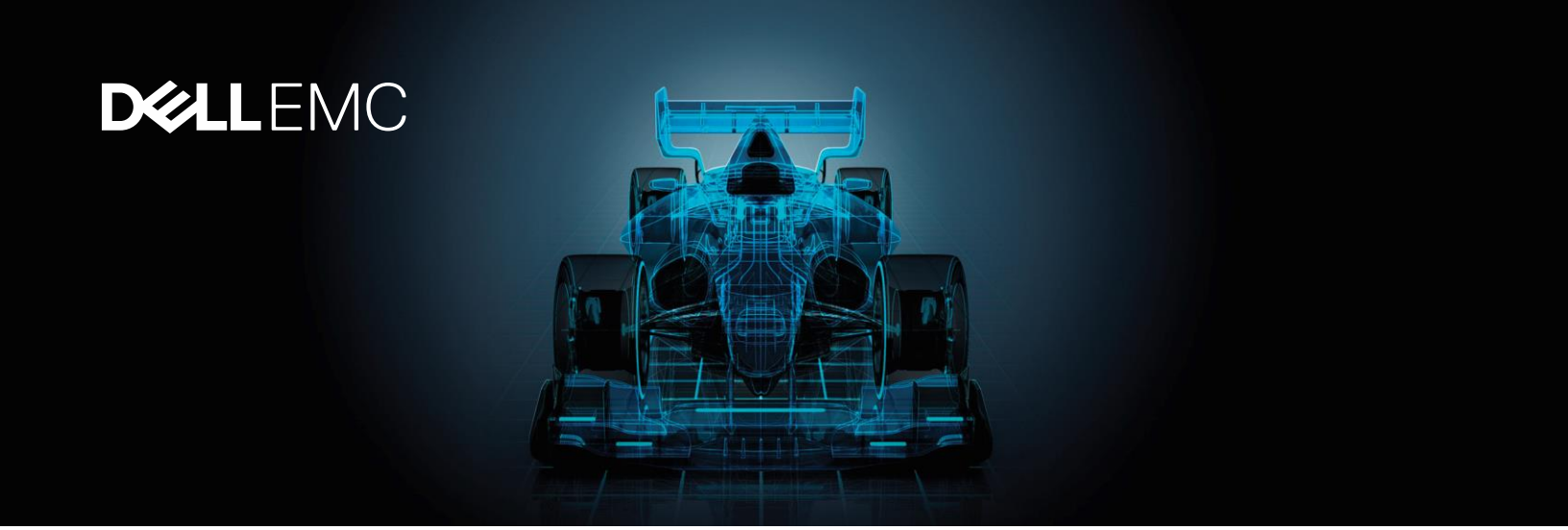

Dell EMC VxFlex Ready Nodes

Scalable, reliable and easy-to-deploy building blocks for multi-hypervisor and bare metal environments, hyperconverged or server SAN architecture, and high performance databases

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A solution built for modern storage demands

Enterprises are producing, ingesting and storing more data than ever before. Traditional SAN storage offers the high performance and high availability required to support business applications, hypervisors, file systems and databases. But a SAN doesn't provide the massive scalability, linear performance gains and resilience required by modern enterprise data centers.

Dell EMC VxFlex Ready Nodes converge storage and compute resources, aggregating capacity and performance with simplified management capable of starting small and scaling in discrete increments. Dell EMC VxFlex Ready Nodes bring together Dell EMC PowerEdge servers with Dell EMC VxFlex OS software in scalable, reliable and easy-to-deploy building blocks for hyperconverged or server SAN architecture, multi-hypervisor or bare metal environments, and high performance databases.

VxFlex Ready Nodes offers flexibility in deployment options

HCI/single-layer architecture: An HCI model, where compute and storage reside within the same server, creates a single-layer architecture and offers the best TCO savings while allowing you to modernize your data center with greater efficiency.

Two-layer model: Redesign your storage environment using a traditional two-layer model to resemble a traditional SAN architecture. A two-layer model provides efficient parallelism and no single points of failure. Additionally, storage and compute nodes remain separate operationally, giving teams the flexibility to manage each infrastructure independently.

Either option fits within your existing infrastructure and provides massive scalability with linear performance gains and enterprise-grade, no-compromise resilience — in a validated, configured and supported building block that's quick and easy-to-deploy.

