

MYSQL DB: ACHIEVE SUPERIOR PERFORMANCE VS. DAS WITH THE FUNGIBLE STORAGE CLUSTER

Lower media cost and increased infrastructure agility with hyperdisaggregated storage

MySQL relational database management system is one of the most popular database management engines for enterprises requiring for the most demanding database processing needs. It provides scalability, availability, performance and a rich set of features to tackle the deluge of data. A key infrastructure component that affects MySQL database is the storage system. An optimal storage system for databases should be designed to be durable, performant, agile and secure. Fungible Storage Cluster (FSC), powered by the Fungible DPU™, meets all the requirements of an optimal storage system for MySQL.



TODAY'S RIGID AND WASTEFUL STORAGE INFRASTRUCTURE

MySQL is often implemented using storage servers with direct attached storage (DAS). While this is workable in configurations of a few nodes, it becomes rigid and wasteful as the number of nodes grows.

The drawbacks of the DAS model for MySQL are:

- **Rigid ratio of compute and storage resources.** You must scale compute and storage resources together. This leads to over provisioning of one resource or the other.
- **Proliferation of server models.** Different workloads require different levels of compute and storage resources. Matching the server to the workload results in a large number of server configurations, making procurement and administration complex.
- **Low storage utilization.** Storage is spread across multiple nodes, making it difficult to share. Utilization is often as low as 25%, with much of the resources stranded behind compute servers.
- **Data reduction takes too many CPU cycles.** Software in-line data compression takes up valuable CPU cycles, forcing a tradeoff between SSD capacity efficiency and performance.
- **Insecure data.** To secure the data from prying eyes, encryption is a critical piece of the solution. Encryption is expensive on CPU resources and often not implemented due to such cost.

Current implementations of shared storage for MySQL also have challenges:

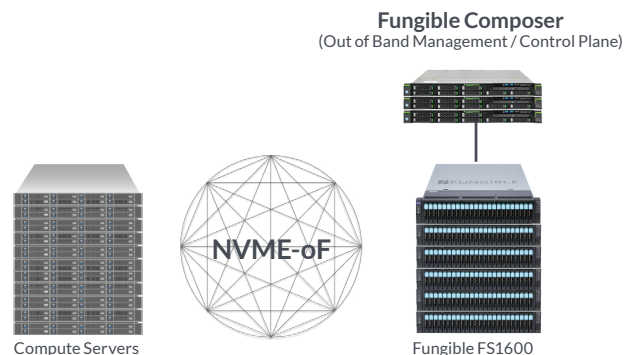
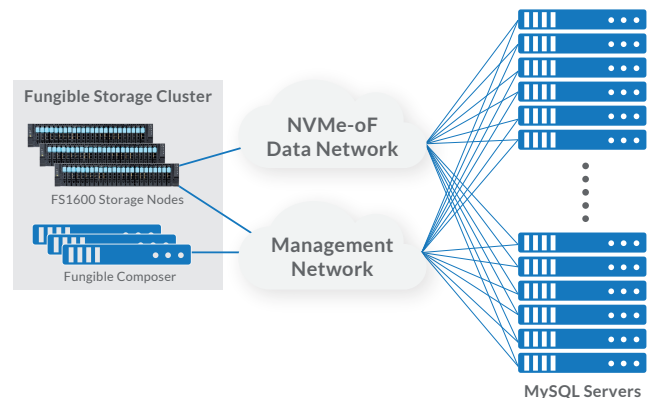
- Lower performance compared to DAS, especially average and tail latency
- Fiber Channel implementations require a separate network that is costly
- Most data protection schemes do not address rack level failures
- Increased east-west network traffic causes congestion, leading to unpredictable SLA
- Current storage solutions are rigid and cannot effectively scale from small to large deployments

THE FUNGIBLE STORAGE CLUSTER

Powered by the Fungible DPU, the Fungible Storage Cluster (FSC) is the highest performance, secure, scale-out disaggregated all-flash storage platform in the market today. The FSC comprises a cluster of two or more Fungible FS1600 storage target nodes and three Fungible Composer nodes. The control plane is managed by the Fungible Composer software, a centralized management solution that configures, manages, orchestrates, controls and deploys the Fungible Storage Cluster.

THE SOLUTION - SUPERCHARGE YOUR DATABASE TO CLOUD SCALE

Fungible Storage Cluster (FSC) powered by the Fungible DPU™ is connected to MySQL nodes via standard NVMe/TCP Data Network and Management Network. Control plane functions such as volume management are performed through the Fungible Composer. The cluster forms a shared pool of erasure coded or replicated, compressed and encrypted NVMe storage that is shared by all the MySQL nodes. By placing each node of the FSC in a separate rack, the data is protected from drive, processor, node, TOR and rack failures. With computationally intensive tasks of EC, compression and encryption offloaded to the Fungible DPU in the Fungible Storage Cluster, MySQL nodes can now handle more database workloads and achieve higher performance. FSC is linearly scalable in increments of FS1600 nodes, up to hundreds of nodes.



BETTER THAN DAS LATENCY

For 50/50 mixed YCSB workload, at all levels of transactions per second tested (60k, 80k, 100k), the Fungible Storage Cluster delivers better tail latency than DAS. 99% read and update tail latency is as much as 50% better. You can now get better performance AND all the benefits of disaggregated storage.

SUMMARY OF BENEFITS

- NVMe All flash array with Fungible Data Processing Unit for the highest performance
- No custom software or agent installed on the MySQL nodes
- Data durability schemes protect against drive, processor, system and rack failures and eliminates any single point of failure
- 93% reduction in required SSD capacity with EC, compression and increased utilization¹
- Single pool of storage increases utilization and avoids stranded resources behind the node
- Network EC provides improved reliability and media efficiency compared to replication or MySQL primary-secondary configuration
- Line-rate compression reduces the required capacity, even on hot data, with little performance impact – much more efficient than MySQL based compression
- Line-rate encryption secures data with no impact to cluster performance
- Complete offload of data plane functions from the MySQL node to the Fungible Storage Cluster reduces the number of MySQL nodes required
- Standard IPoE network compliance (NVMe/TCP) obviates need for expensive InfiniBand or complex RDMA that does not scale
- Disaggregation of compute and storage nodes enable improved infrastructure agility through independent scaling of servers
- Reduced and simplified server configurations reduces management complexity
- Per-volume level granularity of features for data durability, reduction, security makes the FSC ideal for multi-tenant environments

¹ Compare to 3 copy replication and 25% utilization vs. 4+2 EC, 3x compression, and 80% utilization

CONCLUSION

Disaggregated storage has tremendous benefits for the agility and TCO for MySQL environments. In today's unpredictable environment and cost pressure of cloud data centers, it's critical to have highly performant, available, secure, flexible and cost efficient storage infrastructure. Fungible Storage Cluster, with unique core technologies of the Fungible DPU and Fungible TrueFabric, delivers better read and update tail latency for MySQL compared to locally attached SSDs. You can now benefit from storage disaggregation while achieving lower cost and higher performance.

NEXT STEPS

For additional information and demo, contact sales@fungible.com. See more detailed performance results in this [whitepaper](#).

ABOUT FUNGIBLE

Silicon Valley-based Fungible is reimagining the performance, economics, reliability, security and agility of today's data centers.

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