

Quest® QoreStor™ 7.1.3

Release Notes

January 2023

These release notes are intended to supplement the QoreStor documentation to provide last minute information available for the latest release of the QoreStor software. These release notes contain details about the latest updates and resolutions, known issues, resolutions, and other information.

About this release

QoreStor is a software-defined secondary storage platform based on Quest's proven DR Series Appliance's resilient deduplication and replication technologies. With QoreStor, you can break free of backup appliances and accelerate backup performance, reduce storage requirements and costs, and replicate safer and faster to the cloud for data archiving, disaster recovery and business continuity.

QoreStor supports all of the major backup software applications in use today and can lower your backup storage costs to as little as \$.16/GB while reducing your total cost of ownership. (For a complete list of supported backup software, see the *QoreStor Interoperability Guide*). QoreStor achieves these results using patented Rapid Data Access (RDA) technology as well as built-in, variable block-based deduplication and compression.

QoreStor helps you to:

- Reduce on-premises and cloud storage costs with industry-leading deduplication and compression.
- Accelerate backup completion with protocol accelerators and dedupe.
- Shrink replication time by transmitting only changed data.
- Improve data security and comply with FIPS 140-2.
- Maximize return on investment for existing data protection technologies.
- Lower total cost of ownership through all-inclusive licensing.

QoreStor 7.1.3.144 is a maintenance release of QoreStor with enhancements and resolved issues. See [New features and enhancements](#) for more information. See [Resolved issues](#) for information on issues resolved in this version.

New features and enhancements

This QoreStor build includes the enhancements listed below:

- Support for Backblaze S3 in Cloud Tier
- Option to choose protocols NFS, CIFS, and Object container during installation and later
- Allowing non-email-id format for SAML users
- Support for Web UI audit logging
- More statistics on capacity usage and Cloud Tier and Archive Tier files replicated
- Support for RHEL/Oracle Linux/AlmaLinux/Rocky Linux 8.7

Deprecated features

The following is a list of operating systems that are no longer supported starting with QoreStor 7.1.3.

- CentOS 8.x
- RHEL 7.3 - 7.8, 8.2, 8.3
- Oracle Linux 7.3 - 7.8, 8.2, 8.3

i **NOTE:** As of version 7.1.2, QoreStor deprecated support for CentOS, RHEL, and Oracle Linux versions older than 7.9, and RHEL and Oracle Linux version 8.0-8.3. If you currently use a deprecated 7.x version, for best performance and product support, Quest, upgrade to version 7.9. If you use a deprecated 8.x version of RHEL or Oracle Linux, Quest recommends upgrading to version 8.7. If you use an 8.x version of CentOS, Quest recommends migrating to a supported 8.x platform.

Upgrade notes

This topic contains important information for users who are upgrading from a previous QoreStor release.

- If the existing installation of QoreStor uses the default passwords for the **UI admin** login, **qsservice** user, or **qsadmin** user, then you must update these passwords before upgrading to QoreStor 7.1.3
- In version 7.1.3, auto upgrade is not available from the QoreStor Menu.
- AWS Lambda and IAM permissions are required for an archive tier. After you complete an upgrade, to update the IAM roles and permissions, see the *Quest QoreStor User Guide*.
- Existing QoreStor installations can not be upgraded to use Object Direct storage. To use QoreStor in Object Direct mode, you must perform a fresh installation.
- During the upgrade, the QoreStor installation script will verify that the Repository and Metadata filesystems are mounted with the **noatime** and **dirsync** mount options. If not, the installation script will prompt the user to allow the script to make the necessary changes in */etc/fstab* and prompt you to reboot the system and re-run the QoreStor installation process.
- To ensure proper authentication of network shares, after upgrading to QoreStor 7.1.3, remove the QoreStor server from the domain and re-add it to the domain.
- The metadata volume storage requirement for Object Direct configuration has been extended to 2TB, 8TB, and 18TB for cloud-optimized, standard, and large modes. Although it is not mandatory to extend the metadata volume on existing QoreStor instances before upgrade, Quest recommends you extend the volume when it reaches 90% full.
- QoreStor 7.1.3 contains VTL support for RHEL, CentOS, and Oracle Linux versions 8.3 and above. To enable VTL support, see the *Quest QoreStor Installation Guide*.

When using QoreStor with VTL, if you want to upgrade the operating system, upgrade QoreStor before you upgrade the operating system.

Upgrading a migrated DR Series appliance to this QoreStor build

If you have previously migrated your DR Series system to a version of QoreStor prior to 6.1.0.814, then you must upgrade your QoreStor software to build 6.1.0.814 **before** upgrading to this build. The upgrade process in build 6.1.0.814 includes a step that flushes WAM data, and that process must be completed before upgrading to this build.

Upgrading to Rapid CIFS Plug-in 4.0.4.4002 with Secure Connect

Secure Connect is comprised of a set of client and server components that create a resilient and secure communication channel for use by WAN-connected clients. The server components are installed and enabled by default during the installation of the QoreStor server. Starting with the Rapid CIFS plug-in version 4.0.4.4002, the plug-in installer includes the option to install and enable Secure Connect.

i | **IMPORTANT:** Refer to the Known Issues section of this document for Rapid CIFS issues known to be present at the time of release.

