Flash-On-Demand for MySQL

Deploy low-latency flash storage as a service to your MySQL Clustered Database, and lower TCO in the process

Solution Overview

Key Benefits

- Reduce the cost of deploying large cloud-scale MySQL deployments in terms of both CAPEX and OPEX
- Simplify database provisioning, deployment and protection
- Deliver orders of magnitude better application performance in high-scale cloud, web, and SAAS environments

MySQL Benefits

- Scalability and Flexibility
- High Performance
- High Availability
- Management Ease
- Open Source with Support available.
- Lower TCO by leveraging scale-out architecture

Pavilion Benefits

- Latency of local DAS
- High Capacity - up to 460 PB in 4U
- Frictionless Deployment
- Data Resiliency & High Availability
- Space-Efficient, Instant Snapshots and Clones
- Thin Provisioning
- Standard Ethernet
- Pay As You Grow Scalability and Modularity

MySQL

MySQL databases deliver effortless scalability, availability, and performance for the most demanding scale-out applications. MySQL also offers the flexibility to run on many platforms, strong data protection and management ease.

MySQL is the choice of many modern IT organizations given that it is open source and offers a rich set of features that allow it to be deployed as a foundation for high-traffic web sites as well as large data warehouses. It can scale for high performance due to its very high performance query engine, and for big data warehouses in either scale up, or scale out architectures.   As a result, MySQL can meet the most demanding performance expectations of any application.

The Pavilion Memory Array

The Pavilion Memory Array delivers 25X the performance and 10X better latency than typical networked All-Flash-Arrays as well as up to a petabyte of capacity. As a result, it is now possible to deploy shared storage in place of direct-attached SSDs in cloud-scale SAAS and PAAS environments.

Besides performance and capacity, the Pavilion Memory array offers several important data management and enterprise availability features, including thin provisioning, instant zero-space snapshots and clones, and no single point of failure in an enterprise class chassis and platform.   Finally, the Pavilion Memory Array requires no custom software to be installed on application servers, freeing up resources for applications and eliminating deployment complexity.

MySQL Storage Challenges

While MySQL offers the flexibility of being able to deploy the database in a scale-out fashion using distributed resources, it can be costly to deploy when it comes to storage and storage management.   Storage is typically deployed as direct-attached SSDs in individual servers that will host a clustered MySQL database(s).   This leads to several problems that administrators must deal with.   Given that the storage cannot be shared effectively since it is stranded in a given server, it tends to be under utilized. In many cases, storage utilization is as low as 25%.   In addition, storage provisioning decisions need to be made at server procurement time typically, meaning that determining the size of the storage in each server is done up front when hardware is purchased.   This leads to inflexibility and higher costs over time. In addition, if storage needs to be scaled for either performance or capacity reasons, more server nodes may need to be deployed to accommodate more direct-attached SSDs.   Finally, while MySQL offers robust data protection mechanisms, it relies on making copies of data on other database server nodes, leading to more capacity being required.

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Lower TCO by delivering Flash-As-A-Service for Scale-Out MySQL Deployments

Up until now, the primary drivers behind deploying DAS SSDs as the primary storage in MySQL clusters were performance and fault isolation.   MySQL required the absolute lowest latency in many cloud-scale SAAS environments in particular, and thus the best performance available came from direct-attached SSDs.   However, with the advent of high speed RDMA-capable networking, and efficient block storage protocols like NVMe-Over-Fabrics, it is now possible to get the same performance advantages with shared storage.   The Pavilion Memory Array can offer 100s of Terabytes of low-latency logical flash storage from a disaggregated 4U storage appliance, allowing racks of database nodes to be supplied storage capacity from a central storage appliance that can deliver up to 120 GB/s bandwidth and 20 million 4K Read IOPS. In addition, the Pavilion Memory Array offers important data management features that lower the cost of deploying MySQL clusters significantly.
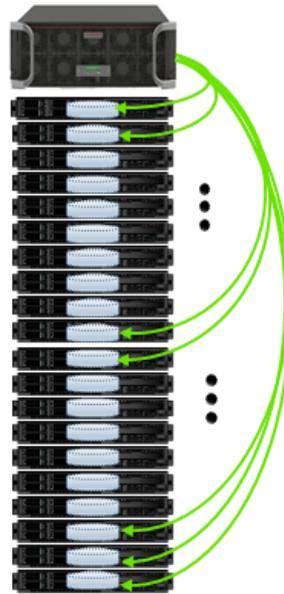
Low-Latency,
Thin-Provisioned,
Logical NVMe Volumes
presented on all
MySQL Database
Nodes over standard
Ethernet Network

The key benefits derived from using the Pavilion Memory Array in place of DAS SSDs in MySQL deployments are listed below.

Up to 4X+ less flash deployed in most environments
This benefit is derived by leveraging thin-provisioned logical flash storage, where the Pavilion Memory Array will deliver the agility required to meet the changing needs of the applications.   With the Pavilion Memory Array, you can decide at application deployment time how much storage to provision to a given MySQL database node.   You no longer are constrained by the size of the SSDs that were purchased and installed in any given server.   With Thin Provisioning, you will only be using what the application is actually requiring at a given time, regardless of how much capacity has been advertised to that specific database node. This will greatly reduce the amount of raw flash storage required to deploy MySQL in these cloud-scale environments.

Simplify data protection and reduce server overhead
Instant no-space-required snapshots and clones allow an entire clustered database to be backed up, or copied for test/dev purposes instantly and on the fly without any performance impact. In addition, the Pavilion Memory Array is an enterprise platform without a single point of failure, ensuring maximum application uptime and data availability.   This alleviates the need to make multiple copies of each node's data on other nodes in the cluster, lowering storage capacity requirements and reducing application and network processing overhead required to distribute data to additional nodes in the cluster.

Increased Compute Density per Rack by deploying Disk-less server nodes
By provisioning high speed logical flash storage volumes to each server in a rack, you no longer need to purchase servers that can accommodate SSDs.   This allows you to potentially increase the compute density of a rack by leveraging 1U servers instead of 2U servers with front-loading drive bays.   In addition, Pavilion requires no custom software to be installed on database nodes, allowing MySQL to take full advantage of application host processing resources as well as simplifying deployment complexity.

As a result of the power, simplicity, and density offered by the Pavilion Memory Array, it is now possible to deploy flash as a flexible service for scale-out MySQL deployments, allowing for cloud-scale agility and flexibility, and lowering TCO in the process.