

Storage Center 7.4 Release Notes

This document describes the new features, enhancements, fixed issues, and known issues in Storage Center 7.4.

Current Release Version: 7.4.21

Previous Release Version: 7.4.20

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Document Revision History


Revision	Date	Description
A	August 2019	Initial release of Storage Center 7.4
B	October 2019	Added SCOS-58743 to Known Issues
C	January 2020	Removed SCOS-55504 from Fixed Issues, added SCOS-59639 and SCOS-55685 to Known Issues, and added the hypervisor platforms that support Live Volume with Auto Failover
D	February 2020	Updated for Storage Center 7.4.10
E	July 2020	Updated for Storage Center 7.4.20
F	August 2020	Updated for Storage Center 7.4.21
G	December 2020	Added SCOS-60092 and SCOS-62354 to Known Issues
H	March 2021	Added VMware vSphere 7.0 to the Live Volume with Auto Failover section, added SCOS-60438 to Fixed Issues in Data Reduction, and added SCOS-62922 to Known Issues Related to Vendors

Compatibility

The following storage systems are compatible with Storage Center 7.4:

- SC9000
- SC8000
- SC7020F
- SC7020
- SC5020F
- SC5020
- SC4020

- SCv3000 Series
- SCv2000 Series

 **NOTE:** Storage Center 7.4 supports cabling mixed-speed expansion enclosures. SC400, SC420, and SC420F expansion enclosures can be cabled with SC200 and SC220 expansion enclosures.

New in Storage Center 7.4.21

The following features and improvements were added to Storage Center 7.4.21:

Live Volume with Auto Failover Support

The Live Volume with Auto Failover feature supports the following hypervisor platforms in Storage Center 7.4.21:

- Windows Server 2019 Hyper-V
- Windows Server 2016 Hyper-V
- Windows Server 2012 R2 Hyper-V
- Windows Server 2012 Hyper-V
- VMware vSphere 7.0
- VMware vSphere 6.7
- VMware vSphere 6.5
- VMware vSphere 6.0
- VMware vSphere 5.5

New in Storage Center 7.4.10

The following features and improvements were added to Storage Center 7.4.10:

Space Reporting Improvements

Made improvements to the space reporting in Storage Center 7.4.10, which is visible in the Storage Manager Client and Unisphere web interface.

New in Storage Center 7.4.2

The following features and enhancements were added to Storage Center 7.4.2:

CloudIQ Support

CloudIQ provides customer with the ability to remotely monitor the performance, capacity, configuration, and health of the storage systems using a web browser.

Basic support for CloudIQ was introduced in Storage Center 7.3.

Storage Center 7.4 contains full support for CloudIQ, including an automated onboarding feature to simplify the process of registering storage systems with CloudIQ.

Live Volume with Auto Failover Support

The Live Volume with Auto Failover feature supports the following hypervisor platforms in Storage Center 7.4.2:

- Windows Server 2016 Hyper-V
- Windows Server 2012 R2 Hyper-V
- Windows Server 2012 Hyper-V

- VMware vSphere 6.7
- VMware vSphere 6.5
- VMware vSphere 6.0
- VMware vSphere 5.5

Performance Improvements

Storage Center 7.4 contains performance improvements to the Storage Center software .

SSL Certificate Improvements

Improvements have been made to SSL certificate handling to enable the following:

- Importing of chained SSL certificates
- Wildcard certificates

Storage Center Initial Configuration with Unisphere

The Unisphere web interface in Storage Center 7.4 can be used to perform the initial configuration of the following storage systems:

- SC9000
- SC7020F
- SC7020
- SC5020F
- SC5020
- SCv3000 Series

Storage Manager 2019 R1

Storage Manager 2019 R1 or later is required to manage storage systems running Storage Center 7.4.

Veeam Snapshot Integration

Storage Center 7.4 contains support for snapshot integration with Veeam Backup and Replication 9.5.

The Veeam Backup and Replication Plug-in for Storage Center is available for download from the Veeam website.

The plug-in does not support the following Storage Center objects:

- FluidFS volumes
- Live Volumes
- VVols

Windows Server 2019

Support for hosts running Windows Server 2019 has been added to Storage Center 7.4.

Storage Center 7.4 Feature Availability and Licenses

The core licenses and support for optional licensed features varies depending on the storage system.

SC9000 Features and Licenses

The following licensed features and optional value-added bundles are available on SC9000 storage systems:

Licenses/Bundles	Licensed Features
Core Software Bundle	<ul style="list-style-type: none">• Data Reduction (Compression and Deduplication)• Dell Storage Manager• Dynamic Capacity• Dynamic Controllers• Live Migrate• Local Data Protection<ul style="list-style-type: none">◦ Data Instant Replay (Snapshots)◦ Manual Replay (Snapshots)• Multi-VLAN Tagging• Virtual Ports• Volume QoS• VVols
Optional Licenses	<ul style="list-style-type: none">• Live Volume and Live Volume with Auto Failover• Remote Instant Replay (Replication), including Cross-Platform Replication• Replay Manager• SED FIPS Secure Data• Storage Manager Chargeback
Storage Optimization Bundle	<ul style="list-style-type: none">• Data Progression• Fast Track
Storage Protection Bundle	<ul style="list-style-type: none">• Live Volume and Live Volume with Auto Failover• Remote Instant Replay (Replication), including Cross-Platform Replication• Replay Manager
Total Feature Bundle	<ul style="list-style-type: none">• SED FIPS Secure Data• Storage Manager Chargeback• Storage Optimization Bundle• Storage Protection Bundle

SC8000 Features and Licenses

The following licensed features are available on SC8000 storage systems:

Licenses/Bundles	Licensed Features
Core Software Bundle	<ul style="list-style-type: none">• Data Reduction (Compression and Deduplication)• Dell Storage Manager• Dynamic Capacity• Dynamic Controllers• Live Migrate• Local Data Protection

Licenses/Bundles	Licensed Features
	<ul style="list-style-type: none"> ○ Data Instant Replay (Snapshots) ○ Manual Replay (Snapshots) ● Multi-VLAN Tagging ● Virtual Ports ● Volume QoS ● VVols
Optional Licenses	<ul style="list-style-type: none"> ● Live Volume and Live Volume with Auto Failover ● Remote Instant Replay (Replication), including Cross-Platform Replication ● Replay Manager ● SED FIPS Secure Data ● Storage Manager Chargeback

