Dell EMC FX2 Enterprise Database Workloads with Toshiba 12Gb/s SAS SSDs

Tackle Demanding Workloads with Dell EMC FX2, Toshiba PX05S Series 12Gb/s SAS SSDs and Oracle Database

Executive Summary

The Dell EMC PowerEdge FX2 enclosure is a 2U hybrid rack mount computing platform that combines the flexibility, density, and efficiencies of blade server technology with the simplicity and cost benefits of rack-based systems. The FX architecture's innovative modular design supports IT resource building blocks of varying sizes so data centers have greater flexibility to construct their infrastructures. The enclosure uses Toshiba's 12Gb/s SAS SSDs to provide performance and density to the solution. This platform can be attractive to those needing more computing power in a smaller space without having to go through the "learning curve" of blade environments.

We wanted to show a real-world example of the density and simplicity of the FX architecture by deploying an Oracle database solution. For this particular set of tests, we chose two compute nodes and two storage nodes. For the compute nodes, we chose the half-width PowerEdge FC630, a two-socket workhorse server that provides a powerful punch in a small footprint. For the storage nodes, we chose the half-width PowerEdge FD332. These dense storage nodes support 16 small form factor devices – and we filled them with 3.84TB Toshiba PX05S Series 12 Gb/s SAS SSDs, providing more than 60 terabytes of flash storage in each storage node. We then assigned one storage node to each compute node.

We deployed the latest version of the Oracle database on both compute nodes, each having its own all-flash storage node. We ran an OLTP workload on both

compute nodes to see what kind of performance we could get in a 2U rack space.

Key Findings

> With Toshiba 12Gb/s SAS SSDs, we achieved almost 30,000 database transactions per second on each compute node, for a total of almost 60,000 database transactions per second in one chassis.

> Striping the Oracle database across the Toshiba 12Gb/s SAS SSDs resulted in average latencies of less than 350 microseconds (350 µs).

Server Hardware

Two Dell EMC FC630 compute nodes were used in the FX2 chassis. Each compute node included:

> 2x Intel® Xeon® E5-2698 v4 processors, 2.2 GHz, 40 total cores, 80 total threads

> 256 GB RAM

> 2x Toshiba 1.6 TB PX05S 12Gb/s SAS SSDs for boot drives

Storage Hardware

Two Dell EMC FD332 storage nodes were used for the Direct Attach Storage (DAS) and were filled with 16x Toshiba 3.84 TB PX05S 12Gb/s SAS SSDs for application storage, containing more than 60 TB per ½-width unit. One FD332 storage node was assigned to each FC630 compute node.

Configuration
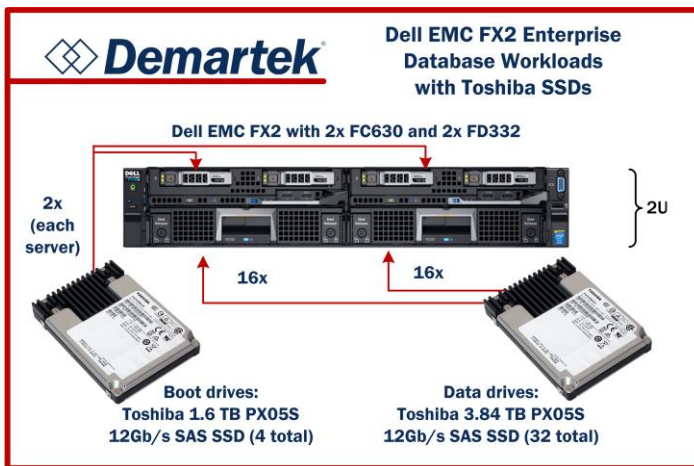
Performance

Running an Oracle database online transaction processing (OLTP) application on a Linux operating system, we achieved nearly 30,000 database transactions per second in each compute node. This was accomplished while maintaining an average of less than one millisecond of write latency and less than 350 microseconds of read latency.

Summary and Conclusion

The FX2 design, with Toshiba 12Gb/s SAS SSDs, would appeal to those who need to get more compute and storage resources into a small amount of rack space, especially those for whom traditional rack servers consume too much rack space. In 2U of rack space, we had two dual-socket compute nodes and two 16-drive all-flash storage nodes — a very dense package.