



VxRack™ System Series

Modular hyper-converged infrastructure system that delivers extreme scalability and flexibility

- Start small and grow to data center scale in flexible discrete increments.
- Add compute and storage linearly or independently to scale to hundreds or thousands of nodes.
- Easy to manage and provision new resources.
- Software-defined architecture provides workload flexibility.
- VxRack™ System and Dell EMC pre-engineering, manufacturing, life cycle assurance, and support greatly simplify data center operations.

DELL EMC VXRACK™ SYSTEM FLEX

Dell EMC has expanded the industry's broadest converged infrastructure system portfolio to include rack-scale hyper-converged systems. The VxRack™ System series is a Dell EMC engineered and manufactured product family with industry-best life cycle management and assurance, adding rack-scale capabilities to complement Dell EMC Vblock® Systems and VxBlock™ Systems. In addition, the VxRack System connects through Vscale™ Architecture, enabling additional Enterprise and Service Provider use cases and consumption models.

Only Dell EMC converged systems provides standardization, modular scale, tightly integrated converged solutions, life cycle management, and industry-best customer experience—enabling on-demand IT services that further accelerate business outcomes and time-to-value.

POWERED BY DELL EMC SCALEIO- SOFTWARE-DEFINED, SCALE-OUT SAN

Dell EMC ScaleIO is software that creates a server-based SAN from the integrated Dell PowerEdge servers to deliver flexible and scalable performance and capacity on demand. ScaleIO combines storage resources to create a virtual pool of block storage with varying performance tiers. Its design enables you to scale from 4 nodes to over a thousand nodes. ScaleIO also uses significantly lower CPU and memory resources. This makes it a far more efficient solution for hyper-converged deployments such as VxRack FLEX, as it reduces the need to add more hardware resources to the cluster; enabling you to better manage your CAPEX. In addition, it provides enterprise-grade data protection, multi-tenant capabilities, and add-on enterprise features such as QoS, thin provisioning, and snapshots. ScaleIO delivers the scalability, elasticity, flexibility and performance needed to meet the demands for whatever comes next.

DELL POWEREDGE SERVERS

Business applications and workloads vary greatly, and Dell EMC strongly believes that one size does not fit all when it comes to hyper-converged infrastructure. With an unmatched hyper-converged infrastructure portfolio, Dell EMC enables IT organizations to accelerate their modernization initiatives by making it easy to deploy infrastructure platforms on which they can build and run both traditional and cloud-native applications.

Integrating industry leading Dell PowerEdge servers with Dell EMC's HCI offerings is another example of the power of the combined companies. Dell EMC's ability to deliver the entire hyper-converged infrastructure stack (from software through servers to storage) provides even more customer value, enabling faster innovation while leveraging Dell's world-class supply chain to drive down costs. IT organizations can now partner with a single vendor for end-to-end technology solutions that will modernize their data center.

The VxRack System built on PowerEdge servers provides better all-flash economics and addresses new customer use cases for both traditional and cloud-native workloads running in mixed environments.

The significance of networking at scale:

- Plan for growth – Expand your environment easily without the worry of network or operational complexity.
- Integrated networking – Turnkey networking is a critical part of the hyper-converged infrastructure. Don't treat it as a separate technology silo.
- Performance at scale – Policy management prevents oversubscription and spine density best practices ensure performance at scale.
- Simplify the complexity – A multi-rack architecture can be built at scale. Manage logical planning and physical connections as needed.

