

VxRack™ System
1000 Series

- **Easy to deploy.** All-inclusive solution including networking.
- **Flexible consumption model.** Rapidly deploy applications through integrated hyper-converged system.
- **Grow-as-you-need.** Start small with a single rack and grow to data center scale.
- **Asymmetric scale.** Flexibly add compute and storage capabilities.
- **No more silos.** Dissolve data center silos through an architecture that accommodates both traditional converged and hyper-converged environments.
- **Simplified operations with unified UI.** Manage through a standard framework that provides a comprehensive systems and data center view of infrastructure.
- **VCE Experience.** VxRack™ Systems are pre-built, pre-tested, and receive pre-validation on new firmware/and software releases (Release Certification Matrix).

VXRACK™ SYSTEM 1000
WITH FLEX NODES

VCE has expanded the industry's broadest converged infrastructure system portfolio to include rack-scale hyper-converged systems. The VxRack™ System 1000 series is a VCE engineered and manufactured product family with industry-best life cycle management and assurance, adding rack-scale capabilities to complement VCE Vblock® Systems and VxBlock™ Systems. In addition, the VxRack 1000 connects through VCE Vscale™ Architecture, enabling additional Enterprise and Service Provider use cases and consumption models.

Only VCE 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.

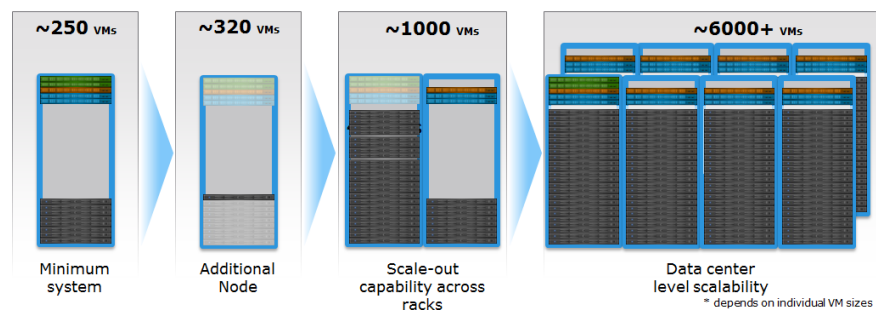
Hyper-converged Software-defined Storage

VCE VxRack™ System 1000 with FLEX Nodes is engineered by VCE and based on EMC® ScaleIO® technology.

VxRack with FLEX Nodes virtualizes the server's direct-attached storage (DAS) into a shared, network-based, block storage solution that is similar to SAN storage, yet is software defined. This makes it easy to achieve extreme scale—up to thousands of nodes. As part of the VCE VxRack System 1000 series family, it is the *only* hyper-converged infrastructures that provides extreme scale. And VxRack with FLEX Nodes achieves this without compromising data center performance, high availability, resiliency, or security.

Start Small and Grow to Web-scale

VxRack with FLEX Nodes 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.



The significance of networking at scale

- Plan for growth—Expand your environment easily without the worry of complicated network calculations.
- Integrate networking—Networking is a critical part of the hyper-converged infrastructure. Don't treat it as a separate technology silo.
- Performance at scale—Oversubscription and spine-density best practices will be needed to ensure performance at scale.
- Simplify the complexity—A multirack architecture cannot be built spontaneously. Logical planning and a massive number of physical connections are a necessity.

VxRack System 1000 networking benefits

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

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 with FLEX Nodes 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 with FLEX Nodes 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 with FLEX Nodes 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 with FLEX Nodes eliminate these restrictions and provides a path for future growth.

Extreme Application Performance

Every node in the VxRack with FLEX Nodes 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 with FLEX Nodes 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

Storage Virtualization

EMC ScaleIO is the software-defined block storage virtualization layer. DAS storage on servers within the VxRack with FLEX Nodes is virtualized into a shared network-based block storage that is similar to SAN storage. This makes it easy to achieve extreme scale-up to 1000+ nodes. Customers can start with a minimum of four nodes and rapidly add more based on their business needs. ScaleIO optimizes resource allocation with performance that scales linearly.

Specifications

VxRack with FLEX Nodes 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. Subtitle

Table 1. BASE SYSTEM CONFIGURATION FOR VXRACK WITH FLEX NODES

COMPONENTS	CONFIGURATION
Compute	Compute based on x86 standard architecture
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	EMC ScaleIO
Management Infrastructure	VCE Vision™ VxRack™ Manager for unified access and management VCE Vision™ Intelligent Operations for telemetry data
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

The enclosure for each VxRack with FLEX Nodes falls into one of the following three types within one 28-inch 42U cabinets. There is a base configuration that is a minimum set of resources.