SC7020F and SC5020F Features and Licenses

The following licensed features are supported on SC7020F and SC5020F all-flash storage systems:

Licenses/Bundles	Licensed Features
Total Feature Bundle	<ul style="list-style-type: none"> ● Data Progression ● Data Reduction (Compression and Deduplication) ● Dell Storage Manager ● Dynamic Capacity ● Dynamic Controllers ● Live Migrate ● Live Volume and Live Volume with Auto Failover ● Local Data Protection <ul style="list-style-type: none"> ○ Data Instant Replay (Snapshots) ○ Manual Replay (Snapshots) ● Multi-VLAN Tagging ● Remote Instant Replay (Replication), including Cross-Platform Replication ● Replay Manager ● SED FIPS Secure Data ● Storage Manager Chargeback ● Virtual Ports ● Volume QoS ● VVols

SC7020 and SC5020 Features and Licenses

The following licensed features and optional value-added bundles are supported on SC7020 and SC5020 storage systems:

Licenses/Bundles	Licensed Features
Core Software Bundle	<ul style="list-style-type: none"> ● Data Reduction (Compression and Deduplication) ● Dell Storage Manager ● Dynamic Capacity ● Dynamic Controllers ● Live Migrate ● Local Data Protection <ul style="list-style-type: none"> ○ Data Instant Replay (Snapshots) ○ Manual Replay (Snapshots) ● Multi-VLAN Tagging ● Virtual Ports ● Volume QoS

Licenses/Bundles	Licensed Features
	<ul style="list-style-type: none"> • VVols
Optional Licenses	<ul style="list-style-type: none"> • Live Volume and Live Volume with Auto Failover • Remote Instant Replay (Replication), including Cross-Platform Replication • Replay Manager • SED FIPS Secure Data • Storage Manager Chargeback
Storage Protection Bundle	<ul style="list-style-type: none"> • Live Volume and Live Volume with Auto Failover • Remote Instant Replay (Replication), including Cross-Platform Replication • Replay Manager
Storage Optimization Bundle	<ul style="list-style-type: none"> • Data Progression • Fast Track
Total Feature Bundle	<ul style="list-style-type: none"> • SED FIPS Secure Data • Storage Manager Chargeback • Storage Optimization Bundle • Storage Protection Bundle

SC4020 Features and Licenses

The following licensed features and optional value-added bundles are supported on SC4020 storage systems:

Licenses/Bundles	Licensed Features
Core Licenses	<ul style="list-style-type: none"> • Data Reduction (Compression and Deduplication) • Dell Storage Manager • Dynamic Capacity • Dynamic Controllers • Live Migrate • Local Data Protection <ul style="list-style-type: none"> ◦ Data Instant Replay (Snapshots) ◦ Manual Replay (Snapshots) • Multi-VLAN Tagging • Virtual Ports • Volume QoS • VVols
Optional Licenses	<ul style="list-style-type: none"> • Live Volume and Live Volume with Auto Failover • Remote Instant Replay (Replication), including Cross-Platform Replication • Replay Manager • SED FIPS Secure Data • Storage Manager Chargeback
Performance/Optimization Bundle	<ul style="list-style-type: none"> • Data Progression • Fast Track
Remote Data Protection Bundle	Remote Instant Replay (Replication), including Cross-Platform Replication
Remote Data Protection with Live Volume Bundle	<ul style="list-style-type: none"> • Remote Instant Replay (Replication), including Cross-Platform Replication • Live Volume and Live Volume with Auto Failover

SCv3000 Series Features and Licenses

The following licensed features and optional value-added bundles are supported on SCv3000 series storage systems:

Licenses/Bundles	Licensed Features
Core Software Bundle	<ul style="list-style-type: none">• Data Compression• Dell Storage Manager• Dynamic Capacity• Dynamic Controllers• Live Migrate• Local Data Protection<ul style="list-style-type: none">◦ Data Instant Replay (Snapshots)◦ Manual Replay (Snapshots)• Virtual Ports• Volume QoS• VVols
Optional Licenses	<ul style="list-style-type: none">• Live Volume and Live Volume with Auto Failover• Replay Manager• SED FIPS Secure Data• Storage Manager Chargeback
Storage Protection Bundle	<ul style="list-style-type: none">• Live Volume and Live Volume with Auto Failover• Remote Instant Replay (Replication), including Cross-Platform Replication• Replay Manager
Storage Optimization Bundle	<ul style="list-style-type: none">• Data Progression• Fast Track
Total Feature Bundle	<ul style="list-style-type: none">• SED FIPS Secure Data• Storage Manager Chargeback• Storage Optimization Bundle• Storage Protection Bundle

SCv2000 Series Features and Licenses

The following licensed features are supported on SCv2000 series storage systems:

Licenses/Bundles	Licensed Features
Core Licenses	<ul style="list-style-type: none">• Dell Storage Manager• Dynamic Capacity• Dynamic Controllers• Live Migrate
Optional Licenses	<ul style="list-style-type: none">• Flex Port• Local Data Protection<ul style="list-style-type: none">◦ Data Instant Replay (Snapshots)◦ Manual Replay (Snapshots)• Remote Data Protection (Asynchronous replication only)

Storage Center 7.4 Scalability

The following scalability guidelines apply to Storage Center 7.4:

Storage System Scalability Guidelines

The following scalability guidelines apply to SC9000, SC8000, SC7020F, SC7020, SC5020F, SC5020, SC4020, SCv3000 Series, and SCv2000 Series storage systems running Storage Center 7.4.

Table 1. Scalability Guidelines for Dual-Controller Storage Systems

Storage System (memory per controller)	Raw (512 KB pages)	Addressable (512 KB pages)	Raw (2 MB pages)	Addressable (2 MB pages)	Raw (4 MB pages)	Addressable (4 MB pages)
SC9000 (128 GB or 256 GB)	1500 TB	1000 TB	6000 TB	4000 TB	12,000 TB	8000 TB
SC8000 (64 GB)	750 TB	500 TB	3000 TB	2000 TB	3000 TB	2000 TB
SC7020F or SC7020 (128 GB)	1000 TB	650 TB	4000 TB	2600 TB	8000 TB	5200 TB
SC5020F or SC5020 (64 GB)	540 TB	350 TB	2160 TB	1400 TB	4320 TB	2800 TB
SC4020 (16 GB)	263 TB	175 TB	1054 TB	700 TB	1054 TB	700 TB
SCv3000 Series (16 GB)	250 TB	169 TB	1000 TB	675 TB	2000 TB	1350 TB
SCv2000 Series (8 GB)	168 TB	112 TB	672 TB	450 TB	N/A	N/A

NOTE: In the release notes for Storage Center 7.2 and Storage Center 7.1, the supported maximum storage space for an SC4020 using a 512 KB page size was incorrectly calculated as 500 TB raw and 400 TB addressable. The correct supported maximum storage space for an SC4020 using a 512 KB page size is 263 TB raw and 175 TB addressable.