Quick and easy deployment

Dell EMC VxFlex Ready Nodes reduce the time IT spends planning and deploying new architectures. Dell EMC VxFlex Ready Nodes are:

- Configured, tuned and optimized to simplify VxFlex OS deployment and ease scaling projects
- Easy-to-deploy, operate and manage with VxFlex OS
- Supported by a single vendor — Dell EMC — for streamlined, collaborative support from the first call

Enterprise-grade resilience

Dell EMC VxFlex Ready Nodes provide enterprise-grade resilience and 6x9s availability by running the storage software directly on application servers. Designed for extensive fault tolerance and availability, the solution effectively handles failures of media, connectivity and nodes, and software interruptions so that no single point of failure can interrupt the input/output (I/O) service. Dell EMC PowerEdge R640, R740xd and R840 Servers are a perfect foundation, with high-availability features such as hot-pluggable and hot-swappable power supply units (PSUs), hard disk drives (HDDs) and fans, and a dual SD card option for fail-safe hypervisors. In addition, Dell EMC VxFlex Ready Nodes support and integrate with Dell EMC data protection services, enabling ERP admins and DBAs to manage, control and protect their growing physical and virtual systems and database environments effectively using tools from the Dell EMC Data Protection Suite, such as Data Domain (DD) with DD Boost, Networker and RecoverPoint.

Scalable performance

Dell EMC VxFlex Ready Nodes are designed to scale massively. Unlike most traditional storage systems, as the number of storage devices grow, so does throughput and IOPS. The scalability of performance is linear with regards to the growth of the deployment. You can add servers and storage modularly so resources can grow individually or together to maintain balance. Every server in the cluster is used in the processing of I/O operations, making I/O and throughput accessible to any application within the cluster. Throughput and IOPS scale in direct proportion to the number of servers and local storage devices added, improving cost/performance rates with growth. Plus, Dell EMC VxFlex Ready Nodes are based on Dell EMC PowerEdge servers, which deliver higher core counts for I/O intensive applications, reducing bottlenecks and further improving performance.

VxFlex OS

VxFlex OS is a scale-out block storage service that enables customers to create a scale-out Server SAN or hyperconverged infrastructure. It is the next generation software technology powering the VxFlex family to deliver:

Wide Distribution of Data for Massive Performance

VxFlex OS widely distributes data across all storage resources in the cluster, which eliminates the architectural problems of other IP-based storage systems. With VxFlex OS, all the IOPS and bandwidth of the underlying infrastructure are realized by a perfectly balanced system with no hot spots.

Massive Availability and Resiliency

VxFlex OS has a self-healing architecture that employs many to many, fine-grained rebuilds, which is much different than the serial rebuilds seen with most storage products. When hardware fails, data automatically rebuilds using all other resources in the cluster. This enables a 6x9's availability profile while using x86 commodity hardware. VxFlex OS can rebuild an entire node with 24 drives in mere minutes – a fraction of the time it takes to rebuild a single drive on a traditional array.

Built-In Multipathing

VxFlex OS automatically distributes traffic across all available resources. Every server can be a target as well as an initiator. This means as you add/remove nodes in the cluster, multipathing is dynamically updated on the fly.

Storage Only and/or Hyperconverged

VxFlex OS can be deployed to separate compute and storage nodes, and it can be deployed as a hyperconverged technology. Moreover, it can encompass both architectures together.

How will you use Dell EMC VxFlex Ready Nodes?

Workloads come in various shapes and sizes, and mission-critical applications require a flexible infrastructure to handle the independent needs of each implementation, while delivering enterprise-class levels of performance and resilience.

