Hammerspace Hardware and Software Compatibility List

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About This Documentation

The Hardware and Software Compatibility List (HSCL) describes the supported and tested hardware and software configurations for a Hammerspace deployment. It covers system requirements, server hardware and CPU compatibility, supported hypervisors, NFS and SMB client compatibility matrices, NAS and object storage compatibility, public cloud support, RDMA and NVMe-oF connectivity, and the qualification process for on-premises server hardware.

This document is intended for infrastructure engineers and procurement teams evaluating or expanding a Hammerspace deployment. Readers are expected to be familiar with Hammerspace software and its capabilities.

For hardware and software questions not covered here, contact support@hammerspace.com with the keyword HSCL in the subject line.

To open a support case, use the Hammerspace Support Hub. To download Hammerspace software and licenses, use the Hammerspace Licensing and Delivery Portal.



Do not install additional or third-party software, agents, or packages directly on Hammerspace Anvil (metadata) or DSX (data) nodes. These nodes run a managed appliance software stack; anything installed outside that stack is unsupported and is removed during a software upgrade. Such software can also interfere with node operation. If you need monitoring or integration with an external tool, contact Hammerspace Support for a supported approach.

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Chapter 1. Prerequisites

It is expected that the reader of this document is familiar with Hammerspace software and its capabilities.

This version of the document is only applicable to Hammerspace version 5.3.

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Chapter 2. System Requirements

Hammerspace is delivered as an appliance-OS software solution that runs on a wide variety of platforms, including virtual, bare-metal, and cloud environments. Hammerspace includes a base operating system (Linux) as well as a series of enhancements to ensure that the latest and greatest in security and performance are delivered to our customers.

The system requirements are developed from Hammerspace testing and customer deployment feedback. It is not recommended to use less than the specified requirements.

Note that these are bare-metal server minimums. For guidance on virtual machine installation, please see the installation guide.

Table 1. Table 1 Anvil Bare-metal system minimum requirements

Anvil - Bare-metal system, minimum requirements	
CPU	1 CPU / 36 total cores minimum[3] . Intel Xeon E5 v3 2680 or better.
Memory	128 GB
Network	10 Gbps
Boot drive	512 GB Hardware RAID 1 (mirror)[1]
Metadata drive	1024 GB NVMe/SSD drive supports a minimum of 100M files[2]

DSX - Bare-metal system, minimum requirements	
CPU	1 CPU / 16 total cores minimum[3]
Memory	64 GB
Network	10 Gbps
Boot drive	512 GB Hardware RAID 1 (mirror) [1]
Data drives	15 GB minimum of any type

Table 2 DSX Bare-metal system minimum requirements

Notes
1) The recommended hardware RAID card is typically what is provided with the server manufacturer. Intel VROC-configured storage is supported for the boot drive only — see the Installation and Licensing Guide's Intel VROC Support section for requirements (UEFI only, single VROC device set, no additional software mirroring on top). VROC is not supported for the metadata or data drives.

2) Spinning media (HDDs) is not supported as metadata storage, it is simply too slow to be practical.

3) The actual sizing of the Anvil and DSX will depend on the size of the environment

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Chapter 3. Server Hardware

The following systems have been installed and tested by Hammerspace. This is not a finite list and if your system is not listed here, please see section for on-site qualification to follow the process to work with Hammerspace to qualify your system.

Table 2. Table 3 Server Hardware List

Vendor	Server model	Supported	Notes
Cisco	C220M4	Yes	
Cisco	C220M5	Yes	
Cisco	C240M4	Yes	
Cisco	C240M5	Yes	
Dell	PowerEdge C6320	Yes	
Dell	PowerEdge R630	Yes	
Dell	PowerEdge R730	Yes	
Dell	PowerEdge R730xd	Yes	
Dell	PowerEdge R930	Yes	
Dell	PowerEdge R640	Yes	
Dell	PowerEdge R740	Yes	
Dell	PowerEdge R740xd	Yes	
Dell	PowerEdge R7515	Yes	CPLD 1.07 or later required
Fujitsu	PRIMERGY RX2540 M1	Yes	
HPE	ProLiant BL460c Gen8	Yes	
HPE	ProLiant DL380p Gen8	Yes	
HPE	ProLiant ML310e Gen8	Yes	
HPE	ProLiant DL360 Gen9	Yes	
HPE	ProLiant DL380 Gen9	Yes	
HPE	ProLiant DL580 Gen9	Yes	
HPE	ProLiant DL360 Gen10	Yes	
HPE	ProLiant DL380 Gen10	Yes	
HPE	ProLiant DL580 Gen10	Yes	

