Quest® QoreStor™ 6.1

Interoperability Guide

Contents

Introduction

This guide provides information about hardware and software requirements for Quest® QoreStor™ installation, as well as additional third-party software applications supported for use with QoreStor.

Other information you may need

The following table lists the documentation available for QoreStor. The documents listed in this table are available on the Quest support website by selecting your specific QoreStor version at:

http://support.quest.com/QoreStor

Table 1: QoreStor documentation

Document	Description
QoreStor Installation Guide	Provides information on installation and operation requirements, supported platforms as well as procedures for installing QoreStor.
QoreStor User Guide	Provides information on configuring and using QoreStor.
QoreStor Release Notes	Provides the latest information about new features and known issues with a specific product release.
QoreStor Command Line Reference Guide	Provides information about managing QoreStor data backup and replication operations using the QoreStor command line interface (CLI).
QoreStor Interoperability Guide	Provides information on supported infrastructure components.
QoreStor Virtual Machine Deployment Guide	Provides information on deploying the QoreStor virtual machine on VMware ESX or Microsoft Hyper-V.
Additional whitepapers	Instructions and best practices for configuring additional Quest and third-party applications to work with QoreStor.

i **NOTE:** Check for the latest documentation updates and release notes at http://support.quest.com/qorestor. Read the release notes first because they contain the most recently documented information about known issues with a specific product release.

Information on compatible products

QoreStor offers direct integration with Quest Software's NetVault® Backup and vRanger®, as well as Veritas NetBackup and Backup Exec. For more information on those products refer to the documents below.

Table 2: Quest NetVault Backup documentation

Document	Description
NetVault Backup Installation Guide	Provides information about installing and upgrading the NetVault Backup server and client software.
NetVault Backup Administration Guide	Decribes how to configure and use NetVault Backup to protect your data. This document also provides information on configuring QoreStor repositories and migrating NetVault SmartDisk data to the new QoreStor repository.
NetVault Backup Release Notes	Provides the latest information about new features and known issues with a specific product release.

> **i** **NOTE:** See the complete NetVault Backup documentation at https://support.quest.com/netvault-backup.

Table 3: Quest vRanger documentation

Document	Description
vRanger Installation/Upgrade Guide	This document provides information on supported platforms, system requirements, and instructions on installing and upgrading vRanger.
vRanger User Guide	This document provides information and procedures on configuring and using vRanger to protect virtual and physical environments.
vRanger Release Notes	This document details the issues resolved in this release, the known issues as of this release, and the third party components in vRanger.

> **i** **NOTE:** See the complete vRanger documentation at https://support.quest.com/vranger.

Table 4: Veritas documentation

Document	Description
Veritas NetBackup	For information on Veritas NetBackup, refer to the NetBackup product documentation.
Veritas Backup Exec	For information on Veritas Backup Exec, refer to the Backup Exec product documentation.

Installation Requirements

The information in this section describes the minimum hardware and software requirements for QoreStor installation.

QoreStor installation modes

QoreStor can be installed in one of four installation modes, each with different hardware requirements and expected performance levels.

- **Large** - This is the mode of installation that will yield the highest capacity and performance. Large mode supports a back-end capacity of up to 360 TB. It also requires that the data and metadata volumes are on separate RAID sets.
- **Standard** - This is the mode of installation that will suit most environments as it supports a back end capacity of up to 150TB.
- **Cloud Optimized** - This is a smaller footprint installation designed to maximize cost-effectiveness for operation in cloud environments. The data dictionary size is reduced to reflect the lower backend capacity limit of 43TB.
- **Demo** - Demo mode is the least hardware-intensive option used for initial evaluation or lightweight testing. Demo mode can easily be installed on a virtual machine running on most workstations. Demo mode is not suitable for any production application and does not allow any license expansion. Demo mode supports a back end capacity of up to 100GB.

> **i** NOTE: For information on available virtual machine configurations, refer to the topic "QoreStor VM Specifications" in Chapter 5.

