

## Hardware Compatibility List (HCL) for KumoScale 3.22

Hardware components qualified for use with KumoScale software.

### Introduction

This document specifies the requirements for hardware (HW) platforms, Network Interface Cards (NICs), Solid State Drives (SSDs), and switches that may be used with KumoScale™ software. It also specifies the platforms that were tested with KumoScale software and qualified for its use.

### KumoScale Software Platform Requirements

Components	Minimal Requirement
Memory	64GB DDR4
System Disk	2 x 128 gigabyte[1] (GB) SATA DOM
NIC	<ul style="list-style-type: none"><li>MCX516A-CCAT <i>or</i> MCX545A-CCAN ConnectX™-5 EN network interface card, 100GbE dual/single port QSFP28, PCIe® 3.0 x16 ROHS R6</li><li>MCX416A-CCAT ConnectX-4 EN network interface card, 100GbE dual/single port QSFP28, PCIe 3.0 x16 ROHS R6</li><li>Intel™ 810</li></ul>
Power Supply	Dual power supply, hot swappable
Cooling	N/A
Management Interface	A dedicated management port is optional. KumoScale software can use the data port for management traffic, or it can utilize a dedicated management port.
SSD physical removal during runtime/hotplug	√
SSD physical insertion during runtime/hotplug	√

### Compatible Platforms

The following section specifies platforms that were tested and found to be compatible with KumoScale software.

#### Dell™ Inc.

Dell PowerEdge R650xs	
Model Name	PowerEdge R650xs
CPU	3rd Generation Intel® Xeon® Scalable processors
Memory	128 GB RAM
BIOS Version	1.7.4
iDRAC FW Version	5.10.30.00

Dell PowerEdge 6525	
Model Name	PowerEdge R6525
CPU	AMD EPYC 7543P 32-Core processor
Memory	128 GB RAM
BIOS Version	2.6.6
iDRAC FW Version	5.00.20.00

Dell EMC™ PowerEdge™ R7415	
Model Name	PowerEdge R7415
CPU	AMD EPYC™ 7551P 32-Core processor

Memory	64 GB RAM
BIOS Version	1.16.1
iDRAC FW Version	5.00.00.00, A00

Dell EMC™ PowerEdge™ R7525	
Model Name	PowerEdge R7525
CPU	Dual AMD EPYC 7502 32-Core processor
Memory	128GB RAM
BIOS Version	2.8.4
iDRAC FW Version	5.00.00.00, A00

**Note** – Please refer to the KumoScale software Release Notes for performance issues detected on this platform.

HPE™ Company

HPE ProLiant™ DL325 Gen10 Plus	
Model Name	HPE ProLiant DL325 Gen10 Plus
CPU	AMD EPYC 7502 32-core @ 2.50 GHz
Memory	128 GB
BIOS Version	System ROM A443 v2.60 (08/11/2022)
iDRAC FW Version	iLO 5 2.72

**Note** - This server supports only U.3 NVMe™ SSDs and can only be used with Cx6 SSDs.

Supermicro™ Computer

Supermicro 2028U-TN24R4T+	
Model Name	SYS-2028U-TN24R4T+
CPU	Intel® Xeon® CPU E5-2690 v4 @ 2.60GHz
Memory	64 GB
BIOS Version	3.5
BMC FW Version	3.9

Supermicro 2029U-TN24R4T+	
Model Name	SYS-2029U-TN24R4T
CPU	Intel Xeon Gold 6132 CPU @ 2.60GHz
Memory	96 GB
BIOS Version	3.7 (06/15/2022)
BMC FW Version	01.74.02

Supermicro AS-1114S-WN10RT	
Model Name	MBD-H12SSW-NTR
CPU	Single AMD EPYC 7003/7002 Series Processor
Memory	4 TB
BIOS Version	2.1 or newer
BMC FW Version	01.00.36w

Tyan™ Computer

Tyan 1U B8026T70AE24HR	
Model Name	B8026T70AE24HR
CPU	1 x AMD EPYC 7551P 32-Core Processor
Memory	64 GB
BIOS Version	V2.02.B10
BMC FW Version	5.00

Quanta™ Computer

QuantaGrid™ D52B-1U	
Model Name	QuantaGrid D52B-1U
CPU	2 x Intel Xeon Gold 6132 CPU @ 2.60GHz
Memory	64 GB
BIOS Version	5.14 3B21.Q402
BMC FW Version	3B21.Q402 4.99.00 Nov 3 2020

QuantaGrid D42A-2U	
Model Name	QuantaGrid D42A-2U
CPU	AMD EPYC 7551P 32-Core
Memory	64 GB
BIOS Version	3A07
BMC FW Version	3.14.19

Lenovo™ Group

ThinkSystem™ SR650	
Model Name	SR650
CPU	2x Intel Xeon Gold 6142 CPU @ 2.60GHz
Memory	384 GB
BIOS Version	2.70 (Build ID: CDI338D)
UEFI Version	3.00 (Build ID: IVE172F)

Network Interface Cards (NICs)

The following section specifies NICs that were tested and found to be compatible with KumoScale software on the target side.

