Benefits of Dell EMC HCI Solutions for Microsoft Windows Server

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White Paper

Abstract

This white paper describes the benefits of the preconfigured, validated, and scalable Dell EMC HCI Solutions for Microsoft Windows Server.

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Executive summary

Business challenge

IT organizations are under tremendous pressure to provide their businesses with innovative capabilities that accelerate digital transformation. Simultaneously, they must maintain existing traditional systems with constrained budgets and reduced staff. The key to addressing these challenges is to adopt a modern infrastructure that can be seamlessly ordered, deployed, maintained, and supported. This adoption frees technology leaders to invest time and capital in designing applications and services that differentiate their company's brand and disrupt their chosen marketplace.

When purchasing modern platforms, organizations must carefully evaluate their options. Any new infrastructure deployment must be software-defined with tightly integrated compute, storage, and network virtualization capabilities. The solution must also be able to meet or exceed the performance and availability requirements of today's most demanding applications.

Furthermore, data centers are challenged with antiquated, inflexible management tools and manual, error-prone operational processes. It is critical that IT organizations introduce new management capabilities that are familiar enough for technical staff to operate and powerful enough to provide a high degree of automation and orchestration. When appropriate, it is preferable to integrate the globally distributed and feature-rich management services of public cloud providers to create a hybrid cloud ecosystem. This integration enables IT professionals flexibility to optimize their management landscape by augmenting or replacing existing tools when applicable with public cloud services.

Solution overview

For 35 years, Dell Technologies has partnered with Microsoft to develop solutions that solve these business challenges. Dell EMC HCI Solutions for Microsoft Windows Server is a broad, intelligently designed hyperconverged platform that can meet the requirements of a vast array of workloads and use cases. The solution comes preconfigured, validated, and certified to remove the guesswork when building a modernized virtualization environment. Comprehensive management with Dell EMC OpenManage Integration with Microsoft Windows Admin Center, rapid time to value with Dell EMC ProDeploy options, and solution-level Dell EMC ProSupport complete this modernized portfolio.

Audience

This white paper is intended for technology leaders, systems engineers, field consultants, partner engineering team members, and customers with some knowledge of virtualization technologies found in Microsoft's Windows Server 2016 or Windows Server 2019 Hyper-V, and Windows Server HCI.

We value your feedback

Dell Technologies and the authors of this document welcome your feedback on the solution and the solution documentation. Contact the Dell Technologies Solutions team by email or provide your comments by completing our documentation survey.

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Note: For links to additional documentation for this solution, see the Info Hub for Microsoft HCI Solutions from Dell Technologies.

Technology overview

Built on the software-defined compute, storage, and networking features of Windows Server 2019, Dell EMC HCI Solutions for Microsoft Windows Server delivers a fully productized, validated, and supported hyperconverged solution. This solution enables enterprises to modernize their infrastructure for improved application uptime and performance, simplified management and operations, and lower total cost of ownership. The AX family of nodes from Dell Technologies, powered by Dell EMC PowerEdge server platforms, offer a high-performance, scalable, and secure foundation to build a software-defined infrastructure.

Key benefits

Broad and fully productized portfolio

Components in the AX nodes from Dell Technologies are carefully selected and balanced for customers' intended workloads and use cases. The solution is correctly sized to meet the needs of today's business and to expand easily to accommodate future growth. Customers have typically used the platform for running the diverse portfolio of applications that are found in remote branch offices, large-scale virtual desktop implementations, resource-demanding Microsoft SQL Server environments, and more.

You can choose from three distinct platforms: AX-640, AX-740xd, and AX-6515. The three platforms provide configuration options that are broad enough to meet the performance and availability requirements of many applications. The following table describes the AX nodes from Dell Technologies portfolio:

Table 1. AX nodes from Dell Technologies portfolio

Platform	Description	Target workload and use case	Storage configurations available
AX-640 node	Performance- and density-optimized 1U Intel-based form factor	Most demanding databases and workloads requiring high performance and low latency, dense virtualization clusters, service provider application tiers	Hybrid and all-flash. HDD, SSD, NVMe, and the only platform for Intel Optane persistent memory and Intel Optane SSDs
AX-740xd node	Storage- and capacity-optimized 2U Intel-based form factor	Applications requiring significant storage capacity, big data, analytics, service provider data tiers	Hybrid and all-flash. HDD, SSD, and NVMe
AX-6515 node	Value-optimized 1U short depth AMD-based form factor	ROBO and edge use cases, providing increased security through processor diversification	All-flash SSD