Hardware requirements for installation

QoreStor can be installed in one of four modes: Large, Standard, Cloud Optimized, and Demo. Each installation mode has different minimum installation requirements, as described below. Refer to QoreStor installation modes for more information on the installation modes.

NOTE: The table below lists the minimum hardware requirements for installation. Refer to "QoreStor Sizing Guidelines" in the *QoreStor Interoperability Guide* for information on sizing your QoreStor server.

Table 5: Hardware requirements for installation

	Large Mode	Standard Mode	Cloud Optimized Mode	Demo Mode
CPU cores	32	4	4	4
RAM	64 GB	24 GB	14 GB	6 GB
Storage capacity	Minimum of 500GB free space on repository volume. Minimum of 700GB free space on metadata volume	Minimum of 500GB free space on repository volume.	Minimum of 500GB free space on repository volume.	Minimum of 50GB free space on repository volume.

Additional storage requirements	Storage back-end should support: • 20,000 IOPS for sequential writes • 20,000 IOPS for Metadata with random writes • 450 IOPS for data volume with random writes. Recommended back-end configuration is: • RAID 6 with 48 to 60 disks for repository • RAID1 or RAID10 with 2 to 4 drives for metadata. Maximum supported physical capacity is 360TB	Storage back-end should support: • 450 IOPS for sequential writes • 450 IOPS with random writes Recommended back-end configuration is RAID 6 with 12 disks. Maximum supported physical capacity is 150TB	Storage back-end should support: • 450 IOPS for sequential writes • 450 IOPS with random writes Recommended back-end configuration is RAID 6 with 6 disks. Maximum supported physical capacity is 43TB	When installing in Demo mode, QoreStor does not perform a pre-check for IOPS Maximum supported physical capacity is 100GB

Networking requirements

The following network configurations need to be made in order to successfully install and run QoreStor.

ℹ **NOTE:** If you install QoreStor with the **-f** option, or answer **yes** to the prompt regarding firewall changes, the QoreStor installer will ensure these ports are open.

Port configuration

The ports below need to be available for the QoreStor service:

Component/Function	Ports required
UI / Cloud Tier	• 80 • 5233
OST / RDA[1]	• 9920 • 10011 • 11000
NFS[1]	• 111 • 2049
Replication	• 9904 • 9911 • 9915 • 9916
CIFS[1]	• 138 • 139 • 445
NDMP	• 10000 • 43000-43040
RDA-NDMP	• 12000-12127
iSCSI	• 3260
Secure Connect[2]	• 9443

[1] When using Rapid NFS or Rapid CIFS, the ports for both RDA and NFS or RDA and CIFS, respectively, are required.If Secure Connect is used with Rapid CIFS, then the Secure Connect port is also required.

[2] If Secure Connect is used for all RDA and OST clients, then only the Secure Connect port is needed for RDA and OST.

Verify connectivity

The usage of the QoreStor repository requires stable TCP/IP connectivity between the backup application server and the QoreStor repository server.

ⓘ **NOTE:** The QoreStor repository and backup application server need to be on the same local network.

Supported installation platforms

QoreStor is supported on the following platforms:

Table 6: Operating systems supported for installation

Operating System	Bit level
CentOS Linux 7.3 - 7.7	64-bit
RHEL Linux 7.3 - 7.7	64-bit
Oracle[1] Linux 7.3 - 7.7	64-bit

ℹ **NOTE:** CentOS, RHEL, or Oracle[1] versions 7.7 is recommended

ℹ **NOTE:** Only CentOS, RHEL, or Oracle[1] versions using the following kernels are supported:

- 3.10.0-514
- 3.10.0-693
- 3.10.0-862
- 3.10.0-957
- 3.10.0-1062

ℹ **IMPORTANT:** Before upgrading the operating system on the QoreStor server, refer to "Upgrading the QoreStor Operating System" in the *QoreStor Installation Guide*.