Storage Center Scalability Guidelines

The following scalability guidelines are the maximum recommended design guidelines for storage systems running Storage Center 7.4.

Table 2. Storage Center Scalability Guidelines for SC9000, SC8000, SC7020F, SC7020, SC5020F, SC5020, and SC4020 Storage Systems (continued)

Storage Center Object	Supported Maximum
Drives	<ul style="list-style-type: none">SC9000 – 1024 drives total, 192 drives per SAS chainSC8000 – 960 drives total, 168 drives per SAS chainSC7020F or SC7020 – 606 drives total, 192 drives per SAS chainSC5020F or SC5020 – 222 drives total, 192 drives per SAS chainSC4020 – 192 drives total, 168 drives per SAS chain
Disk Folder	10 disk folders
Server	<ul style="list-style-type: none">500 servers (Total number of servers includes physical servers, virtual servers, and server clusters)500 server folders1000 server HBA initiator ports (Total number of HBA initiator ports includes all physical and virtual ports that are visible to the SAN)
Volume	<ul style="list-style-type: none">500 TB maximum volume size (or the maximum addressable storage space, whichever is less)2000 volumes500 volume folders
Deduplication	1 PB data ingestion limit (SC4020 – 500 TB data ingestion limit)
Data Instant Replay (Snapshots)	<ul style="list-style-type: none">Snapshots:

Table 2. Storage Center Scalability Guidelines for SC9000, SC8000, SC7020F, SC7020, SC5020F, SC5020, and SC4020 Storage Systems

Storage Center Object	Supported Maximum
	<ul style="list-style-type: none"> ○ SC9000 – 32,000 snapshots ○ SC8000 – 16,000 snapshots ○ SC7020F or SC7020 – 16,000 snapshots ○ SC5020F or SC5020 – 8000 snapshots ○ SC4020 – 8000 snapshots ● 1000 snapshot profiles ● 100 snapshot history profiles ● 200 consistency groups ● 100 volumes per consistency group <ul style="list-style-type: none"> ○ SC5020F or SC5020 – 50 volumes per consistency group ○ SC4020 – 40 volumes per consistency group
Replications	<ul style="list-style-type: none"> ● Source replications: <ul style="list-style-type: none"> ○ SC9000 – 1000 source replications ○ SC8000 – 500 source replications ○ SC7020F or SC7020 – 1000 source replications ○ SC5020F or SC5020 – 500 source replications ○ SC4020 – 500 source replications ● 2000 target replications <ul style="list-style-type: none"> ○ SC4020 with Fibre Channel front-end ports – 1000 replications ○ SC4020 with iSCSI front-end ports – 230 replications
Live Volumes	<ul style="list-style-type: none"> ● 500 Live Volumes ● 150 Live Volumes with Auto-Failover
QoS Profiles	<ul style="list-style-type: none"> ● 100 Volume QoS Profiles ● 100 Group QoS Profiles ● 100 Volumes per Group QoS Profile
Thin Import	10 volumes (maximum simultaneous imports)

Table 3. Storage Center Scalability Guidelines for SCv3000 Series Storage Systems


Storage Center Object	Supported Maximum
Drives	<ul style="list-style-type: none"> ● SCv3000 – 208 drives total, 192 drives per SAS chain ● SCv3020 – 222 drives total, 192 drives per SAS chain
Disk Folder	10 disk folders
Server	<ul style="list-style-type: none"> ● 250 servers (Total number of servers includes physical servers, virtual servers, and server clusters) ● 250 server folders ● 500 server HBA initiator ports (Total number of HBA initiator ports includes all physical and virtual ports that are visible to the SAN)
Volume	<ul style="list-style-type: none"> ● 500 TB maximum volume size (or the maximum addressable storage space, whichever is less) ● 1000 volumes ● 500 volume folders
Data Instant Replay (Snapshots)	<ul style="list-style-type: none"> ● 4000 snapshots ● 1000 snapshot profiles ● 100 snapshot history profiles ● 100 snapshots per volume ● 200 consistency groups ● 25 volumes per consistency group
Replications	<ul style="list-style-type: none"> ● 250 source replications ● 1000 target replications

Table 3. Storage Center Scalability Guidelines for SCv3000 Series Storage Systems

Storage Center Object	Supported Maximum
Live Volumes	<ul style="list-style-type: none"> • 250 Live Volumes • 150 Live Volumes with Auto-Failover
QoS Profiles	<ul style="list-style-type: none"> • 100 Volume QoS Profiles • 100 Group QoS Profiles • 100 Volumes per Group QoS Profile
Thin Import	10 volumes (maximum simultaneous imports)

Table 4. Storage Center Scalability Guidelines for SCv2000 Series Storage Systems

Storage Center Object	Supported Maximum
Drives	<ul style="list-style-type: none"> • SCv2000 – 168 drives total, 156 drives per SAS chain • SCv2020 – 168 drive totals, 144 drives per SAS chain • SCv2080 – 168 drives total, 84 drives per SAS chain
Disk Folder	4 disk folders
Server	<ul style="list-style-type: none"> • 100 servers (Total number of servers includes physical servers, virtual servers, and server clusters.) • 100 server folders • 200 server HBA initiator ports (Total number of HBA initiator ports includes all physical and virtual ports that are visible to the SAN.)
Volume	<ul style="list-style-type: none"> • 500 TB maximum volume size (or the maximum addressable storage space, whichever is less) • 1000 volumes • 500 volume folders
Data Instant Replay (Snapshots)	<ul style="list-style-type: none"> • 2000 snapshots • 1000 snapshot profiles • 100 snapshot history profiles • 100 snapshots per volume • 100 consistency groups • 25 volumes per consistency group
Replications	<ul style="list-style-type: none"> • 124 source replications • 1000 target replications
QoS Profiles	<ul style="list-style-type: none"> • 100 Volume QoS Profiles • 100 Group QoS Profiles • 100 Volumes per Group QoS Profile
Thin Import	10 volumes (maximum simultaneous imports)

 **NOTE:** Data Instant Replay is a licensed feature.

Fixed Issues

The following sections summarize the issues fixed in Storage Center 7.4:

Fixed Issues Related to Alerts and Reporting

The following issues are fixed in Storage Center 7.4:

Table 5. Fixed Alert and Reporting Issues in Storage Center 7.4.20

Issue	Description
SCOS-52698	Storage Center might fail to send customer alerts if the SMTP policy requires the hostname of the SMTP server in a HELO or EHLO message.