Server SAN or two-layer storage architecture

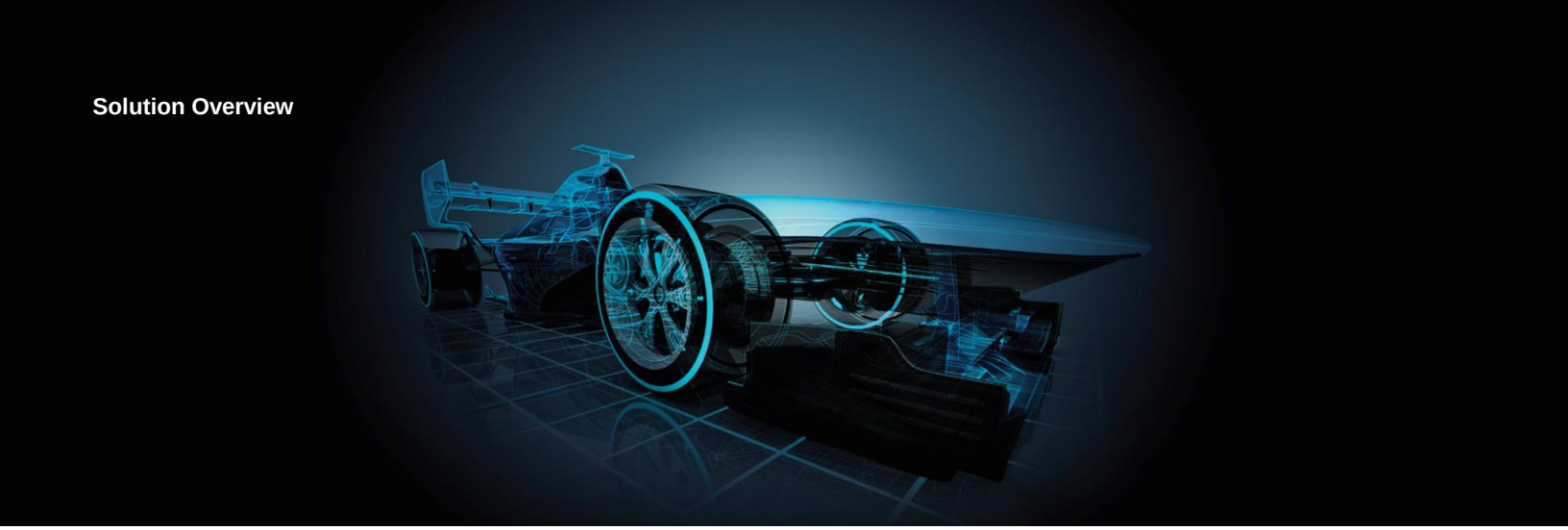
Dell EMC VxFlex Ready Nodes abstract the direct-attached storage of Dell EMC PowerEdge servers into a pool of shared block storage. By converging the storage and compute on the same physical servers, this single- and/or two-layer architecture helps simplify management and optimize storage efficiency as the infrastructure grows from three nodes to thousands. Whether using HDDs, solid disk drives (SDDs), or even NVMe or PCIe flash, storage is combined into block-storage pools with varying performance tiers. Combined with quality of service (QoS), snapshots, caching, fault sets and protection domains, and data-at-rest encryption, Dell EMC VxFlex Ready Nodes deliver an enterprise-grade hyperconverged solution. You can break free of the large initial investments and high operational costs commonly associated with traditional SANs and lower the costs and risks associated with refreshes and data migrations.

Heterogeneous or bare-metal hypervisor environments

SAN-driven storage comes with numerous limitations in a virtual environment. Dell EMC VxFlex Ready Nodes optimize traditional virtualized infrastructures by providing highly scalable server-based storage for heterogeneous platforms, including support for multiple hypervisors, operating systems and bare metal configurations. The solution allows for independent scaling of compute and storage, reducing stranded resources and bringing flexibility to virtualized infrastructures that traditional SAN can't provide. Scaling now becomes significantly easier with the ability to optimally distribute resources based on application and workload needs.

High performance databases

For databases — such as Microsoft® SQL Server®, SAP® and Oracle® Database — the ability to satisfy various sets of business requirements and service level agreements (SLAs) on the same infrastructure without impacting other applications or workloads is imperative to a successful deployment. Every node in a Dell EMC VxFlex Ready Node cluster is used in the processing of I/O operations, making throughput accessible to any application within the cluster. Such massive I/O parallelism eliminates performance bottlenecks, while throughput and IOPS scale in direct proportion to the number of nodes added to the system, improving cost/performance as the environment grows. Performance optimization is automatic and whenever rebuilds and rebalances are needed they occur in the background with minimal or no impact to applications. For optimal utilization, the solution also enables independent scaling of compute and storage, eliminating stranded resources.



Are you facing any of these challenges?

"We can't support the high performance requirements of our applications and databases."