VxRack System networking benefits:

- Standardized and repeatable
- Easily extensible
- Greatly simplifies operations
- Lowers risk
- Superior application performance at scale

VxRack FLEX and ScaleIO provides essential features for enterprises and service providers

- Partitioning / protection domains
- Tiering
- Multi-tenancy
- Snapshots
- Fault set domains
- Two-way mesh mirroring
- Storage QoS
- In-flight checksum
- Five-node MDM cluster
- Read flash cache
- EMC Secure Remote Services (ESRS)
- Instant maintenance mode

For the VxRack FLEX System, two new PowerEdge-based options are available (1U/1N based on PowerEdge R630; 2U/1N based on PowerEdge R730xd), both of which can be configured with all-flash, storage only, or hybrid. Dell PowerEdge servers provide:

- Better all-flash economics: New Dell PowerEdge based nodes for VxRack System with latest Intel processors offer 2.5X more usable flash capacity for a similar price versus previous generation nodes.
- Application acceleration: Full integration with SanDisk DAS Cache accelerates the speed of storage input-output (I/O) operations and reduces latency, resulting in improved performance of I/O-intensive applications such as Microsoft SQL OLTP applications.

START SMALL AND GROW TO WEB-SCALE

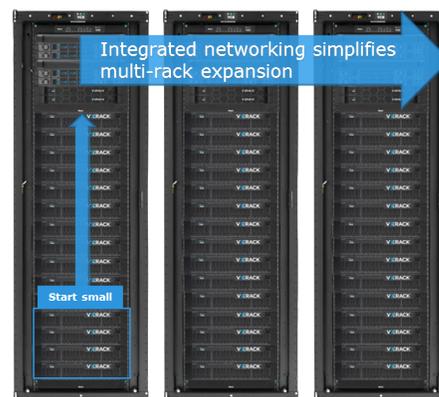
VxRack FLEX enables scale-out capabilities to your data center. Start small with as little as four nodes and grow to web scale. Add nodes one by one within a single rack or scale out with additional racks as compute and storage resources are consumed. This provides your infrastructure with elastic sizing and efficient scalability, allowing you to start small with your proof of concept or new application and grow to web-scale size as your requirements evolve.

Networking

A hyper-converged network can be difficult to build as needs arise and many solutions simply exclude it. Overlooking the network makes it very difficult to plan for growth and as the environment scales, performance degrades. These forgotten components consist of the physical, top-of-rack switches, as well as software defined networking (SDN) technologies.

The VxRack FLEX encompasses support for networking—both physical and virtual. Physical networking consists of a leaf-spine topology with top of rack (ToR) and spine switches. Each physical rack contains two ToR switches, which control network traffic and redundancy, and a management switch for out-of-band connectivity. With scale-out across multiple racks, east-west traffic is fully self-contained. Connectivity between racks is provided using the two inter-rack spine switches.

When designing a network, oversubscription, spine density, switch ports, high density, low density, wire rates, are just a few of the many technical details that need to be considered. The VxRack FLEX was designed with industry best practices already applied. Best-in-class Cisco Nexus ToR and Spine switches provide 10 GbE or 40 GbE IP connectivity between VxRack FLEX and the external network for superior performance. Unlike other solutions in the market, where network bottlenecks limit the scale of hyper-converged infrastructures, the 10 GbE network switches within the VxRack FLEX eliminate these restrictions and provides a path for future growth.



Extreme Application Performance

Every node in the VxRack FLEX/ScaleIO 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 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. The VxRack FLEX system autonomously manages performance hot spots and data layout. EMC lab testing results demonstrate

| WORKLOAD | IOPS (3 NODES) | IOPS (128 NODES) |
|------------------|----------------|------------------|
| 100% read | ~875,000 | ~31,000,000 |
| 70%read/30%write | ~650,000 | ~23,750,000 |
| 100% write | ~375,000 | ~12,500,000 |

Specifications

VxRack FLEX makes the transition to a hyper-converged and software-defined storage simple by removing complexities, such as designing and integrating a build-it-yourself solution.