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Vendor	Server model	Supported	Notes
HPE	ProLiant DL325 Gen10 Plus	Yes	
Huawei	RH1288 V3	Yes	
Huawei	XH628 V3	Yes	
Intel Corporation	S2600WFT	Yes	
Lenovo	System x3650 M5	Yes	
Lenovo	Think System SR635	Yes	
Quanta	D51BP-1U	Yes	
Quanta	Freedom	Yes	
Supermicro	2029BT-HNC0R	Yes	
Supermicro	H12DST-B	Yes	
Supermicro	SSG-6028R-E1CR12L	Yes	
Supermicro	SYS-1027R-WC1R	Yes	
Supermicro	SYS-120C-TN10R	Yes	
Supermicro	SYS-220U-TNR	Yes	
Supermicro	X10DRi	Yes	

3.1. CPU Compatibility

CPU Architecture

Currently, Hammerspace nodes are qualified only for Intel and AMD x86-64 CPUs. Non-Hammerspace nodes can be of a different CPU architecture.

CPU Extensions

Hammerspace requires the CPU to support the following feature sets.

- cx16 (CMPXCHG16B - Double compare-and-swap, introduced with Pentium 4 in 2000)
- sse4_2 (SSE 4.2, introduced with Intel Nehalem in November 2008 and with AMD in 2011)

NUMA Support

NUMA supports up to two NUMA nodes. If the system is configured with more than two NUMA nodes, it may not install/start properly.

Any power-saving, performance-throttling CPU settings must be disabled on any bare-metal system running Hammerspace software.

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Chapter 4. Hypervisor

Hammerspace has been tested and is known to work with the following Hypervisors / virtual environments.

Vendor	Version(s)	Supported	Notes
VMware vSphere	6.x, 7.x, 8.x	Yes	
Microsoft Hyper-V	2016, 2019	Yes	
KVM	Incl. Proxmox	Yes	Field qualified
Nutanix Acropolis		Yes[1]	Field qualified
XenServer		Yes	Field qualified

Hypervisor compatibility list

1) Hammerspace installs and runs in the virtual environment; however, it may lack platform drivers to show additional information (such as IP addresses) in the native virtualization UI.

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Chapter 5. Client - NFS

5.1. NFS Version 3

5.1.1. Linux

All Linux versions are supported.

Recommended mount options: nolock

5.1.2. UNIX

Solaris, AIX is supported.

Recommended mount options: nolock

5.2. NFS Version 4

5.2.1. 4.0

Not supported.

5.2.2. 4.1

Supported.



The minimum Hammerspace version required is 5.0.

5.2.3. 4.2

Hammerspace qualifies Linux client kernels for the NFS 4.2 protocol to ensure all functionality works as expected.

The following kernel versions are qualified to connect using the 4.2 protocol. If a Linux kernel is not on the list, it will automatically be redirected to use version 3. See the *Hammerspace 5.2 Administration Guide* for further information on how this logic works.



The RHEL/CentOS-family rows below only match a kernel that reports itself as x86_64. The generic "6+" and "7+" kernel rows match any architecture the kernel reports.

Table 3. Linux Client Kernel Support for NFSv4.2

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Linux	Kernel version(s)	NFS protocol version	Notes
7+ kernels	Linux 7.x (any architecture)	3, 4.1, 4.2	
6+ kernels	Linux 6.x (any architecture)	3, 4.1, 4.2	
5.15+ kernels	Linux 5.15.x	3, 4.1, 4.2	(incl. relevant Ubuntu kernels)
5.14+ EL9 kernels	Linux 5.14.x (EL9 builds)	3, 4.1, 4.2	(incl. relevant Rocky kernels)
Debian 5.10+ kernels	Linux 5.10.0-30 through 5.10.0-32 (amd64)	3, 4.1, 4.2	Only build revisions 30-32 are qualified; other 5.10.0 revisions are not.
RHEL 8.10 kernels	Linux 4.18.0-553.x (el8_10, x86_64)	3, 4.1, 4.2	Use 4.18.0-553.116 or later. Earlier 553 builds are missing NFS direct I/O fixes.
RHEL 8.9 kernels	Linux 4.18.0-513.x (el8_9, x86_64)	3, 4.1, 4.2	
RHEL 8.8 kernels	Linux 4.18.0-477.x (el8_8, x86_64)	3, 4.1, 4.2	
RHEL 8.7 kernels	Linux 4.18.0-425.x (el8_7, x86_64)	3, 4.1, 4.2	
RHEL 8.6 kernels	Linux 4.18.0-372.x (el8_6, x86_64)	3, 4.1, 4.2	
RHEL 8.5 kernels	Linux 4.18.0-348.x (el8_5, x86_64)	3, 4.1, 4.2	
RHEL 8.4 kernels	Linux 4.18.0-305.x (el8_4, x86_64)	3, 4.1, 4.2	
RHEL 8.3 kernels	Linux 4.18.0-240.x (el8_3, x86_64)	3, 4.1, 4.2	
RHEL 8.2 kernels	Linux 4.18.0-193.x (el8_2, x86_64)	3, 4.1, 4.2	
RHEL 7.7+ kernels	Linux 3.10.0-1062, -1127, or -1160.x (el7, x86_64)	3, 4.1, 4.2	
Ubuntu 24.04 LTS		3	Use mount bypass option for 4.2
Ubuntu 23.10		3	Use mount bypass option for 4.2
Ubuntu 22.04 LTS		3	Use bypass mount option for 4.2
Ubuntu 20.04 LTS		3	4.2 not tested