Table 6. Fixed Alert and Reporting Issues in Storage Center 7.4.10

Issue	Description
SCOS-58784 (was SCOS-58783)	After updating to Storage Center 7.4.2, an SCv3000 series or SC5020 storage system with 1378 W low-line PSUs might see an alert stating that the PSUs are reporting an incorrect wattage.
SCOS-58505	In the Storage Center Settings dialog box, when the Test Server link on the SMTP Server settings page is clicked, the email that is sent fails to use the text in the Common Subject Line field.
SCOS-56791	The SNMP subagent might reset because of a bad index in the RemoveOutstandingTrap function.
SCOS-55750	When new drives are installed in a Storage Center, the drives might report an incorrect Power On time of 136 years.

Table 7. Fixed Alert and Reporting Issues in Storage Center 7.4.2

Issue	Description
SCOS-55661	The syslog server configuration file might be removed from a controller when the controller reboots.
SCOS-55390	A controller might reset because of threading issues in the Storage Center alerts subsystem.
SCOS-51965	Storage Center might generate invalid alerts when Dell SAS cables longer than 4 meters are used to connect a Storage Center to SC280, SCv360, or SCv420 expansion enclosures. Dell SAS cables longer than 4 meters are supported for use with SC280, SCv360, or SCv420 expansion enclosures.
SCOS-51847	Storage Center logs might contain many unnecessary <code>Lock ownership reacquired while lock outstanding, lock 'RAID Device Table Lock</code> messages.
SCOS-54175	Storage Center alerts without a create time are not displayed in CloudIQ.
SCOS-50002	An excessive number of 'Exiting SCSIVolume::CAsSet' messages may be displayed in the syslog.
SCOS-49321	On an SC7020, SC5020, or SCv3000 series storage system, iSCSI port down alerts might occur for unconfigured iSCSI ports.
SCOS-48807	Added a Storage Center system alert that states some data progression features might not run properly due to time differences on the controllers in a dual-controller storage system.
SCOS-48350	The customer editable name of a Storage Center is now in the subject line of Storage Center email alerts.

Fixed Issues Related to Data Reduction

The following issues are fixed in Storage Center 7.4:

Table 8. Fixed Data Reduction Issues in Storage Center 7.4.20

Issue	Description
SCOS-60622	Deduplication might pause because Storage Center keeps changing the Dedup capable attribute to False for pagepools that support deduplication.
SCOS-60438	An overflow condition might cause the deduplication garbage collection process to fail.
SCOS-60386	A storage system might fail to completely defragment partial pages because of a change introduced in Storage Center 7.4.5.
SCOS-60224	Optimized data might become unavailable if data optimization memory is maxed out due to a memory leak.
SCOS-58788	Page statistics for the active snapshot might be incorrect after data progression.
SCOS-54606	On storage systems that use compression, data progression might fail with an out of memory error.

Table 9. Fixed Data Reduction Issues in Storage Center 7.4.2

Issue	Description
SCOS-55306	Data progression might become suspended and fail to resume if DPM defragment and data progression are running simultaneously.
SCOS-54988	Secondary storage data might be erroneously recovered as lost space during data progression.
SCOS-54249	On a storage system running deduplication, the deduplication ratio might be low because of an issue that prevents the deduplication dictionary from growing.
SCOS-54180	On a storage system with volumes that have many optimized pages, a controller might reset because of a memory exhaustion issue.
SCOS-54104	Deduplication might fail to occur on a storage system because the Data Optimization Deduplication Capable attributes are set to false after a storage system is updated to Storage Center 7.3.4 or later.
SCOS-54101	A RAID restripe might not be able to make progress if there are too many DPM/PPM lost partial pages.
SCOS-52707	An SC8000 controller with 16 GB of memory might reset if the deduplication dictionary grows too large.
SCOS-49144	Data progression might stop running or the Storage Center might reset when a payload checksum failure occurs due to table entries being read incorrectly from memory.
SCOS-49069	In rare instances, increased latency might occur on a storage system if a pagepool consolidation process is active.
SCOS-48236	A restripe statistic might be incorrect within a 5-minute window during which a copy completes.

Fixed Issues Related to Hardware

The following issues are fixed in Storage Center 7.4:

Table 10. Fixed Hardware Issues in Storage Center 7.4.20

Issue	Description
SCOS-59595	On Chelsio T5 or T6 iSCSI HBAs, the target connection code might prevent the SACK-permitted option from being set in response to a connection request from a SCSI initiator, which could impact read I/O performance.

Table 11. Fixed Hardware Issues in Storage Center 7.4.10

Issue	Description
SCOS-59862	A storage system with SEDs might fail to initialize after a complete system power cycle.
SCOS-59486	A controller with an MVLAN fault domain and iSCSI QRQ ports might fail to boot because of an issue with iSCSI QRQ port logic.
SCOS-59111	The iSCSI QRQ interfaces on SCv3000 series and SC5020 storage systems might reset repeatedly after updating to Storage Center 7.4.2.
SCOS-58697	A controller might reset because of resource contention issues with Chelsio iSCSI HBAs.
SCOS-54645	A link up failure might occur when a Chelsio T5 or T6 iSCSI HBA is connected to a Dell Networking switch.

Table 12. Fixed Hardware Issues in Storage Center 7.4.2

Issue	Description
SCOS-56774	On storage systems that use Chelsio T3 iSCSI HBAs with port two enabled, the HBA might send TCP Reset commands to remote initiators on the wrong port.
SCOS-56549	If self-encrypting drives (SEDs) are being managed while the Parent Folder is being changed from Unsecured to Secured, Storage Center might perform a Crypto Erase the SEDs.