Base system configuration for VxRack FLEX

| COMPONENTS | CONFIGURATION |
|---------------------------|--|
| Compute | Dell PowerEdge Servers |
| Storage | DAS storage attached to the x86 servers |
| Networking | Cisco Nexus switches |
| Server Virtualization | VMware vSphere 6.0 or higher VMware ESXi, VMware vSphere Server Enterprise Plus, VMware vCenter Server |
| Storage Virtualization | Dell EMC ScaleIO |
| Management Infrastructure | Vision™ Intelligent Operations for management |
| Environmental | Intelligent Physical Infrastructure consisting of Cabinet 2.0—fully welded and dynamically load-rated Smart Power Deliver Units (PDU) Hid Reader and Thermal Sensors |

VxRack FLEX has many configuration options. Enclosures are flexible and can be configured in any combination:

Table 1. Dell PowerEdge R630

| NAME | CPU | MEMORY | SSD/ NODE | HDD/ NODE | DAS CACHE | TOTAL # OF CORES /NODE |
|--|---------------|--------|--------------|--------------|--------------|---------------------------|
| HIGH-DENSITY: ALL-FLASH | 2x IE5-2697v4 | 512 | 10x1.6TB | None | No | 36 |
| HIGH-DENSITY: CACHED HIGH | 2x E5-2680v4 | 768 | 2x800GB | 8x1.2TB | Yes | 28 |
| HIGH-DENSITY: CACHED ENTRY | 2x E5-2650v4 | 256 | 2x800GB | 8x1.2TB | Yes | 24 |
| HIGH-DENSITY FLASH: DENSE SSD-HIGH CAPACITY | 2x E5-2680v4 | 512 | 10x3.84TB | None | No | 28 |
| HIGH-DENSITY FLASH: DENSE SSD-MID CAPACITY | 2x E5-2680v4 | 512 | 10x1.92TB | None | No | 28 |
| HIGH-DENSITY: STORAGE ONLY ALL- FLASH | 2x E5-2620v4 | 64 | 10x1.6TB | None | No | 16 |
| HIGH-DENSITY: STORAGE ONLY CACHED | 2x E5-2620v4 | 64 | 2x800GB | 8x1.2TB | Yes | 16 |
| HIGH-DENSITY: STORAGE ONLY MAX HDD | 2x E5-2620v4 | 64 | None | 10x1.2TB | No | 16 |
| HIGH-DENSITY: STORAGE ONLY FLASH DENSE SSD- HIGH CAPACITY | 2x E5-2620v4 | 64 | 10x3.84TB | None | No | 16 |
| HIGH-DENSITY: STORAGE ONLY FLASH- DENSE SSD- MID CAPACITY | 2x E5-2620v4 | 64 | 10x1.92TB | None | No | 16 |

Table 2. Dell PowerEdge R730XD

| NAME | CPU | MEMORY | SSD/ NODE | HDD/ NODE | DAS CACHE | TOTAL # OF CORES /NODE |
|--------------------------------|--------------|--------|--------------|--------------|--------------|---------------------------|
| CAPACITY CACHED: HIGH | 2x E5-2680v4 | 512 | 2x800GB | 22x1.2TB | Yes | 28 |
| CAPACITY CACHED: MEDIUM | 2x E5-2650v4 | 256 | 2x800GB | 22x1.2TB | Yes | 24 |
| CAPACITY MIXED: SSD/HDD | 2x E5-2680v4 | 256 | 6x800GB | 18x1.2TB | Yes | 28 |
| CAPACITY ALL-FLASH: DENSE SSD | 2x E5-2680v4 | 512 | 24x1.92TB | None | No | 28 |
| STORAGE ONLY: CACHED 1 | 1x E5-2620v4 | 64 | 2x800GB | 22x1.2TB | Yes | 8 |
| STORAGE ONLY: MIXED SSD/HDD | 1x E5-2650v4 | 64 | 6x800GB | 18x1.2TB | Yes | 12 |
| STORAGE ONLY: MAX CAPACITY HDD | 1x E5-2620v4 | 64 | None | 24x1.2TB | No | 8 |
| CAPACITY ALL-FLASH: DENSE SSD | 1x E5-2650v4 | 64 | 24x1.92TB | None | No | 12 |

Management Layer

The Dell EMC VxRack™ management software is comprised of Vision™ software for VxRack™ Systems.