Appliance 100G RNIC

Mellanox™ ConnectX-5 Ex Dual Port 100 Gb [ConnectX-5EX]	
Driver	mlx5_core
Version	5.0-0
Firmware Version	16.27.6120 (DEL0000000004)

Mellanox MT28908 Family [ConnectX-6]	
Driver	mlx5_core
Version	5.0-0
Firmware Version	20.32.1010

Mellanox MT27800 Family [ConnectX-5]	
Driver	mlx5_core
Version	5.0-0
Firmware Version	16.34.1002

OCP 100G RNIC

Mellanox MT27800 Family [ConnectX-5]	
Driver	mlx5_core
Version	5.0-0
Firmware Version	16.34.1002

SSDs

KumoScale software supports all NVMe™ SSDs including those not manufactured by KIOXIA.

KIOXIA

KumoScale software has been tested on the following KIOXIA NVMe SSDs:

FL6

Part Number	Controller Version	Capacity	DWPD	FW Version
KFL61HVL800G		800 GB	1	01A2

CM6 Series PCIe® 4.0 NVMe SSDs

Part Number	Controller Version	Capacity	DWPD	FW Version
KCM61VUL3T20	SOC 2.0	3.2 TB	3	0105 only
KCM61RUL3T84	SOC 2.0	3.84 TB	1	0105 only
KCM61VUL800G	SOC 2.0	800 GB	3	0105 only
KCM61VUL1T60	SOC 2.0	1.6 TB	3	0105 only
KCM61VUL3T20	SOC 2.0	3.2 TB	3	0105 only
KCM61VUL6T40	SOC 2.0 / 2.1 (S/N 8040A001A1M7)	6.4 TB	3	0105 only

CD6 Series PCIe 4.0 NVMe SSDs

Part Number	Controller Version	Capacity	DWPD	FW Version
KCD61LUL3T84	CS 3.1	3.84 GB	1	0105 only

CM5 Series PCIe / NVMe SSDs

Part Number	Controller Version	Capacity	DWPD	FW Version
KCM51RUG960G	CS 3.1	960 GB	1	0107 only
KCM51RUG1T92	CS 3.1	1.92 TB	1	0107 only
KCM51RUG3T84	CS 3.1	3.84 TB	1	0107 only
KCM51RUG7T68	CS 3.1	7.68 TB	1	0107 only
KCM51RUG15T3	CS 3.1	15.36 TB	1	0107 only
KCM51VUG800G	CS 3.1	800 GB	3	0107 only
KCM51VUG1T60	CS 3.1	1.6 TB	3	0107 only
KCM51VUG3T20	CS 3.1	3.2 TB	3	0107 only
KCM51VUG6T40	CS 3.1	6.4 TB	3	0107 only

CD5 Series PCIe / NVMe SSDs

Part Number	Controller Version	Capacity	DWPD	FW Version
KCD51LUG960G	CS 3.1	960 GB	< 1	0107 only
KCD51LUG1T92	CS 3.1	1,920 GB	< 1	0107 only
KCD51LUG3T84	CS 3.1	3,840 GB	< 1	0107 only
KCD51LUG7T68	CS 3.1	7,680 GB	< 1	0107 only

XD5 Series Data Center NVMe SSDs

Part Number	Controller Version	Capacity	DWPD	FW Version
KXD51RUE960G	CS 3.2	960 GB	1	1CEE6110 only
KXD51RUE1T92	CS 3.2	1,920 GB	1	1CEE6110 only
KXD51RUE3T84	CS 3.2	3,840 GB	1	1CEE6110 only

Application Initiator Testing

These configurations have been tested as application initiators.

- CentOS™ platform: Linux™ release 8.5.2111
  - Kernel: kernel 4.18.0-348.2.1
  - Patch: nvme\_host\_fast\_io\_fail\_patch\_4.18.0-348.2.1.el8\_5-1.1-0.x86\_64.rpm
- Ubuntu™ platform v20.04.04
- OpenStack™ Yoga platform supports Ubuntu 20.04.04 NVME CLI: nvme\_cli\_v1.9.

