

## Increase Hyper-V® VM Density and Performance While Saving on Software License Cost

SanDisk, a leading brand of data center flash hardware and software solutions, collaborated with DB Best Technologies, Microsoft's dominant database modernization, migration, and optimization partner, to quantify the impact of high-performance storage and caching on both VM density and the cost of software licensing for hosts.

Workload consolidation increases the efficiency of IT organizations, as well as cloud and hosting providers, by harnessing the rising power of modern servers to support a growing number of virtualized workloads. Increasing the workload density—the number of workloads running on a host server—drives the economics of consolidation by reducing the number of host servers required to run a given number of workloads.

Reduce the number of host servers needed, and you reduce both hardware and software license costs.

The solutions summarized in this Solution Brief demonstrate a 3x increase in workload density, delivering an average savings of 65%, totaling about \$460,000 savings in hardware and software license cost for the scenarios tested, compared to HDD-only configurations to achieve comparable workloads and throughput.

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The caching solution stores “hot data” locally in the host server, requiring no changes to the existing storage environment. This solution uses SanDisk's FlashSoft® caching software combined with Fusion ioMemory™ PCIe application accelerators, delivering a 66% savings totaling \$467,850, for a 79x ROI.

The direct storage solution adds enterprise flash storage locally in the host server to store data previously stored elsewhere. This solution uses Fusion ioMemory PCIe flash products to store all data, delivering a 64% savings totaling \$453,219, for a 22x ROI.

### **The Problem: SQL Server® Workload Consolidation**

Many IT organizations strive to maximize utilization of their existing hardware investments by virtualizing workloads, and gain additional advantages of simplified management with lower operating cost. The number of virtualized SQL Server workloads that can be consolidated onto a given host—“workload density”—depends on many factors, including CPU performance, the amount of system memory, etc. Additionally, a common limiting factor in workload consolidation is storage performance.

Software license costs are critical to consider when evaluating potential savings. In our testing scenario, SQL Server per-core licensing accounts for about 80% of the total system cost. If you can use fewer cores, you'll need fewer per-core licenses, and can realize significant savings. In other words, if you can increase the number of workloads supported by a host server, you'll need fewer hosts to run all your workloads, and the solution will have a much lower acquisition cost.

The scenario tested up to 25 SQL Server transactional workloads and is applicable to projects migrating workloads from physical servers for consolidation to a virtualized host, or increasing the consolidation of workloads already virtualized.

Both solutions tested—caching and direct, local storage—demonstrate a 3x increase in workload density after adding SanDisk products to the virtualized host, in two different configurations (Figure 1).

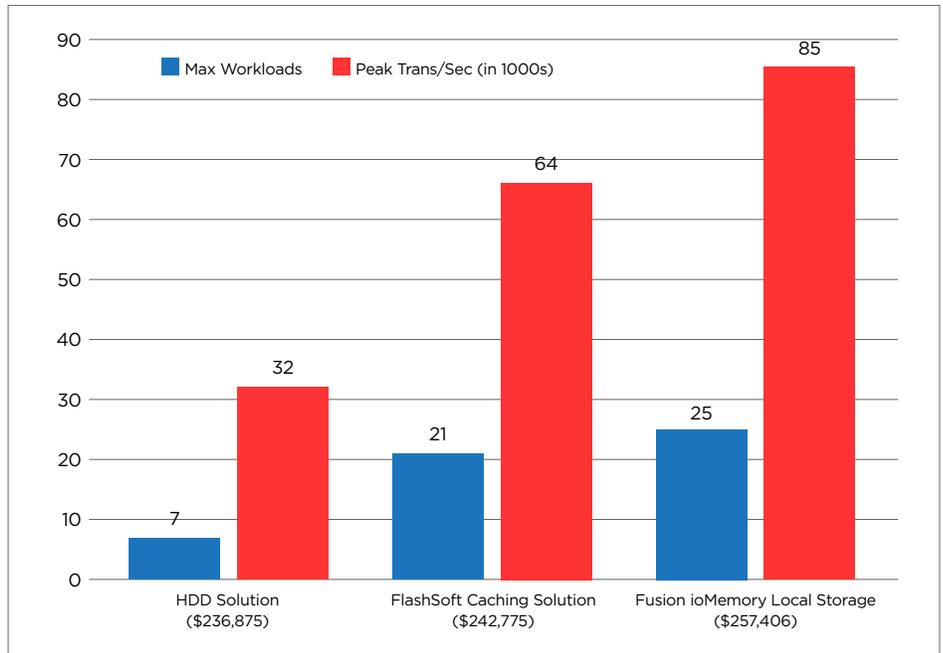


Figure 1. Workload performance comparisons by storage type.

Increasing the workload density by 3x can result in substantial savings: 1/3 the number of host servers getting the same work done or more, while reducing spending by 2/3 on host servers, infrastructure, and software licenses.

## Two Solutions Tested - Both Enable You to Do More, With Less

### FlashSoft Caching Solution

This is a great solution when data needs to remain where it is currently stored; to keep costs down for maximum ROI; or for large datasets that exceed the capacity of the Fusion ioMemory cards used. This solution also extends the value of past investments in storage solutions while those investments are depreciated.

The FlashSoft caching software, combined with Fusion ioMemory PCIe application accelerators, delivers a 66% savings totaling \$467,850, for a 79x ROI. Workloads also ran 2x faster.

### Fusion ioMemory Direct Storage Solution

Using flash storage local to the server is a great solution to maximize workload density; maximize CPU utilization to get full value from per-core software license investments; or to maximize the performance of the hosted workloads.

When Fusion ioMemory flash storage products were used to store all data, our testing showed a 64% savings totaling \$453,219, for a 22x ROI. Workloads also ran 2.6x faster.

## Conclusion

SanDisk flash memory and caching solutions enable enterprise IT customers to dramatically improve their Microsoft SQL Server performance, maximize their Microsoft license value, and substantially reduce total system cost savings.

For full details of the DB Best test and findings, please see the whitepaper *Increase Hyper-V VM Density and Performance While Saving on Software License Cost* at sandisk.com.

We invite you to learn how SanDisk can help you experience similar cost savings and results.

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