



**Hewlett Packard**  
Enterprise

# **NimbleOS 5.1.1.0 Release Notes**

Version 5.1.1.0

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## Support

All documentation and knowledge base articles are available on HPE InfoSight at <https://infosight.hpe.com>. To register for HPE InfoSight, click the *Create Account* link on the main page.

Email: [support@nimblestorage.com](mailto:support@nimblestorage.com)

For all other general support contact information, go to <https://www.nimblestorage.com/customer-support/>.

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# NimbleOS 5.1.1.0

<b>Version:</b>	5.1.1.0
<b>Revision:</b>	Wednesday May 22, 2019 12:12:06

The release notes describe the major changes, fixes, and known issues for this release of the NimbleOS. They do not include all individual fixes and internal changes.

For technical support, contact HPE Nimble Storage Support at:

<mailto:support@nimblestorage.com>

877-3-NIMBLE (877-364-6253), option 2.

## Special Notes

Note	Description
<b>CRITICAL</b>	HPE Nimble Storage continues to qualify configurations between releases. The Validated Configuration Matrix provides information about validated configurations and is updated frequently. It is a good practice to check your system configuration against this online tool. The Validated Configuration Matrix tool is available on HPE InfoSight:  <a href="https://infosight.hpe.com/resources/nimble/validated-configuration-matrix">https://infosight.hpe.com/resources/nimble/validated-configuration-matrix</a>
<b>CRITICAL</b>	Arrays must be running NimbleOS 5.0.4.0 or later to upgrade to NimbleOS 5.1.1.0.
<b>CRITICAL</b>	Internet Explorer 10 and earlier versions are not supported in NimbleOS 4.x and later.
<b>CRITICAL</b>	An extended data services outage may occur with MS iSCSI initiator and Intel NICs using the built-in Windows driver e1q60x64.sys (version 11.0.5.21/11.0.5.22).  If you encounter this problem, please update your system to use the latest Windows driver.
<b>CRITICAL</b>	A service outage may occur on Windows 2012 R2 hosts using Emulex or Broadcom Fibre Channel HBAs with firmware/driver prior to 11.2. Update the Emulex or Broadcom firmware/driver to 11.2 or later
<b>CRITICAL</b>	Due to a known Red Hat Enterprise Linux bug 1002727, while running virtualized in VMware ESX, manually rebooting the active controller in presence of heavy IOs using the <b>reboot --controller</b> command on a Fibre Channel array may trigger an incorrect retry initiated by RHEL guests running the following kernel versions: <ul style="list-style-type: none"> <li>• 6.4 and earlier</li> <li>• 6.5 without the patch</li> <li>• 7.0 without the patch</li> <li>• 7.5 without the patch</li> </ul> This incorrect retry logic may lead to unexpected application behavior. In these environments, we recommend the <b>failover</b> command instead.

Note	Description
<b>CRITICAL</b>	As outlined in the current Validated Configuration Matrix, HPE Nimble Storage fully supports Windows guest operating systems on Microsoft Hyper-V, including Virtual Fibre Channel (VFC) connectivity and multipathing with HPE Nimble Storage DSM and VSS support. However, Linux guest operating systems running in Hyper-V VFC configurations are not qualified. Running Red Hat Linux guest operating systems with the “Linux Integration Services” kit installed, or with hv_storvsc drivers in such configurations can lead to Red Hat bug 1364282, which can cause an unexpected service outage.
<b>Important</b>	Starting with NimbleOS 5.1.1.0, the size of the software package now exceeds 2 GB, which may lead to lengthier software download times. Previously, the sizes of the NimbleOS 5.0.x download packages were approximately 1.6 GB, and NimbleOS 4.x packages were approximately 900 MB.
<b>Important</b>	HPE Nimble Storage CSxx (except CS235) and CS4xx arrays are blocked from updating to NimbleOS 5.1.1.0 and later releases by default. These arrays will be allowed to update in special circumstances, such as for group merge and evacuation purposes, and temporary data migration workloads. Contact HPE Nimble Storage Support if you wish to update your CS2xx or CS4xx array to NimbleOS 5.1.x.x.
<b>Important</b>	Microsoft Offload Data Transfer (ODX) is not supported if the destination volume has synchronous replication enabled.
<b>Important</b>	Starting with NimbleOS version 5.0.7.0, the Fibre Channel HBAs will use an updated firmware (11.4.204). The new firmware addresses an issue in which some 16Gb Fibre Channel HBAs might not auto-negotiate to 16Gb on all ports due to a timing issue within the code of the previous version of the firmware.
<b>Important</b>	As of vSphere 6.5, VMware is discontinuing the Thick Client (also known as the desktop or C# Client). As a result, the HPE Nimble Storage vCenter Plugin is deprecating the Thick Client and future releases of NimbleOS will not support it.