[1]With Oracle Linux, the Red Hat Compatible Kernel (RHCK) must be used. The Oracle Unbreakable Enterprise Kernel is not supported.

Supported file systems

Only the file system listed below is supported for the QoreStor server.

- XFS
- vXFS (DR migrated machine only)

Supported file system protocols

QoreStor supports the following file system protocols. The Rapid Data Access (RDA) protocols below provide a logical disk interface that can be used with network storage devices to store data and support data storage operation.

- RDA with NetVault Backup
- RDA with vRanger
- OpenStorage Technology (OST)
- Common Internet File System (CIFS)
- Network File System (NFS)
- Rapid CIFS (RCIFS)

- Rapid NFS (RNFS)
- VTL [1]
    - iSCSI
    - NDMP

[1]iSCSI and NDMP are not supported when QoreStor is installed in Demo mode.

Supported VTL replication configurations

When configuring replication for VTL containers from DR Series appliances to QoreStor instances, the configurations below are supported:

Table 7: Supported VTL OEM configurations for replication

Source (DR Series)	Target (QoreStor)
Dell OEM type	Quest OEM type
Quest OEM type	Quest OEM type

Supported virtual environments

This section lists the supported virtual environments for the QoreStor virtual machine.

Supported virtual platforms

Delete this text and replace it with your own content.

Table 8: Supported virtualization platforms

Platform	Versions
VMware	- ESXi 5.5 or later - vSAN 6.5 - vSAN 6.6
Microsoft Hyper-V	- Hyper-V Server 2012 R2 - Hyper-V Server 2016 - Windows 10[1]
Oracle VirtualBox[2]	

[1]Windows 10 is supported for hosting only VMs in Demo mode.
[2]Oracle VirtualBox is supported only for ESX OVA VMs in Demo mode.

QoreStor VM Specifications

The QoreStor virtual machine templates are available in three configurations: Demo, Tier1, and Tier2. The table below details the differences between the configurations.

Table 9: QoreStor VM Specifications

	Demo	**Tier 1**	**Tier 2**	**Tier 3**
CPU	4	4	8	32
RAM	6	24	32	64
OS Disk	64 GB (Thin provisioned)	64 GB (Thick provisioned)	64 GB (Thick provisioned)	64 GB (Thick provisioned)
Metadata disk	N/A	300 GB	512 GB	512 GB
Data Disk	128 GB (Thin provisioned)	1 TiB expandable up to 40 TiB	5 TiB (3 individual disks of 1.7 TiB each) expandable up to 150 TiB.	10 TiB (6 individual disks of 1.7 TiB each) expandable up to 360 TiB.
QoreStor Mode (Dictionary type)	Based on Demo installation	Based on Cloud-optimized installation	Based on Standard installation	Based on Large installation
VM OS	Oracle Linux 7.7 - minimal install	Oracle Linux 7.7 - minimal install	Oracle Linux 7.7 - minimal install	Oracle Linux 7.7 - minimal install
NIC	1	1	1	1
Virtual hardware version	11	11	11	11

Supported Software

The applications listed in the sections below are supported for use with QoreStor

Supported browsers

This section lists the minimum supported web browsers for use with the QoreStor UI.

Table 10: Supported browsers

Software	Versions
Mozilla Firefox	67 or later
Microsoft Internet Explorer	11.0[1]
Microsoft Edge	44 or later
Google Chrome	75 or later

[1]Internet Explorer 11 is supported only for use with the QoreStor Web Terminal. When IE11 users log in to the QoreStor UI, the Terminal page will be displayed and navigation options will be hidden.

Supported clients

This section details the operating systems supported for installation of the QoreStor clients.