Table 12. Fixed Hardware Issues in Storage Center 7.4.2

Issue	Description
SCOS-56536	Read errors might occur if Storage Center attempts to read data from a T10-PI drive after a Crypto Erase has been performed, but before Storage Center initializes the drive.
SCOS-55569	On storage systems that use Chelsio iSCSI HBAs with the T420 driver, the 768 MB limit of SG Payload pool size was increased to 1 GB to prevent iSCSI connection timeouts.
SCOS-55572	On storage systems that use Chelsio T3 iSCSI HBAs, connectivity issues might occur if the iSCSI driver memory allocations exceed a pre-defined threshold.
SCOS-52053	A Storage Center that is in distributed spare mode might select the wrong disk spare for SC460 or SCv360 expansion enclosures.
SCOS-49124	Intermittent erroneous battery failures might occur on SC4020 and SCv2000 series storage systems because of an issue with the BMC firmware.

Fixed Issues Related to Licensing, SupportAssist, and Updating

The following issues are fixed in Storage Center 7.4:

Table 13. Fixed Licensing, SupportAssist, and Updating Issues in Storage Center 7.4.21

Issue	Description
SCOS-61862	If the iDRAC login credentials have been changed on an SC5020 or SC5020F storage system that is running Storage Center 7.4.20 or being updated to Storage Center 7.4.20, the storage system controllers might fail to boot.

Table 14. Fixed Licensing, SupportAssist, and Updating Issues in Storage Center 7.4.20

Issue	Description
SCOS-59083	During a Storage Center software update, the lead controller reboots and sends a Drive Self Test (DST) command to multiple drives. The DST command might cause some drives to go down on the peer controller, which is now the lead controller.
SCOS-58699	If a storage system is updated from Storage Center version 6.4.x or earlier to Storage Center version 7.3.1 or later, a problem with the system metadata might impact host I/Os.

Table 15. Fixed Licensing, SupportAssist, and Updating Issues in Storage Center 7.4.2

Issue	Description
SCOS-54886	Storage Center might stop sending SupportAssist diagnostic data to CloudIQ if the Phone Home Daemon enters a recursive loop.
SCOS-54088	A Storage Center update check might report an update blocker because failed disks that have been previously replaced are not ignored when the update check is performed.
SCOS-53468	Map OS definitions might fail to load after updating a storage system from Storage Center 6.7 to Storage Center 7.2 or later.
SCOS-52506	Storage Center might fail to authenticate a Storage Center user during a service affecting update if the password for user is longer than 16 characters.

Fixed Issues Related to Replication and Live Volume

The following issues are fixed in Storage Center 7.4:

Table 16. Fixed Replication and Live Volume Issues in Storage Center 7.4.10

Issue	Description
SCOS-58967	A controller might reset because of a null pointer error that occurs during replication after updating to Storage Center 7.4.2.

Table 16. Fixed Replication and Live Volume Issues in Storage Center 7.4.10

Issue	Description
SCOS-56743	Recovery from a restore point after Sync Live Volume Auto Failover might cause the size of an expanded volume to revert to the size of the volume prior to expansion.
SCOS-56503	Applying a consistency group snapshot profile to a Storage Center volume fails if the volume has the same index value as a Live Volume on the Storage Center.

Table 17. Fixed Replication and Live Volume Issues in Storage Center 7.4.2

Issue	Description
SCOS-51239	After a Live Volume is converted to a replication, selecting the Replicate Storage to Lowest Tier checkbox in the Edit Replication dialog box has no effect on the replication. Selecting the Replicate Storage to Lowest Tier checkbox still works for replications that have not been converted to a Live volume and converted back to a replication.
SCOS-49585	Deleting a volume might fail after an unsuccessful attempt to create a Live Volume.
SCOS-2474	Deleting a copy/mirror/swap or replication during a controller failover might result in a situation that prevents snapshot reservations from being removed.

Fixed Issues Related to Security

The following issues are fixed in Storage Center 7.4:

Table 18. Fixed Security Issues in Storage Center 7.4.10

Issue	Description
SCOS-59261	Increased the HTTP Strict Transport Security (HSTS) Max Age directive from six months to one year.
SCOS-58472	If a wildcard character is used in the Common Name of a custom SSL certificate, the web server cannot start after the storage system is updated to Storage Center 7.3.11.

Table 19. Fixed Security Issues in Storage Center 7.4.2

Issue	Description
SCOS-55131	Self-signed SSL certificates that are generated by Storage Center have been identified as security vulnerabilities because the certificates do not have a validity period of 825 days or less.
SCOS-48576	A security scan showed a possible vulnerability in the Apache software in the Storage Center management interface.

Fixed Issues Related to Storage Management

The following issues are fixed in Storage Center 7.4:

Table 20. Fixed Storage Management Issues in Storage Center 7.4.21

Issue	Description
SCOS-61881	Rebalancing ports on a storage system might cause volumes to go down because of a change made in Storage Center 7.4.20.

Table 21. Fixed Storage Management Issues in Storage Center 7.4.20

Issue	Description
SCOS-61122	The operation mode of a device copy might be incorrect when RAID devices go into a degraded state, which could result in data integrity issues.

Table 21. Fixed Storage Management Issues in Storage Center 7.4.20

Issue	Description
SCOS-60986	In a dual-controller storage system, a controller might reset because of a segment violation in a SCSI initiator command.
SCOS-60721	RAID scrubs are placed on hold while Storage Center performs a RAID restripe.
SCOS-60271	When drives are added to a storage system, the RAID Device copies that occur might result in RAID devices that are considered unscrubbed and writing to these RAID devices might result in performance degradation.
SCOS-60244	On a storage system with embedded iSCSI ports, the ports might stop accepting new TCP connections due to retransmit errors.
SCOS-60231	A storage system might experience front-end latency because of repeated attempts to start a Data Progression cycle.
SCOS-60203	On a dual-controller storage system with FC and iSCSI ports, if the front-end ports are rebalanced while the iSCSI ports are going up and down on both controllers, different FC ports may become unavailable which might cause a storage outage on a controller.
SCOS-59488	A controller might reset because of a failure with the extended copy (XCOPY) code.
SCOS-58972	In a dual-controller storage system, both controllers might reset repeatedly after an improper shutdown of the storage system.
SCOS-58834	In a dual-controller storage system with front-end SAS connections to a non-Windows host, a controller might reset during initialization because of a null pointer exception.
SCOS-57356	When the Expire Time of a snapshot is changed to Do Not Expire and a local copy of the snapshot is created with the Copy Snapshots option selected, a local copy of the snapshot is created that uses the expiration time of the original Snapshot Profile . If the expire time of the original Snapshot Profile is in the past, the copy of the snapshot expires immediately.