Note	Description																				
<p><b>Important</b></p>	<p>Starting with version 5.0.3.0, NimbleOS includes a restriction that prevents you from enabling deduplication when you are using a CS3000, CS5000, CS7000, HF20, HF40, or HF60 array and have fewer than six SSDs. This restriction is necessary to prevent the possibility of significant performance issues.</p> <p>Because NimbleOS 5.0.2.0 and 5.0.1.0 did not enforce this restriction, arrays upgrading from those releases may already have volumes with deduplication enabled. Any array upgrading to 5.0.3.0 or later with deduplicated volumes will continue to operate as a dedupe capable array, regardless of the number of installed SSDs. Such configurations are <i>not</i> recommended by HPE Nimble Storage.</p> <p>The following table lists the number of SSDs required for the different arrays:</p> <table border="1" data-bbox="643 674 1464 1209"> <thead> <tr> <th data-bbox="643 674 1052 724">Array Model</th> <th data-bbox="1052 674 1464 724">Required Number of SSDs</th> </tr> </thead> <tbody> <tr> <td data-bbox="643 724 1052 774">HF20H</td> <td data-bbox="1052 724 1464 774">2 SSDs</td> </tr> <tr> <td data-bbox="643 774 1052 825">HF20H upgraded to full population</td> <td data-bbox="1052 774 1464 825">4 SSDs</td> </tr> <tr> <td data-bbox="643 825 1052 909">HF20H fully populated and upgraded to HF40H</td> <td data-bbox="1052 825 1464 909">4 SSDs</td> </tr> <tr> <td data-bbox="643 909 1052 959">HF20, HF40, HF60</td> <td data-bbox="1052 909 1464 959">6 SSDs</td> </tr> <tr> <td data-bbox="643 959 1052 1010">CS500</td> <td data-bbox="1052 959 1464 1010">4 SSDs</td> </tr> <tr> <td data-bbox="643 1010 1052 1060">CS700</td> <td data-bbox="1052 1010 1464 1060">4 SSDs</td> </tr> <tr> <td data-bbox="643 1060 1052 1110">CS3000</td> <td data-bbox="1052 1060 1464 1110">6 SSDs</td> </tr> <tr> <td data-bbox="643 1110 1052 1161">CS5000</td> <td data-bbox="1052 1110 1464 1161">6 SSDs</td> </tr> <tr> <td data-bbox="643 1161 1052 1209">CS7000</td> <td data-bbox="1052 1161 1464 1209">6 SSDs</td> </tr> </tbody> </table>	Array Model	Required Number of SSDs	HF20H	2 SSDs	HF20H upgraded to full population	4 SSDs	HF20H fully populated and upgraded to HF40H	4 SSDs	HF20, HF40, HF60	6 SSDs	CS500	4 SSDs	CS700	4 SSDs	CS3000	6 SSDs	CS5000	6 SSDs	CS7000	6 SSDs
Array Model	Required Number of SSDs																				
HF20H	2 SSDs																				
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CS500	4 SSDs																				
CS700	4 SSDs																				
CS3000	6 SSDs																				
CS5000	6 SSDs																				
CS7000	6 SSDs																				
<p><b>Important</b></p>	<p>You can enable deduplication for CS3000, CS5000, CS7000, CS700, and CS500 arrays on a volume only if the corresponding storage pool has a Flash to Disk Ratio (FDR) greater than 4%. To calculate the FDR, obtain the "Total array capacity (MiB)" and "Total array cache capacity (MiB)" values by using the HPE Nimble Storage CLI command <b>pool --info pool_name</b>. This command returns the <b>Pool capacity (MiB)</b>, which is the "Total array capacity (MiB)", and the <b>Pool cache capacity (MiB)</b>, which is the "Total array cache capacity (MiB)".</p> <p>Then perform the following calculation:</p> <p><b>FDR = "Total array cache capacity (MiB)"/"Total array capacity (MiB)" * 100</b></p> <p>If the array has sufficient capability for deduplication, the <b>pool --info</b> command will also show a value for <b>dedupe capacity (MiB)</b>.</p> <p><b>Note</b> On the HF20H, HF20, HF40, and HF60 platforms, <b>pool --info</b> displays "N/A" as the value for <b>dedupe capacity (MiB)</b>. This because you can enable deduplication for the entire array.</p>																				
<p><b>Important</b></p>	<p>For connections to the NimbleOS GUI, you must have port 5392 open for the Group Management IP address and both diagnostic IP addresses.</p>																				

Note	Description
<b>Important</b>	<p>VMware has announced End of General Support for vSphere 5.0 and vSphere 5.1, which includes vSphere Hypervisor ESXi 5.0 and 5.1 and vCenter Server 5.0 and 5.1. To maintain your full level of support and subscription from VMware, you should upgrade to a supported version of vSphere. Refer to the VMware Knowledge Base article <a href="#">KB2145103</a>.</p>
<b>Important</b>	<p>During deployment of a desktop using VMware Horizon View, a VVol (mapping to a disposable disk) is created. A clone of this VVol is also created and placed within a directory under the virtual machine directory named <code>sdd</code>.</p> <p>When this desktop is deleted from Horizon View, VMware fails to delete the VVol clone of the disposable disk; only the disposable disk itself is deleted. This will be fixed in the next vSphere release. VMware bug number 1807857 should be used to track this fix.</p> <p>This issue occurs on all versions of VMware Horizon and vSphere that support VVols:</p> <ul style="list-style-type: none"> <li>• Horizon 6 version 6.1 and later</li> <li>• vSphere 6.0 and later</li> </ul>
<b>Important</b>	<p>On Windows Server 2012, 2012 R2, and 2016, the disk optimization process may record the following error in the Application event log: "The volume was not optimized because an error was encountered: Neither Slab Consolidation nor Slab Analysis will run if slabs are less than 8 MB. (0x8900002D)". Although Windows records this as an Error in the event log, the event can be safely ignored for HPE Nimble Storage volumes. HPE Nimble Storage volumes do not benefit from or require slab consolidation.</p>
<b>Important</b>	<p>Numerous host integration toolkits are supported in NimbleOS 5.1.1.0. It is strongly recommended that they be installed on all Windows, Linux, and VMware hosts. For more information about supported toolkits, refer to the Validated Configuration Matrix, which is available on HPE Nimble Storage InfoSight:</p> <p><a href="https://infosight.hpe.com/resources/nimble/validated-configuration-matrix">https://infosight.hpe.com/resources/nimble/validated-configuration-matrix</a></p>
<b>Important</b>	<p>Hosts leveraging VSS integration with HPE Nimble Storage Windows Toolkit (NWT) 2.1 and earlier will not work with NimbleOS 3.x. and later.</p>
<b>Important</b>	<p>When deleting files on a Windows Server 2016 HPE Nimble Storage volume that was formatted with ReFS, the user may find the space is not freed from the array. The reason for this is that Microsoft has chosen to leave trim disabled by default on ReFS v2 volumes. This is detailed in the following Microsoft technet article:</p> <p><a href="https://technet.microsoft.com/en-us/windows-server-docs/management/windows-commands/fsutil-behavior">https://technet.microsoft.com/en-us/windows-server-docs/management/windows-commands/fsutil-behavior</a></p> <p>In the "Parameters" list, review the "DisableDeleteNotify" section for details. For customers using ReFS v2, on Windows Server 2016, deleted files will not be unmapped by default. You need to enable trim by executing:</p> <p><b>fsutil behavior set DisableDeleteNotify ReFS 0</b></p>