Table 11: Supported QoreStor clients

Client type	Client installation platform
RDA[1]	- Linux - RHEL 5 - RHEL 6 - RHEL 7 - CentOS 7 - SLES 10 - SLES 11 - Unix - Solaris 10 - Solaris 11 - AIX 7.1 and later - HPUX 11.31 - Windows - Windows Server 2008 R2 - Windows Server 2012 R2 - Windows Server 2016 - Windows Server 2019
OST[1]	- Linux - RHEL 6 - RHEL 7 - CentOS 7 - SLES 11 - Windows - Windows Server 2012 R2 - Windows Server 2016 - Windows Server 2019
Rapid CIFS	- Windows - Windows Server 2008 R2 - Windows Server 2012 R2 - Windows Server 2016[2] - Windows Server 2019[3]

Client type	Client installation platform
Rapid NFS	• Linux
	• RHEL 5
	• RHEL 6
	• RHEL 7
	• CentOS 7
	• SLES 10
	• SLES 11
iSCSI	• Linux
	• RHEL 6
	• RHEL 7
	• CentOS 6.6
	• Windows
	• Windows Server 2008 R2
	• Windows Server 2012 R2
	• Windows Server 2016
	• Windows Server 2019
NDMP	• Dell FluidFS
	• v3
	• v4
	• Windows Server 2016
	• NetApp
	• ONTAP 8.x 7-Mode
	• ONTAP 8.x C-Mode
	• ONTAP 9.x C-Mode
	• EMC
	• VNX OE 7.x and 8.0.x
	• Isilon OneFS 7.0.x
	• Isilon OneFS 8.0.x
	• SUN NAS
	• 2011

[1]To enable secure WAN reconnection functionality, the Secure Connect client must be version 4.1.0.265 and the QoreStor server version must be 5.1.0.670.

[2]Rapid CIFS is not supported on Windows Server 2016 with secure boot enabled

[3]SMB 1.0/CIFS File Sharing Support may need to be installed on Server 2019 depending on your QoreStor version.

Supported client plug-ins

This section lists the client plug-in versions supported by QoreStor.

Table 12: Supported client plug-in versions

Client Plug-in	Version(s)
RDA	4.0.3.049.0 or greater
OST	4.0.3.049.0 or greater
Rapid NFS	4.0.3.049.0
Rapid CIFS	4.0.3.101.1 or greater
Client Plug-in	**Version(s)**
RDA	4.1.0.265 or greater
OST	NA
Rapid NFS	NA
Rapid CIFS	4.0.3346.1 or greater

i | **NOTE:** To enable secure WAN reconnection functionality, the Secure Connect client must be version 4.1.0.265 and the QoreStor server version must be 5.1.0.670 or later.

Supported cloud providers

This section lists the cloud providers supported for installation with QoreStor.

- Microsoft Azure Blob
- Amazon S3
- Wasabi S3
- S3 Compatible providers

Supported backup software

This section lists the supported backup applications and protocols for QoreStor.

Table 13: Supported backup applications and protocols

Data Management Application (DMA)	RDA	OST	NFS	RDNFS	CIFS	RDCIFS	NDMP VTL	iSCSI VTL
NetVault Backup[1]								
12.0.1	✔						✔	✔
12.1	✔						✔	✔
12.2	✔						✔	✔
12.3	✔						✔	✔
12.4	✔						✔	✔
vRanger[1]								
7.6.5	✔				✔	✔		
7.7	✔				✔	✔		
7.8	✔				✔	✔		
Backup Exec								
16		✔			✔	✔		✔
20		✔			✔	✔		✔
NetBackup								
8.0		✔	✔	✔	✔	✔	✔	✔
8.1		✔	✔	✔	✔	✔	✔	✔
8.1.1		✔	✔	✔	✔	✔	✔	✔
8.1.2		✔	✔	✔	✔	✔	✔	✔
8.2		✔[2]	✔	✔	✔	✔	✔	✔
CommVault Simpana								
10			✔	✔	✔	✔	✔	✔
11			✔	✔	✔	✔	✔	✔
DELL EMC NetWorker								
9.1			✔	✔	✔	✔	✔	✔
Microsoft SQL Server Backup								
2016					✔	✔		
Oracle RMAN								
Oracle Linux 12c			✔	✔				
Oracle 12c for Windows					✔	✔		