Table 2. ENCLOSURE TYPE FOR EACH VXRACK WITH FLEX NODES

ENCLOSURE TYPE	BASE CONFIGURATION
Performance Compute	2RU total 1-4 server slots Each server with 6 disk drives
Capacity Compute	2RU total 1 server Each server with 24 disk drives
Capacity Storage	2RU total 1 server Each server with 24 disks drives and minimum CPU/memory configuration

VxRack with FLEX Nodes has many configuration options. Enclosures are flexible and can be configured with dense compute, dense storage, storage only, or a combination of the three.

Table 3. CONFIGURATION USING PERFORMANCE COMPUTE ENCLOSURES

CONFIGURATION NAME	PERFORMANCE HIGH	PERFORMANCE MEDIUM	HYBRID HIGH	HYBRID MEDIUM
Chassis- # of Node	2RU-4N	2RU-4N	2RU-4N	2RU-4N
Power Supply	Dual 1600W platinum PSU AC	Dual 1600W platinum PSU AC	Dual 1600W platinum PSU AC	Dual 1600W platinum PSU AC
Processors per Node	Dual Intel E5-2680 V3, 12c, 2.5 GHz	Dual Intel E5-2680 V3, 12c, 2.5 GHz	Dual Intel E5-2680 V3, 12c, 2.5 GHz	Dual Intel E5-2650 V3, 10c, 2.3 GHz
Chipset	Intel 610	Intel 610	Intel 610	Intel 610
DDR4 Memory per Node	512 GB (16x32 GB)	256 GB (16x16 GB)	256 GB (8x32 GB) 512 GB (16x32 GB)	256 GB (8x32 GB) 512 GB (16x32 GB)
Embedded NIC per Node	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port
RAID Controller per Node	1x LSI 3008	1x LSI 3008	1x LSI 3108 with Supercap and CacheCade SW	1x LSI 3108 with Supercap and CacheCade SW
Solid State Drives per Node	4.8 TB (6x 2.5-inch 800 GB eMLC)	4.8 TB (6x 2.5-inch 800 GB eMLC)	1x 2.5-inch 400 GB eMLC	1x 2.5-inch 400 GB eMLC
Hard Disk Drives per Node	NA	NA	6 TB (5x 2.5-inch 1.2 TB 10,000 RPM HDD)	6 TB (5x 2.5-inch 1.2 TB 10,000 RPM HDD)
SATADOM per Node	32 GB SLC	32 GB SLC	32 GB SLC	32 GB SLC
10 GbE Port per Node	4x 10 Gbps ports SFP+	4x 10 Gbps ports SFP+	4x 10 Gbps ports SFP+	4x 10 Gbps ports SFP+

Table 4. CONFIGURATION USING CAPACITY COMPUTE ENCLOSURES

CONFIGURATION NAME	CAPACITY CACHED HIGH	CAPACITY CACHED MEDIUM	CAPACITY MAX HDD	CAPACITY MIXED SSD/HDD
Chassis- # of Node	2RU-1N	2RU-1N	2RU-1N	2RU-1N
Power Supply	Dual 750W platinum PSU AC	Dual 750W platinum PSU AC	Dual 750W platinum PSU AC	Dual 750W platinum PSU AC
Processors per Node	Dual Intel E5-2650 V3, 10c, 2.5 GHz	Dual Intel E5-2650 V3, 10c, 2.5 GHz	Dual Intel E5-2650 V3, 10c, 2.5 GHz	Dual Intel E5-2650 V3, 10c, 2.5 GHz
Chipset	Intel 610	Intel 610	Intel 610	Intel 610
DDR4 Memory per Node	256 GB (8x32 GB) 512 GB (16x32 GB)	256 GB (8x32 GB) 512 GB (16x32 GB)	256 GB (8x32 GB)	256 GB (8x32GB)
Embedded NIC per Node	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port
RAID Controller per Node	1x LSI 3108 with Supercap and CacheCade SW	1x LSI 3108 with Supercap and CacheCade SW	1x LSI 3108 with Supercap and CacheCade SW	1x LSI 3108 with Supercap and CacheCade SW
Solid State Drives per Node	800 GB (2x2.5-inch 400 GB eMLC)	800 GB (2x2.5-inch 400 GB eMLC)	NA	4.8 TB (6x2.5-inch 800 GB eMLC)
Hard Disk Drives per Node	27.2 TB (22x2.5-inch 1.2 TB 10,000 RPM)	27.2 TB (22x2.5-inch 1.2TB 10,000 RPM)	28.8 TB (24x2.5-inch 1.2 TB 10,000 RPM)	26.4 TB (18x2.5-inch 1.2 TB 10,000 RPM)
SATADOM per Node	32 GB SLC	32 GB SLC	32 GB SLC	32 GB SLC
10 GbE Port per Node	4x10 Gbps ports SFP+	4x10 Gbps ports SFP+	4x10 Gbps ports SFP+	4x10 Gbps ports SFP+