Note	Description
<b>Important</b>	<p>HPE Nimble Storage Connection Manager (NCM) for VMware 5.1.0 is signed by VMware for ESXi 5.x and ESXi 6.x. It can be installed through the VMware Update Manager or esxcli command without the <code>--no-sig-check</code> flag.</p> <p>See NCM for VMware Release Notes 5.1.0 or later and the latest <a href="#">VMware Integration Guide</a> for further details.</p>
<b>Important</b>	<p>Performing a group merge from a source group that contains running Hyper-V virtual machines requires additional care. Group merges require changes to the discovery IP address that can adversely impact running systems. Therefore, if you perform a group merge, you should plan a maintenance outage to gracefully stop all applications and Hyper-V virtual machines on the source group to eliminate unexpected downtime caused by changing IP address during the group merge process. A typical group merge should take only a few minutes to complete and then virtual machines and applications can be restarted.</p> <p>The group merge and pool merge operations will also have impact on SCVMM. The impact will depend on whether the source and destination groups or pools are under SCVMM's management.</p> <p>Please refer to the <i>SMI-S Integration Guide</i> which includes details about SCVMM and the impacts in these situations before performing merge operations.</p>
<b>Important</b>	<p>Various timeout values affect HPE Nimble Storage targets from Windows/Linux hosts. Before you update the NimbleOS, install the HPE Nimble Storage Windows Toolkit (NWT) or HPE Nimble Storage Linux Toolkit (NLT) on the host or tune the timeout values. Timeout details for various operating systems can be found on HPE InfoSight under <b>Resources &gt; Documentation</b>. From the <a href="#">HPE Nimble Storage Documentation</a> page, select <b>Knowledge Base Article</b> and choose the KB you want:</p> <ul style="list-style-type: none"> <li>• <a href="#">KB-000052: Windows Host Disk Timeout Values</a></li> <li>• <a href="#">KB-000087: VMware Host Disk Timeout Values</a></li> <li>• <a href="#">KB-000304: Linux Host Disk Timeout Values</a></li> </ul>
<b>Important</b>	<p>The Backup Repository performance policy introduced in NimbleOS 4.2 cannot be used when replicating against a downstream array running an older release. Replicated volumes need to be associated at the time of creation with a performance policy that either exists downstream or that can be manually created on the downstream array.</p>

## New Features in 5.1.1.0

### Synchronous Replication

This feature provides the ability to synchronously replicate data between two arrays located in separate datacenters. Synchronous replication provides automatic protection against array or site failure.

### Manual Group Leader Failover

This feature supports the ability to move the group leader functionality from one array to another when arrays are grouped. This allows the retirement of the array supporting the group leader functionality.

### Group Scoped iSCSI Target



## NimbleOS 5.1.1.0 Verified Update Paths

This feature allows multiple LUNs to be accessed through a single iSCSI target, which reduces the number of connections required when configuring a large number of LUNs.

### Space Reporting Changes

This feature provides simplified space reporting when using data reduction tools, such as compression and deduplication. Arrays will now show logical mapped usage, which more closely aligns with HPE InfoSight and hosts in terms of per-reduction space usage reported at the volume level. In addition, NimbleOS will actually enforce limits, and introduces the concept of overdraft, which allows a folder to exceed the provisioned limit before the limit is enforced. Going forward, reserves will only be thin (0%) or thick (100%). Volume quotas become volume limits. Snapshot quotas no longer exist.

### Folder Level Space Enforcement

Expanded the functionality for enforcing space usage within individual folders.

### Multi-protocol (iSCSI/FC) Access to Same Array

This feature allows both the iSCSI and Fibre Channel protocols to be used simultaneously on a single array or group to access different LUNs.

### Custom Password Management Policies

This feature provides improved password policies to enable greater security for user access to the HPE Nimble Storage array.

### vCenter Plugin HTML5 Client

This feature improves the vCenter plugin by leveraging HTML5 technology to better interact with VMware vCenter.

## Verified Update Paths

**Table 1: From Versions 5.x**

From Versions 5.x	
From Version	To Version
5.0.7.200	5.1.1.0
5.0.7.100	5.1.1.0
5.0.7.0	5.1.1.0
5.0.6.0	5.1.1.0
5.0.5.200	5.1.1.0
5.0.5.0	5.1.1.0
5.0.4.0	5.1.1.0
5.0.3.100	5.0.7.200
5.0.3.0	5.0.7.200
5.0.2.0	5.0.7.200
5.0.1.100	5.0.7.200
5.0.1.0	5.0.7.200

**Table 2: From Versions 4.x**

From Versions 4.x	
From Version	To Version
4.5.4.0	5.1.1.0
4.5.3.0	5.0.7.200
4.5.2.0	5.0.7.200
4.5.1.0	5.0.7.200
4.5.0.0	5.0.7.200
4.4.1.0	5.0.7.200
4.4.0.0	5.0.7.200
4.3.1.0	5.0.7.200
4.3.0.0	5.0.7.200
4.2.1.0	5.0.7.200
4.2.0.0	5.0.7.200
4.1.0.0	5.0.7.200