If you have WAN-connected Rapid CIFS clients and choose to install Secure Connect, you can do so by following the steps below:

1. On the media server, map a network share to your CIFS-enabled container.
2. Download the plug-in installer from the website, as detailed previously.
3. Open a command prompt with the “Run as Administrator” option selected. To do this using the Windows Start menu, click **Start** → **All Programs** → **Accessories**. Right-click **Command Prompt** and select **Run as Administrator**.
This gives all the required privileges to install/copy the driver files to the Windows drivers folder.
4. Run `QuestRapidCIFS.4.0.4.4002.exe`.
5. When prompted, select **Install a Secure Connection** to install Secure Connect.
Secure Connect ensures backups to QoreStor are completed in spite of slow or unreliable WAN connections. When selecting this option, you will be prompted for additional configuration information required to make Secure Connect function correctly.
6. At the **Configure Secure Connect** page, complete the dialog using the IP or fully qualified domain name (FQDN) of the QoreStor server and appropriate credentials.
The user account used must have the CIFS role assigned.

i | **NOTE:** The **Configure Secure Connect** operation is not supported for CIFS containers on DR Series appliances. DR Series appliances do not contain the required Secure Connect server component. This operation is available only for QoreStor instances. For CIFS containers on DR Series appliances, connect using the Rapid CIFS plug-in and the DR Series host name.

i | **NOTE:** The value entered in the **Display Name** field must **not** match the hostname of the QoreStor server.

Upgrading to Rapid NFS Plug-in 4.0.3320.1

Secure Connect is comprised of a set of client and server components that create a resilient and secure communication channel for use by WAN-connected clients. The server components are installed and enabled by default during the installation of the QoreStor server. Starting with the Rapid NFS plug-in version 4.0.3320.1, the plug-in installation script includes the option to install and enable Secure Connect.

i | **IMPORTANT:** Refer to the Known Issues section of this document for Rapid NFS issues known to be present at the time of release.

If you have WAN-connected Rapid NFS clients and choose to install Secure Connect, you can do so by following the steps below:

1. Download `QuestRapidNFS-4.0.3320.1-x86_64.bin.gz` from the website.
2. Unzip the package using the following gunzip command:

```
gunzip QuestRapidNFS-4.0.3320.1-x86_64.bin.gz
```

3. Change the permission of the binary package to allow it to run:

```
chmod +x QuestRapidNFS-4.0.3320.1-x86_64.bin
```

4. Install the Rapid NFS package. Before installing, remove the stale NFS entry.

```
QuestRapidNFS-4.0.3320.1-x86_64.bin -install
```

5. Load the file system in user space (FUSE) module, if not already loaded:

```
modprobe fuse
```

6. Create a directory on the client. For example:

```
mkdir /mnt/backup
```

7. Mount Rapid NFS as a file system type using the mount command. For example:

```
mount -t rdnfs 10.0.0.1:/containers/backup /mnt/backup
```

To enable Secure Connect, mount Rapid NFS using the **sc** flag, as shown below:

```
mount -t rdnfs 10.0.0.1:/containers/backup /mnt/backup sc,user=backup_
user,password=<backup_user password>
```

If you are using a DMA that supports a marker, set the marker by using **-o** in the mount command. For example, if you wanted to set the CommVault marker (**cv**):

```
mount -t rdnfs 10.0.0.1:/containers/backup /mnt/backup -o marker=cv
```

i **NOTE:** If you want to do a mount on AIX, you must set the `nfs_use_reserved_ports` and `portcheck` parameters first. The parameters cannot be set to 0. For example: `root@aixhost1 / # nfso -po portcheck=1 root@aixhost1 / # nfso -po nfs_use_reserved_ports=1`

Resolved issues

The following is a list of issues addressed in this release.

Table 1: Resolved issues in this release

Issue ID	Resolved Issue
QS-13604	Added the meta data usage in the GUI Used Space counter.
QS-13976	Resolved an issue to improve cloud reader performance for CloudWave-BridgeHead workflow.
QS-14049	Resolved an issue where dictionary was getting full resulting in loss of saving and running out of physical space.
QS-14552	Resolved an issue where SecureConnect with RDA did not work on certain machine types.
QS-14651	Resolved an issue for HP-UX RDA plugin: Reduce CPU usage during polling.
QS-14696	Added the Total Licensed Capacity for charts in QorePortal.
QS-14703	Resolved an issue where it includes cloud replication stat on oldest file which were yet to be replicated.
QS-14728	Resolved an issue to optimize the memory usage with RMAN backups to a migrated DR system.
QS-14749	Resolved an issue where recycle bin pruning is not happening on migrated DR system.
QS-14752	Resolved an issue when the security token was configured, the cleaner was failing while trying to process large bmaps during token rotation.
QS-14756	Resolved an issue where QoreStor UI was crashing intermittently when RDA client list grows to very large count.
QS-14734	Added an ability to control cleaner threads doing compaction.