Every VxFlex Ready Node within a cluster is used in the processing of I/O operations, making all I/O and throughput accessible to any application within the cluster. Such massive I/O parallelism eliminates performance bottlenecks. Throughput and IOPS scale in direct proportion to the number of nodes added to the system, improving cost/performance rates with growth. Performance optimization is automatic. Whenever rebuilds and rebalances are needed, they occur in the background with minimal or no impact to applications and users.

"We need to plan for future growth and avoid lock-in."

VxFlex Ready Nodes provides support for multi-hypervisors and even bare metal configurations. This unique ability provides workload flexibility and gives groups within the organization the ability to change requirements as needed if new projects and workloads arise without lock-in.

“We’re running out of capacity.”

Data growth is a key driver of storage evolution. Enterprises are producing, ingesting and storing more data than ever before. Traditional SAN arrays are flexible but have a limit on available space and performance. Increasingly, many organizations are finding that their SAN, which they originally forecast would support their operations for five or more years, is already struggling after only two or three. Dell EMC VxFlex Ready Nodes scale from three nodes up to thousands while providing one large pool of storage and eliminating “islands of SANs.” They also optimize storage and compute resources to reduce capacity planning and enable a “pay as you grow” model.

“We need to guard against failures or data loss.”

With today’s consumers and employees expecting around-the-clock access to applications and information, there’s no time for downtime. But data protection becomes increasingly difficult as applications leverage a heterogeneous mix of infrastructure components.

Specifically, for databases, it’s not just about protecting the production environment. The same copy of the production database is used across various business units within an organization, such as test/dev, QA and analytics. This puts enormous pressure on IT to minimize backup windows and reduce the costs associated with storing, copying and protecting mission-critical databases, whether in-production or non-production copies are being used by different business units.

“It takes too long to plan and deploy storage architecture.”

With budgets and staffing tight, it can be hard to dedicate resources to essential core projects like expanding storage capacity. At the same time, getting the configuration, settings and firmware compatibility just right is critical for performance and availability, but can take up a lot of time. Dell EMC VxFlex Ready Nodes take the guesswork out of the equation and speed deployment with configured, tested and optimized building blocks.

Dell EMC VxFlex Ready Nodes

Each Dell EMC VxFlex Ready Node consists of:

- VxFlex OS software
- Optimized PowerEdge R640, R740xd and R840 Servers
- ProDeploy, ProSupport, ProSupport Plus (recommended) or custom services (optional). With ProDeploy, Dell EMC can install and configure VxFlex OS during deployment, regardless of whether the license is pre-existing or purchased with the order
- Dell Financing (optional)

Dell EMC VxFlex Ready Node implementations have a minimum of three nodes per cluster. Customers can increase in one-node increments up to a maximum of 1,024 nodes per cluster.

Configuration options

- Hyperconverged nodes are designed to balance compute and storage and are highly scalable in both areas
- Storage-only nodes are designed to focus on storage density and performance
- Compute-only nodes are designed for compute capacity increase only, with no increase in storage or performance

You can mix and match compute and storage in any node, and each node can be a unique configuration within the cluster. In addition, Red Hat® Enterprise Linux®, KVM, Microsoft® Hyper-V® and VMware ESXi™ work in any combination within the cluster.