Data Management Application (DMA)	RDA	OST	NFS	RDNFS	CIFS	RDCIFS	NDMP VTL	iSCSI VTL
CA Arcserve								
v16			✔		✔			
v17.5			✔		✔			
VEEAM								
9.0					✔	✔		
9.5					✔	✔		✔
HP Data Protector								
9			✔		✔			
10.04			✔		✔			
Bridgehead								
x3.2			✔		✔			
Atempo Time Navigator (TiNa)								
4.3			✔		✔			
4.4			✔		✔			
4.5			✔		✔			
Acronis								
11.5			✔		✔			
Native OS or third-party utilities								
UNIX dump			✔	✔				

[1]Refer to "NetVault Backup and vRanger Feature Compatibility" in the *QoreStor Interoperability Guide* for more detailed information on NetVault Backup and vRanger Support

[2]AIR support for NetBackup 8.2 requires an update to the mapping file.

NetVault Backup and vRanger Feature Compatibility

The tables below provide more detailed information on NetVault Backup and vRanger feature compatibility with QoreStor.

Table 14: NetVault Backup feature compatibility

Feature	NVBU 12.0.1	NVBU 12.1	NVBU 12.2	NVBU 12.3	NVBU 12.4

Integrated RDA plug-in version	4.1.0.234	4.1.0.234	4.1.0.237	4.1.0.263	4.1.0.266
Compatible RDA plug-in versions	4.1	4.1	4.1	4.1	4.1
Secure Connect WAN restart-ability[1]	Yes	Yes	Yes	Yes	Yes
Create storage groups and containers from DMA	Yes	Yes	Yes	Yes	Yes
OpDup DR to QoreStor[2]	Yes	Yes	Yes	Yes	Yes
OpDup QoreStor to DR	Yes	Yes	Yes	Yes	Yes

Table 15: vRanger feature compatibility

Feature	vRanger 7.6.5	vRanger 7.7	vRanger 7.8
Integrated RDA plug-in version	4.03	4.0.3202.1	4.1.0.263
Secure Connect WAN restart-ability[1]	No	No	No
Create storage groups and containers from DMA	No	No	No
OpDup DR to QoreStor[2]	Yes	Yes	Yes
OpDup QoreStor to DR	Yes	Yes (w/ DRv4.0.3203.1b)	Yes (w/ DRv4.0.3203.1b)

[1]To enable secure WAN reconnection functionality, the Secure Connect client must be version 4.1.0.265 and the QoreStor server version must be 5.1.0.833.

[2]Requires DR OS 4.0 or later.

QoreStor supported system limits

This section lists the supported configuration limits for the QoreStor system.

Table 16: Supported configuration limits

Feature	Cloud-optimized	Standard	Large
Maximum containers	16	32	64
Maximum VTL containers	1	2	4
Maximum storage groups	5	5	5
Maximum streams	32	64	128
Maximum connections - CIFS/ Rapid CIFS	16	32	64
Maximum connections - NFS/ Rapid NFS	16	32	64
Maximum connections - RDA	32	128	256
Maximum connections - OST	32	128	256
Maximum replications	16	32	64

Reference architectures

The information in the sections below is intended to help you properly size your QoreStor server.

Reference guidelines

The specifications detailed in Hardware references were constructed with the performance guidelines listed below in mind. Please review the performance guidelines below and select an option suitable for your environment. Use that same reference in the Hardware references section to identify the representative reference architecture.