**Table 3: From Versions 3.x**

From 3.x Versions	
From Version	To Version
3.9.0.0	5.0.7.200
3.8.1.0	5.0.7.200
3.8.0.0	5.0.7.200
3.7.0.0	5.0.7.200
3.6.2.0	5.0.7.200
3.6.1.0	5.0.7.200
3.6.0.0	5.0.7.200
3.5.4.0	5.0.7.200
3.5.3.0	5.0.7.200
3.5.2.0	5.0.7.200
3.5.0.0	5.0.7.200
3.4.1.0	5.0.7.200
3.4.0.0	5.0.7.200
3.3.0.0	5.0.7.200
3.2.1.0	5.0.7.200
3.1.0.0	5.0.7.200

**Table 4: From Versions 2.x**

From 2.2.x, 2.3.x Versions		From 2.1.x Versions		From 2.1.x Versions	
From Version	To Version	From Version	To Version	From Version	To Version
2.3.18.0	4.5.4.0	2.1.9.1	2.3.18.0	2.8.0.0	2.1.9.1
2.3.16.0	4.5.4.0	2.1.9.0	2.3.18.0	2.0.7.0	2.1.9.1
2.3.15.0	4.5.4.0	2.1.8.0	2.3.18.0	2.0.6.*	2.1.9.1
2.3.14.0	4.5.4.0	2.1.7.0	2.2.9.0	2.0.5.0	2.1.9.1
2.3.12.*	4.5.4.0	2.1.6.0	2.2.9.0	2.0.4.0	2.1.9.1
2.3.9.*	4.5.4.0	2.1.5.0	2.2.9.0		
2.3.8.0	4.5.4.0	2.1.4.0	2.2.9.0		
2.3.7.0	4.5.4.0	2.1.3.0	2.2.9.0		
2.3.6.0	4.5.4.0	2.1.2.0	2.2.9.0		
2.3.4.0	4.5.4.0	2.1.1.0	2.1.9.1		
2.3.3.0	4.5.4.0	2.1.0.0	2.1.9.1		
2.3.2.1	4.5.4.0				
2.3.2.0	4.5.4.0				
2.3.1.0	4.5.4.0				
2.2.11.0	3.9.0.0				
2.2.10.0	3.9.0.0				
2.2.9.0	3.9.0.0				
2.2.7.*	3.9.0.0				
2.2.6.0	3.9.0.0				
2.2.5.*	3.9.0.0				
2.2.3.*	2.2.11.0				
2.2.2.0	2.2.11.0				
2.2.1.0	2.2.11.0				
2.2.0.0	2.2.11.0				

**Table 5: From Versions 1.x**

From 1.4.x Versions		From 1.3, 1.2, 1.1 Versions		From 1.0.x Versions	
From Version	To Version	From Version	To Version	From Version	To Version
1.4.12.0	2.1.9.1	1.3.**	1.4.6.0	1.0.7.*	Contact Support
1.4.11.0	2.1.9.1	1.2.**	1.4.6.0	1.0.6.*	Contact Support
1.4.10.0	2.1.9.1	1.1.**	1.2.2.0		
1.4.9.0	2.1.9.1				

From 1.4.x Versions		From 1.3, 1.2, 1.1 Versions		From 1.0.x Versions	
From Version	To Version	From Version	To Version	From Version	To Version
1.4.8.0	2.1.9.1				
1.4.7.0	2.1.9.1				
1.4.*.*	1.4.12.0				

## Known Critical Issues

**Note** The following query is exposed for review purposes. Please use this information to verify that your team's bugs are being included or excluded appropriately. All queries will be removed prior to release.

**Note** The Public State and Fix Version columns in the table below are exposed for review purposes. Please use this information to verify that your team's bugs are being included or excluded appropriately. These columns will be removed prior to release.

There are no known critical issues in NimbleOS version 5.1.1.0

## Resolved Critical Issues

**Note** The following query is exposed for review purposes. Please use this information to verify that your team's bugs are being included or excluded appropriately. All queries will be removed prior to release.

**Note** The Public State and Fix Version columns in the table below are exposed for review purposes. Please use this information to verify that your team's bugs are being included or excluded appropriately. These columns will be removed prior to release.

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-85880	Data Service		Data Service may restart unexpectedly with VM health check failure when internal index data structures take too long to merge	As part of the file system checkpoint process, internal indexes are required to merge to disk. Under some circumstances, the merges fail to complete within a specified time when they are competing with other merges, for CPU and Disk bandwidth, that are not part of the checkpoint. When that happens, the Data Service may restart with a health check failure.	Not applicable	

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-35760	Data Service		Data Service may restart unexpectedly restart when the process is already restarting	In rare cases during planned or unplanned Data Service stop/start/restart event, a deadline check can be reached before an internal buffer is fully released. As a result, an unexpected service restart could occur. The service should automatically recover the condition.	Not applicable	
AS-86655	Data Service		ATM Health check failure when a internal transaction with large number of records is committed to NVRAM	The disk Index layer creates new Index tree for each checkpoint for data blocks changed in that checkpoint. Opportunistically these small trees are merged into a single large tree. This merge process might create new NVRAM records which need to be committed as a single transaction. If the number of records is very large, time allotted to the transaction exceeds the internal file system timeout and Data Service Demon crashes and restarts itself	Contact Nimble Storage Support	
AS-83114	Data Service		Lower cache hit ratio on systems with 80GB SSDs	In NimbleOS 4.5.0.0 and 5.0.x, arrays with 80GB SSDs may experience higher read and write latency caused by a lower cache hit rate. This may occur during increased garbage collection activity.	Please contact HPE Nimble Storage Support.	