Table 22. Fixed Storage Management Issues in Storage Center 7.4.10

Issue	Description
SCOS-58492	Storage Center fails to account for extent copies when retrying RAID rebuilds in a read failure state.
SCOS-58292	Updating a storage system with a large number of MC sessions from Storage Center 7.2.51 to Storage Center 7.3 might cause the MC sessions to time out and result in a controller reset.
SCOS-56490	RAID restripe might fail to complete due to a PagePoolDevice being marked with a removal failure.
SCOS-56041	A controller might reset if a new SED drive is moved from a Secured disk folder to a Non-Secured disk folder while the SED is being managed.
SCOS-55888	A controller might reset after a memory allocation failure.
SCOS-55685	Storage Center might fail to delete a disk object or change the disk folder for a disk object if the request to perform the operation is stuck.
SCOS-50357	A controller might reset if a Secondary Storage device prune decision occurs while a Secondary Storage device is being torn down.
SCOS-20076	A controller might reset during a Secondary Storage page read if the history is detached from Secondary Storage.

Table 23. Fixed Storage Management Issues in Storage Center 7.4.2

Issue	Description
SCOS-58375	On a dual-controller storage system with 4096 byte or larger sector size drives, a controller failover might fail to occur because of a page pool failure caused by I/O alignment issues.
SCOS-58210	On a dual-controller storage system, the controllers might enter a reset loop because of memory allocation issues.

Table 23. Fixed Storage Management Issues in Storage Center 7.4.2

Issue	Description
SCOS-57359	A controller might reset if Storage Center returns a null pointer to an associated virtualization volume or hypervolume.
SCOS-56244	A controller might reset because of a memory leak.
SCOS-56076	A controller might reset because of issues with metadata paging.
SCOS-55944	Attempting to clear a disk spare hunger alert on a Storage Center might fail when the only remaining hungry device is deleted.
SCOS-55897	On a dual-controller storage system with two ports per fault domain, volumes might become inaccessible if a customer performs the following actions: <ol style="list-style-type: none"> 1. A customer disables a switch port that is connected to a controller port in a fault domain. 2. A customer performs a port rebalance on the Storage Center. 3. A customer disables a switch port that is connected to the other controller port that is in the same fault domain as the port from step 1. 4. A customer reenables the switch port from step 1. 5. A customer reenables the switch port from step 3.
SCOS-55835	A controller might reset at the same time on multiple days because the Storage Center fails to skip null pointers when dequeuing IORPs from the delay queue.
SCOS-55713	View volumes cannot be created on a Storage Center if a user creates a traffic profile of the type Group with a name that starts with text 'Default'.
SCOS-55468	On a dual-controller storage system that is being updated from Storage Center version 7.1 or earlier to Storage Center 7.3, a scrubbing RAID device may adopt the wrong Reed-Solomon attribute during the update.
SCOS-55267	SNMP is unable to retrieve information about the power supply and cooling fan modules on SC7020, SC5020, and SCv3000 series storage systems.
SCOS-55147	A controller might reset because of a background process that attempts to communicate with a subcomponent that no longer exists in Storage Center.
SCOS-55136	On SCv2000 series and SC4020 storage systems, a controller might reset because of a cache-to-flash restore error.
SCOS-54981	On a dual-controller storage system, the SCSI target cannot handle persistent reservations requests for volumes that are active on the other controller.
SCOS-54737	Restripping pagepool devices might take longer to complete for storage systems that were originally deployed with Storage Center 5.5 or earlier.
SCOS-54696	When a storage system that is low on available disk space is updated from a version of Storage Center that does not support Distributed Sparing to a version of Storage Center that does support Distributed Sparing, the Storage Center might attempt to create more spare space when no space is available.
SCOS-54626	Storage Center might fail to remove pagepool devices that are marked as space optimized.
SCOS-54597	A controller might reset because of errors in memory accounting routines.
SCOS-54592	A RAID restripe might become stuck if there is not enough space to create a new device in the tier where devices are getting replaced.
SCOS-54172	Storage Center RAID devices might become over degraded if writes to multiple disks fail around the same time.
SCOS-54122	When drives are added to a storage system, pagepool devices may not be correctly marked for pruning.
SCOS-53504	A controller might reset if there is an issue deleting uninitialized http request because of connectivity issues that prevent the storage system from sending the http request.

Table 23. Fixed Storage Management Issues in Storage Center 7.4.2

Issue	Description
SCOS-53429	<p>When the SNMP settings on a Storage Center are changed and the SMTP subagent daemon is restarted, the log message that is displayed has been changed from:</p> <pre>Warning,Daemon,,snmpSubagent: (((((((((((((SIGTERM))))))))))))))</pre> <p>to</p> <pre>SNMP Sub-agent daemon is restarting to reflect the updated configuration</pre>
SCOS-53078	When a dual-controller storage system is updated from Storage Center 7.2 to Storage Center 7.3, a controller might become stuck during controller failover because of improper cache flushing.
SCOS-53073	On SCv3000 series, SC5020, SC5020F, SC7020, and SC7020F storage systems, Storage Center to iDRAC communication using IPMI over LAN might cause the iDRAC to reset every 24 hours.
SCOS-53017	A controller might reset because of excessive CPU usage while releasing memory.
SCOS-51852	When a storage system is updated from Storage Center 7.2 or earlier to Storage Center 7.3, the Spare Optimizer feature might be automatically enabled on the storage system.
SCOS-51777	When a storage system is updated from Storage Center 7.2.51 or earlier to Storage Center 7.3, a dual-controller SC9000 storage system might reset unexpectedly if a controller becomes unresponsive.
SCOS-51737	The total number of scrub errors on a controller is not persistent after a controller reset.
SCOS-51692	Data progression might take several days to complete for large storage systems.
SCOS-50562	A controller might reset because of an IPMI null pointer error.
SCOS-49760	A storage system might consume more than 90 percent of the available memory because of a Volume IORP memory leak.
SCOS-49035	The Disk Initializer Admin Status is not reset correctly when a disk release is canceled.
SCOS-48764	A restripe might get stuck in a loop and not proceed because of improper maintenance of progress stats. Revised estimation of restripe completion time.
SCOS-19650	If a Storage Center is in emergency mode, but the snapshot feature is not licensed, the Storage Center is unable to expire a Space Management Replay (snapshot).