Table 17: Reference guidelines

Reference Guidelines	CPU (cores)	Memory (GB)	NIC Minimum		IO Minimums		Inbound bandwidth
				SSD Support	IOPS BW	IO spindles	Ingest Rate Max @ 90% deduplication rate
Extreme	32-64	128+	4 x 10GbE	Required	IOPs = 100K+ BW = 700MiB/Sec	RAID6 48+	30+ TB/HR
Enterprise	32-64	64-128	2x 10GbE	Optional	IOPs = 20K+ BW = 300MiB/Sec	RAID6 24-48	20 TB/HR
Standard	8-32	32-64	2x 10GbE	Optional	IOPs = 10K+ BW = 200MiB/Sec	RAID6 8-12	10 TB/HR
Starter	4-8	24-32	4+ x 1GbE	NA	IOPs = 5K+ BW = 100MiB/Sec	RAID5-6 4-8	5 TB/HR

Hardware references

The table below provides reference architectures for different levels of performance. Two of the examples below use SSD storage to host the QoreStor metadata, which will improve QoreStor performance.

Table 18: Hardware references

Hardware references	Extreme	Enterprise	Standard	Starter
	R740-05 – HDD/SSD MetaData	**R740-05 – ALL HDD**	**R730-10 – HDD/SSD MetaData**	**R730-10 – ALL HDD**
Model	Dell EMC OEMR XL R740xd	Dell EMC OEMR XL R740xd	Dell EMC PowerEdge R730xd	Dell EMC PowerEdge R730xd
Drives	2x 2TB 7.2K RPM NLSAS 12Gbps 512n 12x 8TB 7.2K RPM NLSAS 12Gbps 512e	2x 2TB 7.2K RPM NLSAS 12Gbps 512n 12x 8TB 7.2K RPM NLSAS 12Gbps 512e	2x 500GB 7.2K RPM SATA 6Gbps 2.5i n Flex Bay Hard Drive,13G 12x 8TB 7.2K RPM Self-Encrypting N LSAS 6Gbps 3.5in Hot-plug Hard Drive, FIPS140-2,13G	2x 500GB 7.2K RPM SATA 6Gbps 2.5i n Flex Bay Hard Drive,13G 12x 8TB 7.2K RPM Self-Encrypting N LSAS 6Gbps 3.5in Hot-plug Hard Drive, FIPS140-2,13G
Drive Qty	2 x 2TB INT 12 x 8TB EXT 2 x 400GB SSD INT	2 x 2TB INT 12 x 8TB EXT 2 x 400GB SSD INT	2 x 500GB 24x 8TB / 36x 6TB	2 x 500GB 24x 8TB / 36x 6TB
Internal SSD (optional)	4x 400GB SSD SAS Mix Use 12Gbps 5 12e	4x 400GB SSD SAS Mix Use 12Gbps 5 12e	4x 400GB SSD SAS Mix Use 12Gbps 5 12e	4x 400GB SSD SAS Mix Use 12Gbps 5 12e
CPU	2x Intel Xeon Gold 5118 2.3G, 1 2C/24T, 10.4GT/s 2UPI, 16M Cac he, Turbo, HT (105W) DDR4-2400 , OEM XL	2x Intel Xeon Gold 5118 2.3G, 1 2C/24T, 10.4GT/s 2UPI, 16M Cac he, Turbo, HT (105W) DDR4-2400 , OEM XL	2x Intel Xeon E5-2660 v3 2.6GHz,2 5M Cache,9.60GT/s QPI,Turbo,HT ,10C/20T (105W) Max Mem 2133MH z	2x Intel Xeon E5-2660 v3 2.6GHz,2 5M Cache,9.60GT/s QPI,Turbo,HT ,10C/20T (105W) Max Mem 2133MH z
Memory	208GB 13 x DUAL IN-LINE MEMORY MODULE, 16GB, 2666, 2RX8, 8G, DDR4, R	208GB 13 x DUAL IN-LINE MEMORY MODULE, 16GB, 2666, 2RX8, 8G, DDR4, R	8x 16GB RDIMM, 2400MT/s, Dual Ran k, x8 Data Width	8x 16GB RDIMM, 2400MT/s, Dual Ran k, x8 Data Width
PERC RAID	1x PERC H740P RAID Controller, 8G B NV Cache, Mini card 1x PERC H840 RAID Adapter for External MD14XX Only, 8GB NV Cache, Full Height	1x PERC H740P RAID Controller, 8G B NV Cache, Mini card 1x PERC H840 RAID Adapter for External MD14XX Only, 8GB NV Cache, Full Height	1x PERC H730P RAID Controller, 2G B NV Cache, Mini card 1x 1x PERC H830 RAID Adapter for External MD14XX Only, 2GB NV Cache, Full Height	1x PERC H730P RAID Controller, 2G B NV Cache, Mini card 1x 1x PERC H830 RAID Adapter for External MD14XX Only, 2GB NV Cache, Full Height
Network	1x QLogic 57800 2x10Gb DA/SFP+ + 2x1Gb BT Network	1x QLogic 57800 2x10Gb DA/SFP+ + 2x1Gb BT Network	1x QLogic 57840S Quad Port 10Gb S FP+ Direct Attach	1x QLogic 57840S Quad Port 10Gb S FP+ Direct Attach

