Performance Summary

(VaultFS vs ZFS)

Comparison of File Systems in conjunction with BeeGFS

In collaboration with

Table of Contents:

Summarized Evaluation Introduction:

This whitepaper, developed by Swiss Vault Global, introduces **VaultFS**, a parallel distributed file system designed to optimize data storage and performance in high-performance computing (HPC) environments. In collaboration with **BeeGFS**, known for its exceptional performance and scalability, VaultFS enhances data resilience and durability, leveraging **erasure coding** for superior protection compared to traditional RAID systems. Benchmarked against **ZFS**, VaultFS consistently demonstrated significant performance advantages across multiple tests, including **StorageBench**, **IOR**, and **FIO**.

Key Findings:

1. StorageBench:

- VaultFS paired with BeeGFS achieved **28% better performance** than ZFS in the max throughput (1193.9 MB/s for VaultFS vs. 927.5 MB/s for ZFS) comparison and a **62% better performance** for Aggregate throughput reaching **4751.84 MB/s**, significantly higher than ZFS's **2931.99 MB/s**, further emphasizing its efficiency.

2. IOR Tests (Server-Level Read/Write Performance):

- VaultFS consistently outpaced ZFS in both **write and read throughput** across multiple servers. Server 1 showed VaultFS achieving **1084.08 MB/s** (write) and **667.87 MB/s** (read), compared to ZFS's **776.91 MB/s** and **501.05 MB/s**, with a similar trend followed by other servers and reflecting an average write speed **56% faster** and read speed **22% faster** across all.

3. Batched IOR Tests (Scalability and Parity Performance):

- **VaultFS** supports flexible and scalable erasure coding, allowing for a **higher number of parities** than ZFS, which is limited to a maximum of **three parities** (RAIDz3). This scalability provides **greater data protection and fault tolerance** in VaultFS, which can scale to configurations beyond what ZFS can offer. The **absence of parity limitations** in VaultFS offers a **higher level of security** by allowing for more robust disk and data protection.

4. FIO Benchmark:

- VaultFS maintained a **bandwidth of 937 MB/s** independently, while integration with BeeGFS achieved **817 MB/s** using POSIXAIO and **787 MB/s** with PSYNC, proving its seamless adaptability to different I/O environments with **minimal overhead**.
- When compared to ZFS, VaultFS significantly outperformed ZFS in average read & write speeds, achieving **nearly 77% faster write speeds and 200% faster read speeds** for handling diverse block sizes.

Performance Highlights:

- VaultFS's **flexible erasure coding** offers unmatched data protection against disk and server failures, surpassing the limitations of ZFS's RAIDz structure.
- Superior **data regeneration** and **automatic chunk relocation** mechanisms in VaultFS ensure continued data integrity, even in the event of failures.
- VaultFS's **scalability** extends beyond traditional RAID systems, allowing dynamic adjustments in disk-parity configurations to meet the specific needs of HPC environments.

Conclusion:

The benchmarking results affirm **VaultFS's superiority** over ZFS, particularly in HPC environments requiring high throughput and robust data protection. With features like **WORM** (write once, read many), real-time disk failure safeguards, and dynamically prioritized data regeneration, VaultFS ensures a **future-proof solution** for data-intensive industries. The collaboration with BeeGFS further amplifies its performance, making VaultFS a leading choice for **cost-efficient**, **high-speed**, and **resilient** data storage solutions.

For further review or in-depth analysis please visit us at VaultFS

Get in touch with us:

VaultFS values its customers and has dedicated resources to ensure the best quality experience when demoing the product. Businesses can discover how VaultFS can serve their needs.

For more information, you can also visit us at https://www.swissvault.global/