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Chapter 6. Client - SMB

Hammerspace supports several versions of SMB; the actual version used is auto-negotiated between the client and the server.

SMB version	Status
SMB version 1	Not supported
SMB version 2.0, 2.1	Supported
SMB version 3.0, 3.0.2	Supported
SMB version 3.1 and later	Supported

6.1. Client-Specific Testing (SMB)

Client operating system	Notes
Linux (SMB mount)	Not tested but known to work. Best effort support
macOS (all versions)	Supported
Windows (all versions)	Supported

6.2. Protocol-Specific Functionality Matrix for SMB

SMB feature	Supported	Assimilated	Notes
Access Based Enumeration (ABE)	Yes	N/A	Requires do-not-cache objective
ACL	Yes	Yes	
Share ACL	Yes	No	
Security ACLs	Yes	Yes	
Alternate Data Streams	No	No	
Anonymous (Guest) Access	No	N/A	
Auditing	Yes	No	
Backup Operator	No	N/A	
BranchCache	No	N/A	
Change Notify	No	N/A	
Continuous Availability	No	N/A	

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SMB feature	Supported	Assimilated	Notes
Copy Offload	Yes	N/A	
DFS	Yes	N/A	
Directory Leasing	No	N/A	
Durable File Handles	Yes	N/A	
Encryption	Yes	N/A	
Hidden/Administrative Shares	Yes	N/A	
Homedirs	No	N/A	
Multichannel	*Yes*	N/A	Supported as Technology Preview
Named Pipes	Yes	N/A	
Oplocks (batch, level 1, level 2, lease)	Yes	N/A	
Persistent File handles	No	N/A	
Previous Versions	Yes	N/A	Supported for Share Snapshots, File Undelete, Versioning and Conflict versioning
Remote VSS	No	N/A	
RFC 2307	Yes	N/A	Also includes RFC 2307biz
Signing	Yes	N/A	
SMB Direct (RDMA)	No	N/A	
VSS	No	N/A	
Windows Extended Attribute API	No	N/A	
Witness Protocol	No	N/A	

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Chapter 7. Storage

The following storage combinations have been tested and are known to work with Hammerspace.

7.1. NAS Storage

Most NFS storage exports will work with Hammerspace; however, if the vendor is not listed in this table, support functionality will be covered under **type: NFS Other**.

Storage Vendor / Model	Version	Backend RW storage	API Integrated Clone & Health Monitoring	NFS Assimilation (RW)	NFS Assimilation (RO)	SMB Assimilation
Dell EMC Isilon	7.x, 8.x, 9.2-9.9	Yes	Yes	Yes	Yes	Yes
Dell EMC Unity	N/A	Yes	No	Yes	Yes	No
Dell EMC VNX		Yes	No	Yes	Yes	No
Dell Embedded NAS		Yes	No	Yes	Yes	No
Google Cloud Filestore	N/A	Yes	No	Yes	Yes	No
NetApp 7-mode	8.1,8.2.3	Yes	Yes	Yes[(1)]	Yes	Yes
NetApp C-mode	8.2, 9.9-9.19.x	Yes	Yes	Yes[(1)]	Yes	Yes
NetApp FsX	N/A	Yes	No	Yes[(1)]	Yes	Yes
NetApp Cloud Volume	N/A	Yes	No	Yes[(1)]	Yes	No
Pure Storage FlashBlade	N/A	Yes	No	Yes	Yes	No
Qumulo	4.3	Yes	No	Yes	Yes	Yes
RozoFS	N/A	Yes	Yes	Yes	Yes	No
SoftNAS Cloud	N/A	Yes	No	Yes	Yes	No
VAST	4.4	Yes	No	Yes	Yes	Yes
WEKA		Yes	No	Yes	Yes	No

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Storage Vendor / Model	Version	Backend RW storage	API Integrated Clone & Health Monitoring	NFS Assimilation (RW)	NFS Assimilation (RO)	SMB Assimilation
Windows File Server	2016, 2019, 2022	Yes	No	Yes	Yes	Yes
Hitachi NAS (HNAS)		Yes				
Rclone		Yes				
Other NFS	N/A	Yes	No	Yes	Yes	No

1) RW mode is only supported when the backend volume is in UNIX mode.