Fixed Issues Related to the User Interface

The following issues are fixed in Storage Center 7.4:

Table 24. Fixed User Interface Issues in Storage Center 7.4.10

Issue	Description
SCOS-59533	Added Mac OS X 10.x MPIO and VMware ESXi 7.0 to the Server operating system list in Storage Center.

Table 25. Fixed User Interface Issues in Storage Center 7.4.2

Issue	Description
SCOS-58275	A storage system might experience CPU usage of 100 percent because of a looping HTTP client request.
SCOS-55290	The Storage Manager Client and Unisphere web interface do not display accurate deduplication and compression statistics for storage tiers.
SCOS-53443	Attempting to connect to a Storage Center using the Unisphere web interface might fail if the Storage Center cannot communicate with a DNS server.

Table 25. Fixed User Interface Issues in Storage Center 7.4.2

Issue	Description
SCOS-52572	In rare instances, the Storage Manager Client might incorrectly display a Live Volume as a replication, if the Live Volume is mapped to a cluster with many servers.
SCOS-51215	When an iSCSI interface is removed from a Storage Center fault domain, the IP address on the iSCSI interface is not released.
SCOS-50682	SC460 or SCv360 expansion enclosure settings are not being displayed correctly in the Storage Manager Client and Unisphere web interface.
SCOS-48963	When the minimum password age requirement is enabled on a Data Collector, attempting to change the password results in a command failure if the password does not meet the Minimum Age setting.
SCOS-44778	If NTP is not configured on a Storage Center, a mismatch in the clocks between the controllers might prevent users from logging into Storage Center using the Storage Manager Client or Unisphere web interface.

Known Issues

The following sections summarize the known issues in Storage Center 7.4:

Known Issues Related to Alerts and Reporting

The following known issues are related to alerts and reporting:

Table 26. Known Alerts and Reporting Issues

Issue	Description
SCOS-62354	For SCv3000 Series, SC5020, and SC7020 storage systems, the BIOS and iDRAC may not display the correct DIMM speed. Workaround: The incorrect DIMM speed displayed in the BIOS and iDRAC can be ignored.
SCOS-60273	Applications that use third-party LDAP clients may cause Windows to generate incorrect Event ID 2889 message entries. This issue occurs if LDAP interface events are logged and the LDAPServerIntegrity setting is set to 2. Workaround: The Event ID 2889 message entries can be ignored.
SCOS-38226	In rare instances, a Sync LiveVolume Auto Failover alert is not cleared when the condition is corrected. Workaround: Use Storage Manager to manually acknowledge and clear the alert.

Known Issues Related to Data Reduction

The following known issues are related to Data Reduction:

Table 27. Known Data Reduction Issues

Issue	Description
SCOS-13237	The Storage Type Data Reduction statistics might be incorrect if the amount of data eligible for Data Reduction contains fewer than 256 pages. Workaround: None

Known Issues Related to Hardware

The following known issues are related to hardware:

Table 28. Known Hardware Issues

Issue	Description
SCOS-52646	<p>The boot cycle of an SC9000 controller might stop responding or restart several times because of an issue in the BIOS or pre-boot sequence.</p> <p>Workaround: Perform a cold boot of the SC9000 controller by disconnecting both power cables from the controller, waiting one minute, and then reconnecting the power cables to controller.</p>
SCOS-49735	<p>On SCv3000 series, SC5020, or SC7020 storage systems, the ports on Intel branded SFP+ modules in XL710 mezzanine cards might go into an infinite up and down loop.</p> <p>Workaround: Use Dell branded SFP+ modules in XL710 mezzanine cards instead of Intel branded SFP+ modules.</p>

Known Issues Related to Replications and Live Volumes

The following known issues are related to replications and Live Volumes:

Table 29. Known Replication and Live Volume Issues (continued)

Issue	Description
SCOS-60092	<p>If Live Volume is enabled on a storage system, and a Live Volume auto failover occurs during a Storage Center firmware upgrade, the Live Volume on the storage system might become inaccessible.</p> <p>Workaround: Disable Live Volume Auto Failover before performing upgrades or known maintenance on a storage system. Enable Live Volume Auto Failover after the work on the storage system is complete.</p>
SCOS-59752	<p>When replicating from a Storage Center to a PS Group, if the size of the replica reserve is set to 105%, an in-progress replica is deleted on the destination PS Group when the borrowing space limit is exceeded. The source Storage Center reports that the remote disk is down and it enters a retrying state.</p> <p>Workaround: Reseed the replication and set the size of the replica reserve to 200%.</p>
SCOS-55072	<p>If a Windows host reboots after a volume is successfully Live Migrated to a secondary storage system, the host may be unable to access the volume.</p> <p>Workaround: Contact technical support.</p>
SCOS-41280	<p>Using a cluster shared volume (CSV) on a Storage Center within a Windows 2016 cluster solution might result in an I/O failure during an infrastructure fault condition where one of the Windows hosts is isolated from both its peer and its quorum witness.</p> <p>Workaround: Use redundant physical switches to reduce the possibility of the I/O failure.</p>
SCOS-17981	<p>Server mappings may not be removed completely when a server is removed from a cluster using Storage Manager before the server is removed from the cluster.</p> <p>Workaround: Remove the server from the cluster through the operating system first. After the server is rebooted, remove the server object using Storage Manager.</p> <p>When a server is removed from one Storage Center only, or a volume is unmapped on one Storage Center only, the persistent reservations might not stay consistent between primary volume and secondary volume.</p> <p>Workaround: When removing a server from a cluster or unmapping a volume, perform the following steps:</p>

Table 29. Known Replication and Live Volume Issues

Issue	Description
	<ol style="list-style-type: none"> 1. Remove the server from the cluster, or unmap the volume on the server side before making changes on the Storage Centers. 2. Delete the server on both Storage Centers, or unmap the volume on both Storage Centers.
SCOS-14322	<p>A <code>one path to disk</code> alert is generated when a Live Volume is created and there is only one replication path per controller.</p> <p>Workaround: None</p>
ENHTKR-90	<p>When importing a volume, Storage Manager does not allow you to select 0 as the LUN number.</p> <p>Workaround: Change the LUN number of the volume to 0 after importing the volume.</p>