Vision™ Intelligent Operations for VxRack FLEX

Vision is a unified UI for the management of the VxRack System. It provides VxRack System administrators a direct and complete way to deploy, monitor, sustain, and support the VxRack System.

- Deploy. Go from power-on servers to a fully provisioned system. Allow for configuring network, installing base OS, and installing ScaleIO.
- Monitor. Monitor the overall system performance, health, and metrics. Report on current state of infrastructure server, switch, storage, and smart cabinet. Report on current state of ScaleIO software-defined storage. Provide basic system health and performance data.
- Sustain. Keep the system updated with the latest versions and fixes. Provide RCM guidance. Update VxRack Management Software.
- Support. Report all system issues affecting operations and performance. Aggregate log and configuration data. Provide knowledge base, VCE support contact, and process information.
- Manage. Integrated with Vision software to easily manage multiple systems from Dell EMC, including VxRack Systems, Vblock Systems, VxBlock Systems, and Technology Extensions, with a multisystem view via Vision software.

Vision™ Intelligent Operations for the data center

The Vision software suite provides an integrated set of software products for managing a data center, not just individual systems. Vision software is the first software suite to provide an intelligent solution to the problem of managing operations in a converged infrastructure environment. These tools enable and simplify converged operations by dynamically providing a high level of intelligence into a customer's existing management toolset.

Vision software enables Dell EMC customers and third-party consumers to know that the VxRack Systems exist, where they are located, and what components they contain. It reports on the health or operating status of the VxRack Systems. It also reports on how compliant the VxRack Systems are with a Release Certification Matrix and the Dell EMC Security Standards.

Vision software effectively acts as a mediation layer between your system and the management tools that are already in place. The software allows for intelligent discovery by providing a continuous, near real-time perspective of your compute, network, storage, and virtualization resources as a single object—ensuring that your management tools reflect the most current state of your VxRack System.

DELL EMC EXPERIENCE

Dell EMC is a leading innovator of intelligent converged infrastructure systems. Customers rely on Dell EMC Vblock® Systems, VxBlock™ Systems, and VxRack Systems for the fastest deployment of data center infrastructure. Dell EMC Systems are engineered to deliver the highest performance, operational simplicity, and scalability for the lowest TCO. Every system is a true converged infrastructure—each is engineered, manufactured, managed, supported, and sustained as ONE product.

- Dell EMC Systems are standardized architectures based on best-in-breed technologies.
- Dell EMC manufacturing completes integration, testing, and validation of every VxRack System. This ensures that it is delivered within 60 days and is operational within hours of arrival
- Every VxRack System includes Vision software, to enable standardized, more efficient, continuous processes for system provisioning, health management, and life cycle management.
- Every VxRack System is sustained by a Release Certification Matrix (RCM), a documented set of firmware and software releases for all VxRack System components, pre-tested and certified for interoperability, and regularly delivered to customers to simplify upgrades and keep systems stabilized and optimized.

ABOUT DELL EMC

As a member of the Dell Technologies unique family of businesses, Dell EMC serves a key role in providing the essential infrastructure for organizations to build their digital future, transform IT and protect their most important asset, information. Dell EMC enables our enterprise customers' IT and digital business transformation through trusted hybrid cloud and big-data solutions, built upon a modern data center infrastructure that incorporates industry-leading converged infrastructure, servers, storage, and cybersecurity technologies.

Dell EMC brings together Dell's and EMC's respective strong capabilities and complementary portfolios, sales teams and R&D. We seek to become the technology industry's most trusted advisor, providing capabilities spanning strategy development, consultative services and solution deployment and support to help our customers and partners drive the digital transformation of their businesses.

We work with organizations around the world, in every industry, in the public and private sectors, and of every size, from startups to the Fortune Global 500. Our customers include global money center banks and other leading financial services firms, manufacturers, healthcare and life sciences organizations, Internet service and telecommunications providers, airlines and transportation companies, educational institutions, and public sector agencies.