As part of a Windows Server HCI solution, networking is validated. Various network configuration options are thoroughly tested and detailed in the Network Integration and Host Network Configuration Options guide. Dell Technologies highly recommends the Dell EMC PowerSwitch S5200-ON family of switches as they provide up to 32 100 GbE ports in a 1RU footprint and deliver outstanding levels of throughput. The following figure shows different switch models with various speeds and port configurations that meet every use case:

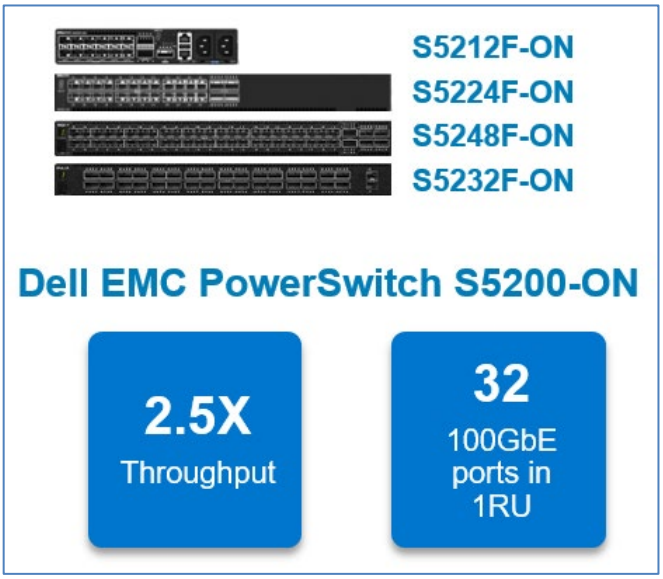

Figure 1. Dell EMC PowerSwitch S5200-ON family of switches for Windows Server HCI

Scalable infrastructure

To be ready for future growth, Windows Server HCI clusters can be easily expanded to provide more performance and capacity to the workloads running in the VMs. The solution offers a minimum cluster size of two AX nodes and a maximum size cluster of 16 AX nodes.

Notes:

- AX nodes do not support the expansion of a two-node cluster to a larger cluster size. However, these AX nodes can be repurposed and redeployed into a new cluster as necessary.
- When you are expanding a cluster, all nodes in a Windows Server HCI cluster must have homogenous hardware configurations.
- A three-node cluster provides fault-tolerance only for a simultaneous failure of a single node and a single drive. If the deployment requires future expansion and optimal fault tolerance, consider starting with a four-node cluster at a minimum.

Advantages of Windows Server 2019 HCI

Dell EMC HCI Solutions for Microsoft Windows Server takes advantage of the many new features that come with Windows Server 2019. Some of these features vastly improve on the features and functionality of Windows Server 2016. Each component has a unique impact on the workloads running on Windows Server HCI:

- **Data deduplication**—This feature enables you to store up to 10 times more data on the same volume with deduplication and compression for the ReFS file system. Deduplication can significantly reduce the amount of storage capacity required in a Windows Server HCI cluster. Datasets that have high duplication—like virtualization libraries—can see optimization rates of up to 95 percent.
- **Increased scalability**—This feature delivers a four-fold increase in capacity over Windows Server 2016 (400 TB per node and 4 PB per cluster).

- **Mirror-accelerated parity**—ReFS uses the benefits of mirroring and parity to deliver both capacity-efficient and performance-sensitive storage by combining both resilience schemes within a single volume.
- **Cluster sets**—This new cloud scale-out technology, which loosely couples a grouping of multiple clusters, enables combining multiple smaller clusters into a single namespace without sacrificing resiliency.
- **Persistent memory support**—This feature delivers improved performance and lower latency and can be used for cache and capacity.