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-85684	Data Service		Data Service may experience restart loop after repeatedly assigning and unassigning member array from default pool	After assigning and unassigning a member array to and from the default pool multiple times, there could be stale entry in the volfams pool membership, which will fail the future pool add operation and the Data Service may restart unexpectedly and repeatedly.	Not applicable	
AS-90042	Data Service		Windows cluster may experience IO timeout or long latency after AFO/ASO triggered by GL/BGL down	If a Windows cluster has synchronous replication enabled on clustered volumes, it may experience IO timeouts or long latency on those volumes after an Automatic Failover (AFO) or Automatic Switchover (ASO) is performed, which is triggered by Group Leader (GL) or Backup Group Leader (BGL) array down.	Not applicable	
AS-88123	Data Service		Data Service restarts when volume is deleted while being moved	Under certain conditions, the Data Service on the array may restart unexpectedly if a volume is deleted while it is being moved to another pool.	Not applicable	
AS-76683	Data Service		Data Service restart after repeatedly assigning and unassigning member array from default pool	After assigning and unassigning a member array to and from the default pool multiple times, the Data Service may restart unexpectedly and repeatedly.	Not applicable	

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-84550	Platform		SCSI High Availability service may restart following controller reboot when HBA is unrecognized	The SCSI High Availability service may restart following controller reboot when a Fibre Channel HBA is unrecognized. This problem is related to a limitation in the FC HBA firmware.	If this issue occurs, make the affected controller standby and power cycle it.	
AS-82981	Platform		Data Service restart when Netlist NVRAM arrays update to NimbleOS 5.0.x	In rare instances, an array that has Netlist NVRAM cards may experience an unexpected Data Service restart when updating to NimbleOS 5.0.x. This restart occurs due to a memory allocation issue for these systems that is most likely to transpire during software updates. During the software update, the kernel memory requirements increase, and the kernel attempts to allocate free pages for the NVRAM driver. If this process surpasses the configured timeout, it may cause the Data Service to restart.	Not applicable	
AS-92877	Platform		Long delays in processing Fibre Channel requests can lead to restarts of the Data Service	The Fibre Channel command state machine does not always properly handle the situation where the Data Service takes an unusually long time to process events. This could lead to unexpected Data Service service restarts and session failures.	Not applicable	

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-91750	Platform		Intel SSDs may timeout or fail after update to 5.0.5.0 or 5.0.5.200	Following a NimbleOS update to 5.0.5.0 or 5.0.5.200, Intel SSDs running specific firmware versions may timeout or fail after SMART data is collected.	Not applicable	
AS-84365	SAN		Data Service restarts due to race condition associated with iSCSI connection termination	The NimbleOS 5.0.x.x release introduced a race condition in the iSCSI connection termination logic, which causes connection processing logic to encounter unexpected connection state, resulting in a segmentation fault. The Data Services Daemon restarts, and the array resumes servicing requests automatically.	Not applicable	
AS-94087	Security		CVE-2017-9765: Remote execution of arbitrary code, and remote denial of service.	The HPE Nimble Storage array GUI can be used to execute arbitrary code and carry out denial of service attacks.	The HPE Nimble Storage array network interfaces should be accessible only to trusted networks, which will limit the number of agents able to exploit this vulnerability. The following NimbleOS versions, and all subsequent releases, contain a software fix for this vulnerability: 3.9.1.0, 4.5.4.0, 5.0.7.200, 5.1	



Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-80883	System Management		Group Management service may restart unexpectedly during group merge	Prior to attempting group merge of two independent groups, one group may have been configured with Active Directory and had an Active Directory user log into that group. On the other group, a local user with the same name may have been created and logged in. This local user is deleted later but the array keeps history of its login. Later, if you try to merge these two groups, the duplication of the Active Directory and local user name login history will cause the group merge to fail with an unexpected Group Management service restart. There may be variations in this user name duplication on each array group prior to group merge.	Contact HPE Nimble Storage Support to assess workarounds.	

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-80367	System Management		Group Management service may restart unexpectedly during group merge	When variations exist with an Active Directory login username on a source and target group involved in a group merge operation, unexpected Group Management service restarts may occur during each group merge attempt. As a result, each group merge operation will fail. For example, domain\username logged into the source group as the user and just the username logged into the target group as the user or vice-versa.	Contact HPE Nimble Storage Support to assess workarounds.	
AS-84861	System Management		Network configuration errors during group merge may cause encryption keys to go missing	Network configuration errors during group merge may cause encryption keys to go missing from source group after the group merge.	No workaround is available.	
AS-64959	System Management		Group Management service may restart during certificate regeneration	In rare cases, during certification regeneration, a race condition can occur between the array group certificate regeneration process and an internal REST handler. As a result, the Group Management service may restart.	Not applicable	

Resolved Critical Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-84112	System Management		Group Management service may restart unexpectedly during replication workflows	If the array has been updated from 2.1.x.x or earlier versions in its history where snapshots were taken, executing replication workflows later, such as promoting a volume collection, may lead to a series of unexpected Group Management service restarts due to a problem with the underlying branches.	Contact Nimble Storage Support.	
AS-95207	System Management		Array Management Service Restarts after losing connection to Backup Group Leader	After successfully creating snapshot collections, the Group Leader may lose connection to the database and as well as the Backup Group Leader. As a result, the Array Management Service may restart unexpectedly to restore the connections. This may be caused by network connectivity issues.	Not applicable	
AS-22391	System Management		Group Management service may restart unexpectedly when frequently opening and closing stats from many different volumes	When external applications, external scripts, multiple monitoring GUI windows or tabs rapidly open and close per-volume statistics across different volumes many times per-second, the Group Management service may restart unexpectedly.	Reduce the frequency of applications opening and closing many different volumes' stats.	

## Resolved Issues

**Note** The following query is exposed for review purposes. Please use this information to verify that your team's bugs are being included or excluded appropriately. All queries will be removed prior to release.

**Note** The Public State and Fix Version columns in the table below are exposed for review purposes. Please use this information to verify that your team's bugs are being included or excluded appropriately. These columns will be removed prior to release.