Server	PowerEdge R740xd  2U high-capacity form factor		PowerEdge R840  2U memory and compute intensive form factor		PowerEdge R640  1U high-density form factor		
	Hyperconverged node	**Storage-only node**	**Hyperconverged node**	**Compute-only node**	**Hyperconverged node**	**Storage-only node**	**Compute-only node**
CPU	Two Intel Xeon Scalable processors, up to 28 cores		Four Intel Xeon Scalable processors, up to 28 cores		Two Intel Xeon Scalable processors, up to 28 cores		
Memory	**NVDIMM** 224–736GB **Without NVDIMM** 192GB–3TB	**NVDIMM** 224–384GB **Without NVDIMM** 96–128GB	**NVDIMM** 800GB–1.3TB **Without NVDIMM** 768GB–6TB	**NVDIMM** 800GB–1.3TB **Without NVDIMM** 768TB-6TB	**NVDIMM** 224–736GB **Without NVDIMM** 192GB–3TB	**NVDIMM** 224–384GB **Without NVDIMM** 96–128GB	**NVDIMM** 224–736GB **Without NVDIMM** 192GB–3TB
GPU	NVIDIA® Tesla® V100, P40		NVIDIA® Tesla® V100, P40				
BOSS	BOSS controller card with 2x 240GB M.2 SATA drives in RAID1						
Storage	**Drive type and capacities, max 24 drives** SAS SSD — 960GB, 1.6TB, 1.92TB, 3.84TB, 7.68TB SATA SSD — 1.6TB, 1.92TB, 3.84TB NVMe — 800GB, 1.6TB, 3.2TB, 6.4TB				**Drive type and capacities, max 10 drives** SAS SSD — 800GB, 960GB, 1.6TB, 1.92TB, 3.84TB SATA SSD — 1.6TB, 1.92TB, 3.84TB NVMe SSD — 800GB, 1.6TB, 3.2TB, 6.4TB		
Network	**Standard** 4x 25Gb Mellanox® ConnectX®-4 Lx 1x 1Gb iDRAC **Optional** 2x 10Gb Intel X710 rNDC; 2x 10Gb Intel X710 NIC; 2x 10Gb Intel X550 rNDC; 2x 10Gb Intel X550 NIC; 2x 1Gb Intel I350 rNDC						

Why Dell EMC?

The combination of Dell and EMC brings together two industry-leading companies with strong reputations for value and innovation. Dell EMC holds leadership positions in some of the biggest and largest-growth categories in the IT infrastructure business and that means you can confidently source your IT needs from one provider — Dell EMC.

- #1 converged infrastructure[1]
- #1 hyperconverged infrastructure[1]
- #1 in traditional and all-flash storage[2]
- #1 virtualized data center infrastructure[3]
- #1 cloud IT infrastructure[4]
- #1 server virtualization and cloud systems management software (VMware)[5]
- #1 in data protection[6]

1 IDC WW Quarterly Converged Systems Tracker, Q4 2017, April 2018, Vendor Revenue.

2 IDC WW Quarterly Enterprise Storage Systems Tracker, September 2017, Vendor Revenue — EMC Q2 2017.

3 Dell EMC Annual Report, 2015.

4 IDC WW Quarterly Cloud IT Infrastructure Tracker, April 2017, Vendor Revenue — EMC Q4 2016.

5 IDC WW Virtual Machine and Cloud System Market Shares 2016, July 2017.

6 Dell EMC Pulse, “Gartner Recognizes EMC as a Leader in the 2016 Data Center Backup and Recovery Software Magic Quadrant,” June 2016.

Services and financing

Dell EMC Support and Deployment Services

Solutions customized for your needs

Leverage on-site integration or application implementation with Dell EMC Services.

Deployment assistance when you need it

You can trust Dell EMC to deploy Ready Nodes and more, including operating system, firmware and hypervisor with Dell EMC ProDeploy.

Support is always on for you

Enjoy unlimited access to 24x7 chat, email and phone support services with how-to assistance and disaster recovery from Dell EMC ProSupport. Dell EMC recommends ProSupport Plus with priority access to engineers and a designated Technology Service Manager to manage and report on collaborative support across hardware and software.

Dell Financial Services

Let the wealth of leasing and financing options from Dell Financial Services help you find opportunities when your organization faces decisions regarding capital expenditures, operating expenditures and cash flow.

- Leasing and financing solutions are available throughout the U.S., Canada and Europe.
- Dell EMC Financial Services can finance your technology solution.
- Electronic quoting and online contracts offer an efficient purchase experience.

Learn more about Dell Financial Services.

Dell EMC Customer Solution Centers

Experience Dell EMC solutions in our global network of 21 dedicated facilities. The Dell EMC Customer Solution Centers are trusted environments where world-class IT experts collaborate with you to share best practices, facilitate in-depth discussions of effective business strategies using briefings, workshops, or proofs-of-concept and help you become more successful and competitive. Dell EMC Customer Solution Centers reduce the risk associated with new technology investments and can help improve speed of implementation.

Learn more

Don’t wait to find out more about this building block for server SAN and hyperconverged infrastructure that can achieve massive scaling with linear performance gains and enterprise-grade resilience — in a reliable solution that’s quick and easy-to-deploy. To learn more, visit dellemc.com/vxflexreadynodes or contact your local representative or authorized reseller.