



Storage Spaces Direct in Windows Server 2016

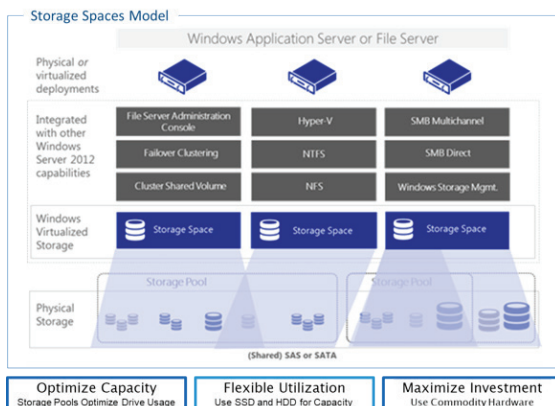
Gain A Performance Advantage with Mellanox in Windows Storage Spaces Direct Environments

EXECUTIVE SUMMARY

Storage Spaces Direct (S2D) is a Microsoft Windows Server technology that enables you to virtualize storage by using commodity disks and grouping them into storage pools. The capacity of storage pools can then be used to create virtual disks referred to as storage spaces, and were developed to handle the exponential growth of data, which has created significant challenges for IT. Compared to older storage solutions, Storage Spaces has doubled the performance at half of the cost, enabling significantly higher efficiency in Windows-based data centers.

OPTIMIZING DATA TRANSFERS IN WINDOWS

The expansion of business-critical information, unstructured data, and rich content within enterprises continues to change storage dynamics. This trend is driving the need for software defined services, higher connection speeds and diverse access through file, block and object storage. In order to address these market conditions, Microsoft and Mellanox combine to deliver the most efficient solutions for Windows Server and Azure Stack-based storage deployments by providing faster and more efficient access to data for enterprise applications.

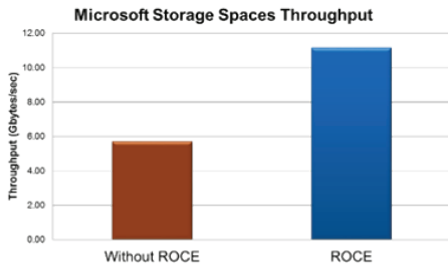
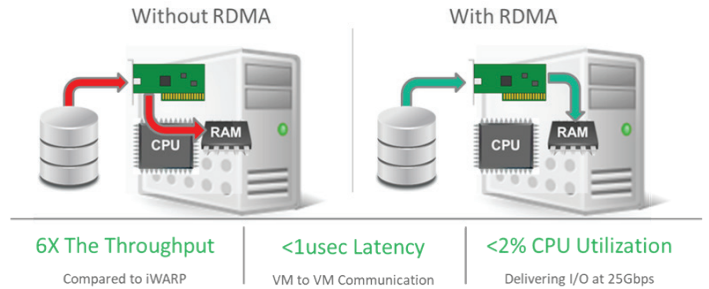


SOLUTION HIGHLIGHTS

- Deliver line-rate performance achieve the full benefits from flash/NVMe storage
- Lower latencies and reduce CPU utilization to increase operational efficiencies
- Increases IO performance and throughput for faster application response time
- Software-defined storage features allowing
 - Storage provisioning from disaggregate pools
 - Caching and tiered storage for enhanced performance
 - Improved resilience through mirroring and erasure coding

STORAGE SPACES DIRECT AND MELLANOX

Storage Spaces Direct comes with enhancements to Microsoft’s Server Message Block (SMB) 3.0. SMB was extended to include two new features, SMB Direct, and SMB Multichannel. SMB Direct implemented the use of various high-speed RoCE methods to transfer large amounts of data with little CPU intervention. SMB Multichannel allows file servers to use multiple network connections simultaneously and provides fault tolerance through automatic discovery of network paths. The addition of these two features allows Mellanox RoCE enabled IO adapters to deliver line-rate performance and improve availability by optimizing data transfer between server and storage over standard Ethernet.



- **2X better performance with RoCE**
 - 2X higher bandwidth & 2X better CPU efficiency
- **RoCE* achieves full Flash storage bandwidth**
 - Remote storage without compromises

Testing by Microsoft shows S2D and Mellanox RoCE improve CPU efficiencies.

By offering built-in support for Mellanox RoCE, Microsoft has enabled customers to deploy storage on low-cost file servers, while delivering higher performance. As a result, S2D is extremely fast with client-to-file server performance, almost equaling solution that use locally attached storage. CPU reduction leaves more cycles available for server applications. The result is larger numbers of hosted VMs per physical servers, more VDI instances and SQL environments achieve high-performance to complete queries quicker.

INCREASE SERVER EFFICIENCY

RoCE lowers latency and reduces CPU consumption in Windows Storage Spaces Direct deployments. This is realized because RoCE uses hardware offloads on the adapter to bypass the CPU, eliminating it’s involvement in the data transfer process. The result is lower latencies and an improvement on CPU efficiencies. RoCE provides the absolute best performance by leaving the CPU available to run other application processes.

RUN MORE WORKLOADS

Intelligent hardware accelerators remove the CPU from I/O tasks, freeing up resources to accelerate application performance. Offloading tasks helps overcome performance bottlenecks. Bottlenecks are created when data is waiting to reach the CPU. By using intelligent network devices that offload functions from the CPU this has the advantage of increasing the availability of the CPU for other computational functions, such as running more VM, and improves the overall efficiency of the system.

CONCLUSION

The efficiency of today’s data centers depends heavily on fast and efficient networking and storage capabilities. Microsoft has determined that offloading the network stack processing from the CPU to the network is the optimal solution when deploying workloads such as Hyper-V and Microsoft SQL Server. Offloading frees the CPU to run more applications, and reduces the number of servers required to support a given workload, resulting in both CapEx and OpEx savings. Mellanox networking technologies with RDMA offload accelerators combined with Microsoft’s solutions provide for a solid foundation to deliver outstanding performance, and increased efficiency to accommodate evolving business needs.

About Mellanox

Mellanox Technologies is a leading supplier of end-to-end InfiniBand and Ethernet interconnect solutions and services for servers and storage. Mellanox interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance capability. Mellanox offers a choice of fast interconnect products: adapters, switches, software, cables and silicon that accelerate application runtime and maximize business results for a wide range of markets including high-performance computing, enterprise data centers, Web 2.0, cloud, storage and financial services.

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