Table 5. CONFIGURATION FOR CAPACITY STORAGE ENCLOSURES

CONFIGURATION NAME	STORAGE CAPACITY MAX	STORAGE MIXED SSD/HDD	STORAGE CACHED
Chassis- # of Node	2RU-1N	2RU-1N	2RU-1N
Power Supply	Dual 750W platinum PSU AC	Dual 750W platinum PSU AC	Dual 750W platinum PSU AC
Processors per Node	Single Intel E5-2650 V3, 10c, 2.5 GHz	Single Intel E5-2650 V3, 10c, 2.5 GHz	Single Intel E5-2650 V3, 10c, 2.5 GHz
DDR4 Memory per Node	64 GB (8x8 GB)	64 GB (8x8 GB)	64 GB (8x8 GB)
Embedded NIC per Node	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port	Dual 1-Gbps Ethernet ports + 1 10/100 management port
RAID Controller per Node	1x LSI 3108	1x LSI 3108	1x LSI 3108 with Supercap and CacheCade SW
Solid State Drives per Node	NA	4.8 TB (6x2.5-inch 800GB eMLC)	800 GB (2x2.5-inch 400GB eMLC)
Hard Disk Drives per Node	28.8 TB (24x2.5-inch 1.2 TB 10,000 RPM)	21.6 TB (18x2.5-inch 1.2 TB 10,000 RPM)	26.4 TB (22x2.5-inch 1.2 TB 10,000 RPM)
SATADOM per Node	32 GB SLC	32 GB SLC	32 GB SLC
10 GbE Port per Node	4x10 Gbps ports SFP+	4x10 Gbps ports SFP+	4x10 Gbps ports SFP+

Management Layer

The VCE VxRack™ management software is comprised of VxRack™ Manager and VCE Vision™ software for VxRack™ Systems.

VCE Vision™ VxRack™ Manager

VxRack™ Manager is a unified UI for the management of the entire 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 VCE Vision software to easily manage multiple systems from VCE, including VxRack Systems, Vblock Systems, VxBlock Systems, and VCE™ Technology Extensions, with a multisystem view via VCE Vision software.



VxRack™ Manager simplifies data center management with a unified interface that provides provisioning, health, performance, and full life cycle management capabilities.

VCE Vision™ Intelligent Operations

The VCE Vision software suite provides an integrated set of software products for managing a data center. VCE 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.

VCE Vision software enables VCE 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 VCE Release Certification Matrix and the VCE Security Standards.

VCE 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 1000.

VCE EXPERIENCE

VCE is a leading innovator of intelligent converged infrastructure systems. VxRack Systems are the extended offering in the VCE world's most advanced converged infrastructure and are engineered to deliver massive scale with enterprise-grade availability, resiliency, and security.

- Every VxRack 1000 is a true converged infrastructure—each is engineered, manufactured, managed, supported, and sustained as ONE product.
- VxRack 1000 are hyper-converged infrastructures based on the standard x86 architecture and EMC ScaleIO storage virtualization technology.
- Every VxRack 1000 is pre-integrated, tested, and validated in a VCE factory environment, and delivered within 45 days as a pre-packaged solution, operational within hours of arrival.
- Every VxRack 1000 requires backup and recovery. VCE offers a complete portfolio of data protection solutions with EMC Avamar plus Data Domain.
- System Management with VCE Vision software is pre-installed on all VxRack Systems, providing a near real-time perspective of your system as a single object—to simplify managing system configurations and overall system health.
- VxRack 1000 are sustained with life cycle system reassurance. VCE supplies the latest Release Certification Matrix (RCM)—based on pre-testing of a wide array of upgrades and patches—to ensure optimum system performance across every hardware and software component.

VCE engineering expertise delivers application optimization. VCE continually tests a range of customer applications and use cases that have been configured according to industry best practices—to ensure optimum application and workload performance.

ABOUT VCE

VCE, an EMC Federation Company, is the world market leader in converged infrastructure and converged solutions. VCE accelerates the adoption of converged infrastructure and cloud-based computing models that reduce IT costs while improving time to market. VCE delivers the industry's only fully integrated and virtualized cloud infrastructure systems, allowing customers to focus on business innovation instead of integrating, validating, and managing IT infrastructure. VCE solutions are available through an extensive partner network, and cover horizontal applications, vertical industry offerings, and application development environments, allowing customers to focus on business innovation instead of integrating, validating, and managing IT infrastructure.

For more information, go to vce.com.



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