	Daughter Card	Daughter Card	Rack Network Daughter Card	Rack Network Daughter Card
External Storage	3x1400	3x1400	4x1400	4x1400
HW RAID CONFIG **<Level (0-5-6-10)> ::** **<# Groups (GRP)> ::** **<# Spindles per GRP> ::** **<#Channels> ::**	RAID 10 :: 1 :: 4 :: 1 RAID 6 :: 4 :: 12 :: 2	RAID 6 :: 4 :: 12 :: 2	RAID 10 :: 1 :: 4 :: 1 RAID 6 :: 4 :: 12 :: 2	RAID 10 :: 1 :: 4 :: 1 RAID 6 :: 4 :: 12 :: 2
LVM CONFIG	Striped LVM :: 64KB :: 4xStripes	Striped LVM :: 64KB :: 4xStripes	Striped LVM :: 64KB :: 4xStripes	Striped LVM :: 64KB :: 4xStripes
FS CONFIG	XFS	XFS	XFS	XFS
SEQ FIO A + B	IOPS=98.5 K/Sec + 18.2 K/Sec BW=385 MiB/Sec + 71.1 MiB/Sec	IOPS=105K/Sec BW=412 MiB/Sec		
RAND FIO	IOPS=95.7 K/Sec + 39 K/Sec BW=374 MiB/Sec + 152 MiB/Sec	IOPS=91.7K/Sec BW=358 MiB/Sec		
MAX INGEST @ 0%	Total Connections :: TB/Hr 8 :: 9.48 16 :: 8.58 24 :: 7.32 32 :: 6.98 48 :: 7.00 64 :: 4.71	Total Connections :: TB/Hr 8 :: 9.00 16 :: 8.52 24 :: 8.00 32 :: 7.02 48 :: 4.31 64 :: 3.25		
MAX INGEST @ 90%	Total Connections :: TB/Hr 8 :: 37.34 16 :: 19.40 24 :: 16.73 32 :: 13:77 48 :: 12.03 64 :: 11.96	Total Connections :: TB/Hr 8 :: 31.41 16 :: 18.94 24 :: 16.05 32 :: 14:53 48 :: 13.82 64 :: 12.96		

Cloud deployment reference configurations

The tables below describe reference configurations for deployments to Microsoft Azure. These configurations are based on QoreStor images available in the Azure Marketplace. Configurations are described for 4 installation modes, as described below:

- Tier 0 - Community edition
- Tier 1 - Cloud Optimized
- Tier 2 - Standard
- Tier 3 - Large

QoreStor Tier 0 configurations

The following VM Size Instance is then recommended and validated for Tier 0, with expected Performance rate between 1 TiB/Hr to 1.5 TiB/Hr.(measured for a 90% dedupe ingest data with RDA/RapidNFS).