25G RNIC	
Initiator	Mellanox Technologies MCX4121A Family [ConnectX™-4]
Firmware Version	14.32.1010 (MT_2420110034)

25G RNIC DELL	
Initiator	Mellanox 25GBE 2P ConnectX-4 Lx Adapter [ConnectX4LX]
Firmware Version	14.32.20.04

<a href="#">Intel E810</a>	
Initiator	Intel Ethernet Network Adapter E810-2CQDA2
Firmware Version	4.00

<a href="#">Intel E810</a>	
Initiator	Intel Ethernet Network Adapter E810-CQDA2
Firmware Version	3.00 0x80008942 20.5.13

<a href="#">Intel E810</a>	
Initiator	Intel Ethernet Network Adapter E810-XXV Dual Port 10/25GbE SFP28 OCP NIC 3.0
Firmware Version	3.00 0x80008942 20.5.13

Switches

The following section specifies switches that were tested and found to be compatible with KumoScale software on target systems.

The Arista™ switch and Cisco™ switches were configured with **Flow Control ON** (for RDMA transport).

The Mellanox switch was configured with **ECN ON** (Congestion control policy) and **Global Pause ON**.

Arista™ Networks

Arista DCS-7060CX2-32S-F	
Hardware Version	11.00
Software Image Version	EOS-4.26.1F
Internal Build Version	4.26.1F-22602519.4261F

Arista DCS-7060CX2-32S-R	
Hardware Version	21.00
Software Image Version	EOS-4.26.1F
Internal Build Version	4.26.1F-22602519.4261F

Cisco™ Systems

Cisco Nexus9000 c9236C
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Software BIOS Version	07.66
Software NXOS Version (Israel)	7.0(3)I7(9)
Software NXOS Version (India)	7.0(3)I5(2)

Mellanox Technologies

Mellanox MSN2100	
ASIC FW Version	13.1730.0158
BIOS Version	5.6.5
Product Release	3.6.5000

Third (3rd) Party Tools

Tools	
Graphite™ telemetry server version 1.1.7	
Ansible™ modules v2.9.6	
rSyslog 8.24.0-34.el7	

Platforms for KumoScale Components

KumoScale software is installed on servers external to the target storage or application initiator nodes. These components require additional servers, which may not be solely dedicated for this purpose.

KumoScale Storage Cluster

The KumoScale storage cluster is a High Availability (HA) cluster implemented over a private Kubernetes environment. The cluster requires at least three (3) servers for replication to ensure HA. The following sections specify the requirements for the servers used in this cluster and the network requirements.

Hardware Requirements

The following table specifies the minimal hardware requirements for the physical server components, and the recommended configuration according to the expected deployment’s scale (number of KumoScale storage nodes):

Component	Minimal Requirements	Best Practice
CPU	4 cores	<10 KS nodes – 4 cores 10-100 KS nodes – 12 cores >100 KS nodes – 24 cores
Memory	16 GB	<10 KS nodes – 16 GB 10-100 KS nodes – 32 GB >100 KS nodes – 128 GB
System Drive	64 GB	<10 KS nodes – 40 GB 10-100 KS nodes – 80 GB >100 KS nodes – 128 GB

Topology

Each server must be installed on a different rack to ensure HA.

Network Requirements

This section specifies the requirements for the server’s ports. These ports must be accessible by the orchestrator, KumoScale storage nodes, and application initiators.

Management Ports

Each of the servers should have at least two management ports. The table below specifies the bandwidth minimum value and recommendation according to the expected deployment’s scale (number of KumoScale storage nodes):

Minimal Requirements	Best Practice
2x1 Gbps	<10 KS nodes – 2x1 Gbps
	10-100 KS nodes – 2x10 Gbps
	>100 KS nodes – 2x25 Gbps

**Data Ports**

Each server requires a data port. The data and management ports may be combined on a single logical interface if there are at least two ports with a bandwidth of  $\geq 25$  Gbps each.

**Storage Requirements**

There are no storage requirements. KumoScale cluster management services require persistent storage but this is provisioned by KumoScale software NVMe-oF™ volumes, so no additional storage is required on the servers used for this cluster.

**Ansible Server**

In a bare-metal environment, an Ansible server is required for running the Ansible modules and playbooks (this can be the same server that is used for the storage cluster).

The only requirement for this Linux OS-based server is to have connectivity with the KumoScale appliance management IP and the application initiators.

*[1] Definition of capacity - KIOXIA Corporation defines a megabyte (MB) as 1,000,000 bytes, a gigabyte (GB) as 1,000,000,000 bytes and a terabyte (TB) as 1,000,000,000,000 bytes. A computer operating system, however, reports storage capacity using powers of 2 for the definition of 1Gbit = 230 bits = 1,073,741,824 bits, 1GB = 230 bytes = 1,073,741,824 bytes and 1TB = 240 bytes = 1,099,511,627,776 bytes and therefore shows less storage capacity. Available storage capacity (including examples of various media files) will vary based on file size, formatting, settings, software and operating system, and/or pre-installed software applications, or media content. Actual formatted capacity may vary.*

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