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-77472	Data Service		A race condition between garbage collection and index validating the liveness of blocks can cause the Data Service to restart	A race condition between garbage collection and the index validating the liveness of blocks can cause Data Service to restart because of an internal check. The condition clears itself automatically on a Data Service restart.	Not applicable	
AS-84318	Data Service		Group Data service restarts during connection rebalancing on systems with many volumes	The iSCSI re-balance operation goes through each connection for each target to evaluate if the connection can be moved to better place. In each evaluation, a lookup to an internal database occurs to get configuration parameters for the IP and host. In configurations with a large number of volumes, this lookup takes a longer than usual to process all the targets which causes the total time to exceed the health check. As a result, the Group Data service (GDD) restarts to recover.	If the GDD service restarts repeatedly, consider the following workarounds: 1) Disable re-balance, netconfig --edit active --iscsi_connection_rebalancing false 2) Contact HPE Nimble Storage Support to increase the GDD health-check to 600 seconds.	
AS-86688	Data Service		Data Service Restart when Deduplication Estimator Tool is run	Under rare circumstances, the Data Service on the array may restart unexpectedly if the Deduplication Estimator tool is run on the array.	Not applicable	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-85448	Data Service		Improvements in garbage collection memory provisioning	The garbage collector requires memory to keep track of the segments it is cleaning. The amount of memory configured in the system was constant across all array models, and for certain models, this was insufficient. To fix this, a calculation is now used to provision the appropriate memory based on the array model.	Not applicable	
AS-59726	Data Service		Mirroring Service restarts unexpectedly	The Mirroring Service on the array may restart unexpectedly as space accumulates on an internal system partition.	Not applicable	
AS-68410	Data Service		Data Service crash during restart or shutdown	When the Data Service is being restarted or shutdown, it is possible for the service to crash instead of terminating gracefully. This is due to a bug in the processing of certain incoming management operations from other services. These management operations do not recognize the process is shutting down, and remain in the system when the service termination logic attempts to free some resources that these management operations require.	Not applicable	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-76020	Data Service		Data Service may restart during management / replication network congestion	In rare cases, network congestion will cause internal delays in the Data Service that are misinterpreted as an error. The service will be restarted automatically to recover from this perceived error. The system will resume normal operation after this restart. Protocol (iSCSI, FC) network congestion will not trigger this failure. It is specific to internal management and snapshot replication traffic.	Not applicable	
AS-48615	Data Service		Data Service restarts due to large amount of key-ids of encrypted volumes	An internal data structure within the Data Service stores the key-ids of encrypted volumes. When encrypted volumes are cloned and those clones are deleted, this leads to incremented key-ids being generated. In certain instances, a considerably large amount of key-ids (~50,000) may consume high memory and cause the Data Service to restart unexpectedly.	Not applicable	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-86485	Data Service		Data Service restart loop after enabling deduplication on a volume with writable snapshots	When a dedupe-capable array has writable snapshots (i.e., most commonly associated with VSS snapshots) on a volume with dedupe currently disabled, then a user enables dedupe on the volume and writes data to a writable snapshot on that volume, a Data Service restart loop condition can occur.	If a DSD restart loop occurs, contact HPE Nimble Storage Support to stabilize the system.	
AS-86535	Platform		The Fibre Channel target driver shall explicitly logout sessions if FCP commands are received without a PRLI or if the session is to a Well Known Fabric Address.	The array does not provide Fibre Channel fabric services. If the initiator attempts to create a session to a Well Known Fabric Address, the session is now explicitly logged out. If the initiator sends SCSI commands to the array without first sending a PRLI command, the session will also be logged out. In each case the initiator will re-establish the session and normal Fibre Channel traffic will resume.	Prior to this change, a session would be created but all SCSI commands would be returned with BUSY status which would cause a data unavailable situation. The Fibre Channel session would need to be terminated to resolve this issue. The easiest way of doing this is to reboot the controller.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-88785	Platform		False alerts of the array being in solo mode after nightly DNA is generated	After performing a software update to NimbleOS 5.0.x, lower-end platforms may falsely report multiple instances of the array being in SOLO mode even though the array is actually in High Availability mode (Active / Standby). This may occur when the nightly DNA is generated on the array. The DNA creation causes a load on the interconnect link between the active and standby controller. And in some instances, the link between the two controllers is exhausted, causing a failure in communication.	Not applicable	
AS-60494	Platform		Software update processes or other services may hang due to stale rsh sessions	Stale rsh sessions, used internally during controller communication, may cause software update processes or other services to hang. Failover typically clears these stale sessions but in rare cases failover too will hang requiring Nimble Storage Support intervention.	Contact Nimble Storage Support.	
AS-75123	Hardware		Enclosure Management service may restart after issuing an IPMI command	Enclosure Management service restarts in rare corner-corner case after issuing an Intelligent Platform Management Interface (IPMI) command. The service automatically restarts and continues shelf management.	No workaround available yet. EMD automatically restarts and continues shelf management. Future NimbleOS releases will have an appropriate fix.	



Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-82674	SAN		SCSI HA Service restarts unexpectedly on standby controller	The SCSI High Availability Service may restart unexpectedly on the standby controller when a SCSI forward command returns a failure, but the memory buffer is not cleared. This service will recover successfully after the restart. ERROR: scsi.data:f_SFDCMDFW-DOP_done: scsi_sfd_cmd_fwd_opcc:226: check failed: _sfw_resp_data_buf == __null ERROR: scsi.data:f_SFDCMDFWDOP_done: scsi_sfd_cmd_fwd_opcc:226: aborting:	None	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-88224	SAN		Data Service or SCSI High Availability Service Restart during abnormal command termination	SCSI commands are processed by both the Data Service and the SCSI High Availability Service. Normally, SCSI commands are processed to completion, and the SCSI response is sent. But under certain conditions (Abort or LU_Reset task management, or connection loss), commands are terminated abnormally instead of executing to completion. Due to a race condition defect in the abnormal termination logic, the Data Service or SCSI High Availability Service may generate a process core, and restart. This results in a short disruption in the Nimble storage systems ability to service IO requests from hosts. After a short period of disruption, the affected process restarts and resumes servicing host IO requests.	No known workaround.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-80470	SAN		Performing Volume Re-size in Multi-Array Pool Configurations may cause Errors during Host Extend Operations	In a multi-array pool environment, if hosts are connected to the pool using group-scoped target (FC arrays, or VVols over iSCSI arrays), the host might fail to extend the volume if the volume is resized on the array. For example, on Microsoft Windows, you may see the following error when trying to extend a drive. "The drive cannot find the sector requested."	Fail-over on each array in the group after performing the volume resize on the array and before performing the extend operation on the host, or contact HPE Nimble Storage Support to work around the issue.	
AS-83463	Security		Array may experience unexpected takeover after excessive login attempts	The array may experience an unexpected takeover after an excessive amount of login attempts (thousands) occur in rapid succession. This may be caused by third party monitoring tools or scanners.	Reducing the number of logins or SSH sessions is recommended.	
AS-90015	Security		Security scanner using Kerberos authentication for SSL causes service restart	When a security scanner is used to perform a Kerberos authentication for an SSL connection, this may cause the SSL connection thread to hang. After a timeout, the Group Management service restarts.	Disabling the Kerberos test is recommended.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-78436	System Management		Group management process my restart due to a deadlock when replicating	A deadlock can occur between two management processes when updating the replication bandwidth throttle. The Management Process will restart and clear the condition. There is no disruption to data services and replication will continue automatically without intervention.	Not applicable	
AS-95570	System Management		Setting multiple snapshots online simultaneously can lead to a LUN ID conflict	When multiple snapshots that have an access control list (ACL) configured to the same set of hosts, are set online simultaneously, it is likely that the same LUN ID can be assigned to different snapshots.	If snapshots do not need to be written to or read from, avoid adding an ACL to the snapshot. If ACLs are added to the snapshot, avoid bringing multiple snapshots online simultaneously.	
AS-89298	System Management		Group Management service may restart due to race condition	Due to a race condition with volume and branch creation, the Group Management service can crash when creating volumes. Occurrence of this race condition is extremely rare. The Process Management service automatically restarts the Group Management service after the crash and it should resolve the race condition.	Not applicable	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-77242	System Management		Alarm to Enter encryption passphrase to reactivate is not cleared	After deleting the existing masterkey and activating a new one, the following alarm persists - Encryption deactivated. Encrypted volumes cannot be accessed or created. Enter encryption passphrase to reactivate.	Not applicable	
AS-81610	System Management		Group merge fails due to unexpected array setting	The group merge operation may fail if an internal array configuration setting is set to an unexpected value.	Please contact HPE Nimble Storage Support to adjust the value.	
AS-75560	System Management		CLI reports a timeout but group merge is still successful	A group merge is initiated via the HPE Nimble Storage Array CLI. The CLI reports the failing error, suggesting that the operation has timed out: ERROR: Failed to communicate with system management service... However, the group merge still completes successfully.	Please run the following command via the HPE Nimble Storage Array CLI to verify that the group merger completed successfully: group --info Verify the Member array(s) section to confirm that all arrays were properly added to the group.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-71088	System Management		Array Management service may restart due to deadlock	In multi-array groups, management services backup is setup to serve as a backup in case that the leader array fails. However, during the setup of the backup, it is possible that the initial seed takes longer than the pre-determined amount of time given for the seeding to finish. If we try to replicate changes to the database synchronously during the seeding, the process become unresponsive. As a result, the Array Management service restarts.	Not applicable	
AS-90646	System Management		After an Automatic Failover, the previous Group Leader fails to takeover as the Backup Group Leader	After and Automatic Failover, when old Group Leader is powered on, it remains out of sync due to failing to takeover as the Backup Group Leader. This is a relatively rare race condition that can happen when the Group Management Services on the Backup Leader is coming up and bringing its services online, and one of the services either takes too long to come up or fails to come up.	Please contact HPE Nimble Storage Support.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-72860	System Management		Controller-level alerts may fail or appear delayed following group leader migration	In rare cases, after migrating the group leader role to another array in a multi-array group, the Controller and Array Management services may become out of sync. Then, controller-level alerts cannot be sent to the Event Management Service. As a result, these controller-level alerts may fail to be sent internally or externally to Nimble Support until the Controller Management Service is restarted.	Following group leader migration, if controller-level alerts are not being sent, perform controller failover or contact Nimble Storage Support to manually restart the Controller Management Service.	
AS-74838	System Management		Group Management service terminates unexpectedly when query for Protocol Endpoint attributes	If netconfig validation failed during group setup, the iSCSI target name used for vVol is not generated correctly. Subsequently, when vVol integration is enabled, the Group Management service will terminate unexpectedly when querying for Protocol Endpoint attributes.	Not applicable	
AS-83269	System Management		HPE Cloud Volume replication may fail if application category is not configured for custom performance policies	HPE Cloud Volumes with deduplication enabled may fail to replicate. This occurs if the volume uses a custom performance policy, and the application category is not defined.	Please contact HPE Nimble Storage Support.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-90226	System Management		Group Management Service may restart due to large amount of snapshot operations	Under certain conditions, the Group Management Service may restart unexpectedly on the array. This may occur if an excessive amount of snapshot operations (create snapshot, delete snapshot, restore volume) are run on the same volume, for a large amount of volumes.	Not applicable	
AS-90913	System Management		Group Management Service restarts unexpectedly on downstream array due to excessive FC sessions	The Group Management Service may restart unexpectedly on the downstream array during the initial replication configuration sync with the upstream array. This may occur if there are a large amount of volumes belonging to the volume collection being replicated and if the volumes have a large amount of Fibre Channel (FC) connections.	Not applicable	
AS-90569	System Management		Group Management Service Restarts when snapshot collection is deleted	Due to a rare timing issue, the Group Management service may restart unexpectedly if a snapshot collection is being deleted while an internal checkpoint is being performed on the same collection.	Not applicable	



Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-91868	System Management		Group Management Service Restarts after deleting replication partner	Under rare circumstances, the Group Management service on the array may restart unexpectedly after a replication partner is deleted. This occurs if a periodic connection task between the partners happens to be running at the same time.	Not applicable	
AS-87008	System Management		Volume dissociation during replication may cause Group Management service restart	Performing a dissociation of a volume from a volume collection while replication is in progress can, in rare cases, lead to a restart of the Group Management services. This is not critical as the group management services are restarted automatically and replication continues from where it left off.	Not applicable	
AS-90407	System Management		Group Management service may restart due to race condition with snapshot collections	Due to a race condition when deleting empty snapshot collections, the Group Management service can crash unexpectedly. This issue is resolved when the Group Management service automatically restarts. The Process Management service automatically restarts the Group Management service after the crash and it should resolve the race condition.	Not applicable	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-84360	System Management		Group Management Service restarts unexpectedly	Due to a rare race condition, the Group Management Service may attempt to resume replication for a snapshot collection whose replication was aborted earlier. This will cause the service to restart unexpectedly.	Not applicable	
AS-87921	System Management		Group Management Service Restarts due to timing issue	Due to a timing issue, the Group Management Service may restart unexpectedly when it is querying a snapshot that has already been deleted.	Not applicable	
AS-18597	System Management		Deleting volume collection or deleting protection schedule can leave behind snapshots	Deleting volume collection or deleting protection schedule from a volume collection will leave behind snapshots that will not be automatically deleted. Such snapshots can occupy space.	Prior to deleting volume collection, delete snapshot collections associated to volume collection if snapshot collections are not required/desired. Even though protection schedule is deleted, snapshot collections are accessible and can be deleted from CLI or GUI, if desired.	
AS-77649	System Management		System management service may restart while reducing snapshot retention for volcolls	The manual reduction of scheduled snapshot retention policies for any number of volume collections may result in multiple system management service restarts when the reduction results in a large number of snapshot deletions. System management service will stabilize once the number of snapshots equals the new retention value across all volume collections.	Modify the retention policy such that a fraction of the total number of snapshots to be discarded due to the policy change are scheduled for deletion, then wait until the number of snapshots equals the new value. Repeat this step until all retention policies have the desired value.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-81890	System Management		Array Management service may restart when reading many different statistics at a high rate	When accessing a specific internal reference variable that has been deleted, the Array Management service may unexpectedly restart. This condition is more likely to occur with very high rates of reads of multiple stats. Third-party monitoring applications are known to access all per-volume statistics in this manner. The Array Management service restart automatically recovers the condition.	Not applicable	
AS-83040	System Management		Array Management service leaks memory during some stats read of non-existent stats data	The Array Management service can restart due to leaking memory. This occurs when a client repetitively opens stats which do not exist. The stat open requests are usually performed by stats CLI, and are usually performed by a 3rd party automated stats data collection tool. Data services are not adversely affected by the Array Management service restart.	Minimize opening stats many times with an automated tool or script. If the service remains unstable, discontinue usage of custom or third party stats monitoring applications.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-82976	System Management		Group Management Service may restart when logging into array	In certain circumstances, due to a rare race condition, the Group Management service may restart unexpectedly on the array. This may occur if a login is made to the array while internal system log maintenance is being performed.	Not applicable	
AS-73687	System Management		Active Directory Integration Service fails restarts unexpectedly	Due to a memory allocation issue, the Active Directory Integration Service on the array may restart unexpectedly, causing Active Directory RBAC authentication to fail.	Not applicable	
AS-78805	System Management		Stale Kerberos ticket with AD may cause Group Management service restart	In rare instances, the Group Management Service may restart while an Active Directory user attempts to log in. This occurs if the array's Kerberos ticket with the AD server expires and is stuck trying to renegotiate. The Group Management Service restarts as part of a routine health check if the renegotiation surpasses five minutes.	Not applicable	
AS-82827	System Management		The Group Management service may restart during concurrent user logins.	Due to a section of code that is not thread safe, concurrent user logins can cause the Group Management service to restart unexpectedly.	Not applicable	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-75227	System Management		Events and Alarms for volumes now include pool name	As part of the 5.1.1.0 Release, HPE Nimble Storage Release now supports volumes with the same name within a group as long as they are in different pools. Previously, the volume name was unique in the group, but now they are only unique within a pool. To make identifying the correct volume easier, we now include the pool name in the event/alert. Tools that parse the events/alerts and are looking for the volume name should take into account the additional information in the event/alert	Not applicable	
AS-69937	System Management		The web service is unreachable or very slow is reported within the array GUI	A dialog box indicating that The web service is unreachable or very slow may appear within the HPE Nimble Storage Array GUI due to intermittent communication problems, even when there is no user activity in the GUI. This is caused by automatic data refresh requests occurring in the background.	If you see the dialog box indicating the error, please wait for 60 seconds and refresh the HPE Nimble Storage Array GUI. You may also need to clear the browser cache if the issue persists.	

Resolved Issues in NimbleOS version 5.1.1.0						
ID	Component	Public State	Title	Description	Workaround	Fix Version
AS-66521	System Management		During a group merge of two Fibre Channel groups, a LUN ID conflict is identified with an incorrect error message	When attempting to merge two Fibre Channel groups, if there is a conflict in the LUN IDs, the merge will fail with the wrong error message. The incorrect error message states conflicting alias name when LUN IDs actually have a conflict.	Ensure that there is not a LUN ID conflict between the two groups.	

### Known Issues

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There are no known issues in NimbleOS version 5.1.1.0