Known Issues Related to Storage Management

The following known issues are related to Storage Management:

Table 30. Known Storage Management Issues

Issue	Description
SCOS-59639	<p>A controller might reset due to a timeout caused by IPMI/KCS driver errors.</p> <p>Workaround: Set the IP address of the iDRAC (BMC) on each controller to a non-routable address such as 0.0.0.0.</p>
SCOS-40588	<p>Connecting to a storage system through Storage Manager Data Collector and setting up an iSCSI fault domain in legacy mode might result in the error <code>Unable to access controller port information</code> and an iSCSI fault domain with only one port.</p> <p>Workaround: Use the Storage Manager Client to connect directly to the storage system and then set up an iSCSI fault domain in legacy mode.</p>
SCOS-22150	<p>In rare instances, a controller failover on an SC7020 or SC5020 storage system might prevent Secure Console access.</p> <p>Workaround: Contact technical support.</p>
SCOS-22026	<p>Removing an HBA or deleting a server object before unmapping it from volumes might result in the server losing access to volumes and prevent controller failover from completing properly.</p> <p>Workaround: Contact technical support.</p>
HPEM-541	<p>In rare instances, SC7020 updates do not complete successfully and the Storage Center might indicate that updates are still required.</p> <p>Workaround: Contact technical support.</p>

Known Issues Related to User Management

The following known issues are related to user management:

Table 31. Known User Management Issues

Issue	Description
SCOS-11192	<p>Storage Center cannot authenticate directory service users that are configured to use an alternate DNS suffix.</p> <p>Workaround: None</p>

Known Issues Related to Vendors

The following known issues are related to vendors:

Table 32. Known Vendor Issues

Issue	Description
SCOS-62922	<p>A Fibre Channel port may restart after being plugged into a Brocade Fibre Channel switch running Fabric OS v8.2.0, v8.2.1, or v8.2.2 that also has multiple logical switches configured.</p> <p>Workaround: Set the <code>fabric.rdp_poll_cycle</code> setting to 0 in the switch configuration for Fabric OS v8.2.0, v8.2.1, or v8.2.2. This issue is fixed in Fabric OS v8.2.3 and v9.0.0.</p>
SQAI-9	<p>An ESXi 5.5 (Update 3b) host using FCoE and QLogic 8262 converged network adapters (CNAs) might cause the host to fail during controller failovers.</p> <p>Workaround: Update the QLogic firmware on the adapter. The QLogic firmware is available at https://www.dell.com/support/home/us/en/19/Drivers/DriversDetails?driverId=6RGDW.</p>
SQAI-3	<p>Software FCoE timeouts might occur when using CNAs in NIC mode.</p> <p>Workaround: Update the QLogic firmware on the adapter. The QLogic firmware is available at https://www.dell.com/support/home/us/en/19/Drivers/DriversDetails?driverId=6RGDW.</p>
SQAI-2	<p>An ESXi 5.5 or 6.0 host with an Emulex FC/FCoE HBA running driver version 11.0.x.x might reset during a controller failover.</p> <p>Workaround: Update to the latest Dell custom images of ESXi 5.5, 6.0, or 6.5.</p>
SQAI-1	<p>Fibre Channel boot from SAN does not work with Emulex LPe12002 boot code version 7.00a2 and the Linux servers RHEL 6.8, SLES 12, and XenServer 7.0.</p> <p>Workaround: Update to Emulex 12002 boot code version 11.20a8 or later.</p>
SCOS-27133	<p>Server bandwidth to the onboard 10 Gb Ethernet ports on an SC7020 drops significantly on reads when the server iSCSI initiator has interrupt moderation set to default or enabled.</p> <p>Workaround: For a Windows server, disable interrupt moderation on the iSCSI cards as described in Dell EMC SC Series Storage: Microsoft Multipath I/O Best Practices. For operating systems other than Windows, review the operating system documentation for instructions on changing interrupt moderation settings. For example, on Linux use the <code>ethtool</code> utility to change interrupt moderation settings.</p>

Limitations

The following limitations exist in Storage Center 7.4:

Portable Volumes

Storage Center 7.4 does not support Portable Volumes.

Portable Volumes are supported in Storage Center 7.2 or earlier.

Support Resources

The following sections provide resources for finding more information about using a Storage Center storage system:

Storage Center Update Information

Contact technical support to determine the Storage Center software version that is required to update to Storage Center 7.4.

NOTE: When updating both the Storage Center and Storage Manager software, update the Storage Manager software before updating the Storage Center software. A storage system that is running a newer version of the Storage Center software cannot be managed by an older version of Storage Manager software.

Related Documentation

The following documents are available for a storage system running Storage Center 7.4.

- *Storage Center Software Update Guide*
Describes how to update Storage Center software from an earlier version to the current version.
- *Storage Center Update Utility Administrator's Guide*
Describes how to use the Storage Center Update Utility to install Storage Center software updates. Updating Storage Center software using the Storage Center Update Utility is intended for use only by sites that cannot update Storage Center using standard methods.
- *Storage Manager Release Notes*
Provides information about Storage Manager software releases, including new features, enhancements, fixed issues, and known issues.
- *Storage Manager Installation Guide*
Provides installation and setup instructions for the Storage Manager software.
- *Storage Manager Administrator's Guide*
Provides instructions for using the Storage Manager software.
- *Unisphere and Unisphere Central Administrator's Guide*
Provides instructions and information for managing storage systems using Unisphere and Unisphere Central.
- *Dell Storage REST API Release Notes*
Provides information about the Dell Storage REST API, which allows you to manage the Storage Manager Data Collector and Storage Centers.

Finding Documentation

The following locations contain documentation for Storage Center products:

- *Dell Support*
Provides documentation for Storage Center storage systems. Go to [Dell.com/support](https://dell.com/support).
- *Dell TechCenter*
Provides technical white papers, best practice guides, and frequently asked questions about Storage Center storage systems. Go to <https://en.community.dell.com/techcenter/storage/>.


Contacting Dell

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services might not be available in your area.

To contact Dell for sales, technical support, or customer service issues, go to Dell.com/support.

- For customized support, type your system service tag on the support page and click **Submit**.
- For general support, browse the product list on the support page and select your product.

Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.