The following table lists increases to storage limits in Windows Server 2019 compared to Windows Server 2016:

Table 2. Windows Server 2019 improvements to resource limits

Maximum components	Windows Server 2016	Windows Server 2019	Increase
Servers per cluster	16	16	-
Drives per cluster	416	416	-
Raw capacity per cluster	1 PB	4 PB	4x
Raw capacity per server	100 TB	400 TB	4x
Number of volumes	32	64	2x
Size per volume	32 TB	64 TB	2x

Simplified monitoring and life cycle management

Microsoft Windows Admin Center is a locally deployed, browser-based application for managing Windows servers, clusters, and hyperconverged infrastructure. The Windows Admin Center gateway host manages target devices using agent-free Windows Management Instrumentation (WMI) over Windows Remote Management (WinRM) and remote PowerShell communications. It is also extensible and can integrate Microsoft Azure services like Azure Backup, Azure Site Recovery Manager, and Azure Monitor to augment or replace existing on-premises systems management tooling.

Dell Technologies has a long history of developing integrations into Microsoft System Center to simplify the monitoring, alerting, and management of hardware in the data center. The newest addition to the OpenManage suite of capabilities is Dell EMC OpenManage Integration with Microsoft Windows Admin Center. The OpenManage Integration extension adds powerful features and functionality for monitoring and life cycle management of a Windows Server HCI cluster. The extension's key benefits include the following:

- Communicates with the Integrated Dell Remote Access Controller (iDRAC) on each AX node in a Windows Server HCI cluster to obtain hardware monitoring information and perform updates. Communication occurs in-band and completely agent free using the OS to iDRAC Pass-through and Redfish technology.
- Includes a dashboard with the health status of the entire cluster in one view — including all components in all AX nodes.
- Provides a detailed inventory of all components in all AX nodes including CPUs, GPUs, memory (including Intel Optane persistent memory), storage controllers, network adapters, hard drives, and more.

- Assists onsite technicians performing drive replacements by blinking and unblinking drive lights.
- Enables seamless compliance reporting and updating and downgrading of component firmware and operating system drivers using the Cluster Aware Updating feature. Cluster Aware Updating occurs on the Windows Server HCI cluster in a completely nondisruptive manner with no downtime to the workloads running in the VMs. Access to the firmware and driver catalog is available whether the Windows Admin Center gateway host is connected to the Internet or not. This access significantly reduces the potential for human error during the update process.

Services and support from HCI experts

Modernizing an aging, traditional virtualization environment can be a daunting task, especially with a limited budget, shrinking staff, and competing business priorities. Introducing this new platform into the technology value stream must be a seamless experience from presales planning, to deployment, to ongoing support and maintenance. Dell Technologies makes the entire process simple, flexible, and worry free. Benefits that a customer can expect when engaging Dell Technologies for assistance with implementing Windows Server HCI include the following:

- Dell Technologies account teams first help customers capture, collect, and analyze performance information from existing running operating systems. The Live Optics tool provides a clear picture of today's infrastructure utilization.
- Current-state information is fed into a powerful Microsoft HCI Solutions Sizer Tool that contains rules for all possible permutations and combinations of AX node configurations. This tool ensures that the solution meets or exceeds today's requirements and can expand for future growth.
- When purchasing the optional Dell EMC ProDeploy or ProDeploy Plus service, certified engineers are available to install, configure, and validate the entire Windows Server HCI solution for a complete turn-key experience.
- The Dell EMC ProSupport or ProSupport Plus options provide single source support from Dell Technologies. This support is one-stop cluster-level support for both hardware and software. When calling Dell EMC Support for Windows Server HCI, customers are connected with a specially trained team of experts who can address any issues with hardware, operating systems, hypervisor, and Storage Spaces Direct.

Conclusion

Dell EMC HCI Solutions for Microsoft Windows Server expertly combines powerful compute, storage, and networking capabilities to provide a modern software-defined infrastructure. It consists of a broad portfolio of hardware and software that is productized and validated to deliver superior performance and availability at an attractive total cost of ownership. Dell Technologies account representatives can help size the solution to perfectly meet today's workload requirements while making it simple to expand in the future. Dell EMC OpenManage Integration with Microsoft Windows Admin Center delivers a seamless monitoring and lifecycle management experience with no interruption to running services. For customers needing additional solution-level guidance from trained HCI experts, Dell EMC ProDeploy and ProSupport options can guarantee peace of mind and remove the guesswork of operating Windows Server HCI.

References

Dell Technologies documentation

The following Dell Technologies websites provide additional and relevant information. For more information, contact your Dell Technologies account representative.

- Dell EMC HCI Solutions for Microsoft Windows Server product page
- Microsoft HCI Solutions from Dell Technologies Info Hub