Table 19: Tier 0 configuration

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
DSv3	Standard_D4s_v3	4	16	32	8	6400 / 96	2 / 2000

This will add 6 Standard SSDs or Standard HDD as Data Repository, starting with 256 GB, can be later expanded up to 20 TiB.

- 1 TiB (1.5 TiB raw space) -- No License needed.
- 5 TiB (6 TiB raw space)
- 10 TiB (12 TiB raw space)
- 20 TiB (24 TiB raw space)

Additional VMs Size that are tested and validated for tier 0:

Table 20: Tier 0 additional configuration

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
Esv3	Standard_E4s_v3 2	4	32	64	8	6400 / 96	2 / 2000

QoreStor Tier 1 configurations

The following are the recommended VM instances validated for Tier 1 configurations. These configurations have an expected performance rate between 1.5 TiB/Hr and 2.5 TiB/Hr (measured for a 90 % dedupe ingest data).

Table 21: Tier 1 configurations

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
DSv2 - 11-15	Standard_ DS12_v2 3	4	28	56	16	12,800 / 192	4 / 3000

The Pre-configured image is Standard_D12s_v2. This will create one Premium SSD of 1024 GB for Metadata and 5 Standard SSDs or Standard HDD of 5 TiB. Storage can be later expanded to 10 TiB, 20 TiB, or 40 TiB

- 5 TiB
- 10 TiB
- 20 TiB
- 40 TiB

Additional VM size tested and validated for Tier 1:

Table 22: Tier 1 additional configuration

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
Esv3	Standard_ E4s_v3	4	32	64	8	6400 / 96	2 / 2000

QoreStor Tier 2 configurations

The following are the recommended VM instances validated for Tier 2 configurations. These configurations have an expected performance rate between 2 TiB/Hr and 3.5 TiB/Hr (measured for a 90 % dedupe ingest data with RDA/RapidNFS).

Table 23: Tier 2 configurations

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
DSv3	Standard_ D8s_v3	8	32	64	16	12,800 / 192	4 / 4000

The Pre-configured Image is Standard_D8s_v3. This will create two Premium SSD of 1TiB for Metadata and 10 Standard SSDs or Standard HDD of 512 GB. Storage can be later expanded to 10 TiB, 20 TiB, 40 TiB , 80 TiB, or 160 TiB.

- 5 TiB
- 10 TiB
- 20 TiB
- 40 TiB
- 80 TiB
- 160 TiB

Additional VMs sizes that can be used for Tier2

Table 24: Tier 2 configurations

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
ESv3	Standard_ E8s_v3 2	8	64	128	16	12,800 / 192	4 / 4000
DSv2	Standard_ DS4_v2	8	28	56	32	25,000 / 384	8 / 6000

QoreStor Tier 3 configurations

The following are the recommended VM instances validated for Tier 3 configurations. These configurations have an expected performance rate between 3 TiB/Hr and 5 TiB/Hr (measured for a 90 % dedupe ingest data with RDA/RapidNFS).

Table 25: Tier 3 configuration

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
DSv3	Standard_ D16s_v3	16	64	128	32	25,600 / 384	8 / 8000

The Pre-configured Image is Standard_D16s_v3. This will create 3 Premium SSD of 1TiB for Metadata and 20 Standard SSDs of 1024 GB. Storage can be later expanded to 40 TiB, 80 TiB, 160 TiB, or 320 TiB.

- 20 TiB
- 40 TiB
- 80 TiB
- 160 TiB
- 320 TiB

Additional VMs sizes that can be used for Tier 3:

Table 26: Tier 3 additional configurations

Series	Size	vCPU	Memory:GiB	Temp Storage (SSD) GiB	Max data disks	Max uncached disk throughput: IOPS / MBps	Max NICs / Expected network bandwidth (Mbps)
DSv2	Standard_DS5_v2	16	56	112	64	51,200 / 768	8 / 12000
DSv2-11-15	Standard_DS13_v2 3	8	56	112	32	25,600 / 384	8 / 6000

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- Chat with support engineers online
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