to provide high availability and redundancy. FluidFS systems typically consist of FluidFS nodes and the underlying storage arrays. FluidFS nodes are based on x86 hardware and store file data on conventional storage arrays (from a single storage array to SAN configurations with multiple controllers). This enables organizations to balance cost/performance and optimize compatibility with existing infrastructure. In a FluidFS cluster, any single controller can fail without affecting data availability or causing data loss, even if write operations are in-flight.



Non-disruptive capacity scaling

In a scale-on-demand model, you don't need to provision excess capacity in anticipation of future growth. This makes scale-out solutions ideal for organizations that expect rapid growth over time or phased consolidation of applications. FluidFS-based products support non-disruptive capacity expansion. Additional arrays can be added to a cluster, and those LUNs will be seamlessly mapped into the file system's virtual volume without downtime.

Performance optimization and scaling

All nodes in a FluidFS clustered system support active I/O, providing high intrinsic performance without exotic protocols or the need to distribute application load across multiple filers. Load balancing automatically sends client requests to the node with the least-current workload. Network traffic is load-balanced across the cluster. Storage platforms using FluidFS are also load- and capacity-balanced in the back end arrays. For example, write traffic is load-balanced across LUNs, and capacity is monitored to ensure that balance is maintained.

High availability

FluidFS cross-cluster reliability is achieved through a variety of mechanisms including a high speed cluster interconnect, write cache mirroring, failsafe journaling, and data integrity checks to ensure data store consistency.

Optimization for large and small file sizes

FluidFS does not limit file share size and is optimized for both large and small file sizes to ensure performance, reliability, and optimal capacity efficiency for specialized workloads.

File system operation in failover mode

Any write to one node cache in a FluidFS cluster is mirrored to the peer node before the operation is acknowledged. In the case of node failure, all affected cache is dumped to local on-disk servers and the failed node is detached from the cluster. The cluster is then put into Journal Mode, which triggers the mirror to be written to a journal file. FluidFS client load-balancing makes migration to failover nodes transparent.

Snapshots

FluidFS incorporates redirect-on-write snapshots instead of the copy-on-write solutions typical of other file systems. This approach requires only one I/O operation and delivers higher write performance.

Asynchronous Replication

FluidFS allows fast and reliable snapshot-based replication of any number of file systems to a peer (local or remote) site. NAS configurations are replicated, enabling continuous access to data in the case of a disaster or site failure to assure business continuity.

Quotas

FluidFS allows quotas to be set at the user and group levels, and enabled or disabled without disruption.

Product integration

FluidFS is being implemented in a number of Dell storage solutions that serve the needs of small, midsize and large organizations. This technology is now available in the following two products:

- The Dell™ PowerVault™ NX3500 works with PowerVault MD32x0i and MD36x0i series arrays to provide an easy-to-manage unified storage solution for entry level deployments.
- The Dell™ EqualLogic™ FS7500 system works with EqualLogic PS Series arrays to offer a high performance scale-out unified storage solution. It is currently the only scale-out unified storage solution optimized for SMBs.

Learn more at Dell.com/FS7500 and Dell.com/NX3500