7.2. RDMA

The product supports RDMA using RoCE or InfiniBand. RDMA is supported between the Client and the DSX nodes, as well as between DSX nodes. RDMA is not supported (or used) between the Client and the Anvil (Metadata server).

RoCE:
Support ConnectX-4 and above

The use of PFC, ECN, and DSCP is recommended.

RDMA acceleration of the NFS data path is available only to **NFS version 4.2** clients. A client negotiates RDMA through pNFS `GETDEVICEINFO`: when the data server advertises RDMA and the client is mounted with NFS v4.2, the client uses RPC/RDMA to reach the data server. Clients using any other protocol or NFS version — including NFS v3 and NFS v4.0/4.1 — use TCP for data access and do not benefit from RDMA, even on RDMA-capable hardware.

RDMA and TCP clients can access the same data concurrently; the server provides each client a layout appropriate to its connectivity.

7.3. NVMe over Fabrics (NVMe-oF)

The product supports the following NVMe over Fabric storage.

Vendor	Version	Notes
Hitachi VSP One Block	N/A	Supported with multi-pathing

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7.4. The Product Object Storage

The following Object Storage vendors and technologies have been tested. For products not listed below, the Generic S3 option can typically be used if the system supports an S3 interface.

Vendor	Version	Notes
Amazon S3	N/A	Supported Storage Classes: Standard
Azure	N/A	Supported Storage Classes: Hot, Cold, Cool and Archive
Backblaze B2	N/A	
Cloudian HyperStore	6.2.x	
DataCore Swarm		
Dell EMC ECS	3.2.x	
Dell EMC PowerScale OneFS S3	N/A	
Generic S3	N/A	Includes MinIO, OTC, Ceph
Google Cloud Storage	N/A	Supported Storage Classes: Standard, Nearline, Coldline and Archive
Google Cloud Storage (S3 Interop)	N/A	
Hitachi Content Platform	7.3.x	
IBM Cloud Object Storage	3.11.x	
NetApp ONTAP S3		
NetApp StorageGrid	10.4.x	
Pure Storage FlashBlade S3	N/A	
Quantum ActiveScale	N/A	
Scality RING	N/A	
Seagate Lyve Cloud	N/A	
Snowflake	N/A	
Storj	N/A	
Wasabi Cloud Storage	N/A	

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Chapter 8. Public Cloud

There are two ways Hammerspace can use the cloud:

1. Run a Hammerspace cluster (Anvil and DSX) in the cloud (see below for compatible clouds)
2. Use Cloud/Object Storage from the cloud (see Object Storage)

Hammerspace is supported and available for Amazon AWS, Google Cloud, Microsoft Azure, and Oracle Cloud.

This section records platform availability only. For step-by-step deployment instructions for each platform, see the cloud deployment guides at docs.hammerspace.com. For Microsoft Azure, see Deploying Hammerspace in Azure.

Amazon AWS

Hammerspace is available in the Marketplace.

Google Cloud

Hammerspace is available in the Marketplace.

Microsoft Azure

Hammerspace is available in the Marketplace.

Oracle Cloud

Hammerspace is available in the Oracle Cloud Marketplace, including support for Oracle Dedicated Cloud Region.

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Chapter 9. On-Site Server Qualification Process

To support the rapid deployment of new systems entering the server market, Hammerspace has developed an on-site qualification process. The process is a part of the standard Proof-Of-Concept (POC) workflow and is fully supported by the Hammerspace engineering team.



It is recommended to involve Hammerspace as the first step in the process. The engineering team can drive the process on behalf of the customer and support remote installs.

Step-by-step workflow:

1. Verify that the system hardware in question is supported by Red Hat Enterprise Linux 8 with no additional vendor-supplied drivers.
   Link to Red Hat HCL: https://access.redhat.com/ecosystem/search/#/category/Server
2. Verify that the system hardware options (networking and storage) in question are included as part of the in-kernel tree of drivers for the Linux kernel used by the release you are qualifying against. For 5.2.14 and 5.3.1, that is the CentOS 8 kernel line (4.18.x).
3. With Steps 1 and 2 executed, proceed to install Hammerspace on the hardware. Hammerspace installation goes through a set of basic tests to ensure that the discovered hardware is functioning properly.

Please contact the Hammerspace team with any questions or feedback regarding the on-site qualification process.

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