Known issues

The issues below are known to exist in this release.

Table 2: Known issues in this release

ID	Issue
QS-437 QS-438	When using multiple NetVault Servers to access the same QoreStor Server, use storage group, container, and user names unique to each NetVault server to avoid accidental deletions.
QS-1446	If the QoreStor partition is not set to automount, and the QoreStor server is rebooted, the system appears to be operational but shows 0 physical capacity.
QS-1588	When running Optimized Duplication jobs in Backup Exec, the container quota is not enforced as it is for backup jobs.
QS-1666	When NetVault is installed on a Linux server, the RDA Client version is not displayed correctly. Workaround: To view the build number of the plugin, run the command <code>strings /usr/netvault/dynlib/librofsoca.so grep "(EAR-4.1.0) Build:"</code>
QS-1670	For Linux clients, the full version number of RDA plug-ins is not displayed.
QS-1823	In some situations, the deduplication savings for a storage group shows as 100% before a backup has occurred. Once a backup has occurred, the deduplication savings will be displayed accurately.
QS-2242	When installing QoreStor, the filesystem selected for the QoreStor repository should not contain data from other application or users. QoreStor must have exclusive access to the repository filesystem.
QS-2604	If unregistered clients access QoreStor CIFS shares by mounting the share, the /var/log/messages will contain numerous host name/mismatch errors. Workaround: Unregistered clients need to be updated in DNS server manually.
QS-2694	When the system time on the QoreStor server is synchronized with the domain time, this may cause the system time to adjust backwards. If this occurs, system statistics (like read/write throughput statistics) will appear to be hung for an amount of time equal to the time adjustment.
QS-3779	When using Secure Connect with NetVault in a multiple-machine configuration (NetVault server, NetVault client, QoreStor server), Secure Connect can respond to errors only for connections between the NetVault server and QoreStor or the NetVault client and QoreStor. Secure Connect does not address connections between the NetVault server and NetVault client.
QS-4169	When using the Linux exports http_proxy or https_proxy , no_proxy is also required for the watcher service to function correctly. Refer to "Accessing QoreStor" in the <i>QoreStor User Guide</i> .
QS-5072	When authenticated to a domain, connecting to CIFS shares with a localhost account is not successful.
QS-5105	Changes to a Cloud Tier Policy for inclusions or exclusions will not take effect until the QoreStor service has been restarted.

ID	Issue
QS-5438	After performing a DR to QoreStor migration, network settings are reset to default.
QS-5627	The current error output of "rda --limit" without any argument incorrect suggests limits are enforced via Mbps (megabits per second) when the limit is actually in MBps (megabytes per second).
QS-5629	When configuring a custom graph, if you select a period for which there is no data, the graph will be blank and display "No Data Available"
QS-5826	When performing a DR to QoreStor migration, bonding modes and MTU settings are not
QS-6291	When using the latest version of the Rapid CIFS plug-in with Veeam Backup and Recovery, the configurations below are required: <ul style="list-style-type: none"> • For the Backup Repository, change the Gateway Server option to The following server and enter the IP or hostname of the local machine. • For VMware Backup, the Gateway server should be changed from the Automatic selection to the Use the selected backup proxy servers only.
QS-6653	OST MSI plugin reports a new version is already installed when installing an updated driver Workaround: Uninstall the OST driver before installing the newer driver
QS-6782	When installing Rapid CIFS on Windows 2008 R2, the installation deploys driver version 4.0.3207.1 , causing the version displayed by rcifsctl.exe driver -q to be different from the version in the Windows Programs and Features dialog. The functionality of Secure Connect is not changed.
QS-6808	When configuring Backup Exec with CIFS shares using the display name, the steps below must be followed: <ol style="list-style-type: none"> 1. In the command prompt, change directpries to the path C:\Program Files\Quest\Rapid CIFS. 2. Run rdcifsctl.exe sc -d for disable a secure connection. 3. Configure storage in Backup Exec by specifying \\displayname\container as network share. During this configuration all connections from Backup Exec to QoreStor are secured. 4. Run rdcifsctl.exe sc -e to enable a secure connection.
QS-6860	During upgrade, the SMB config file is overwritten. Any manual changes to this file will be lost on upgrade.
QS-8945	When QoreStor is installed on Linux versions 7.3 - 7.7, configuring an archive tier may result in a memory leak. This is due to an issue with the curl package installed on those versions of Linux. Workaround Either upgrade the Linux version on the QoreStor server to 7.8, or update the curl package to curl 7.29.0-57.el7. DR Series systems migrated to QoreStor which are on Oracle Linux 7.3 should update the curl package to 7.29.0-57.el7
QS-9056	On DR Series Systems migrated to QoreStor, the maximum inode limit for an object container is set to 1 million. In some cases, this may result in a "maximum allowable File(s) and Directories limit" error. Workaround: To increase that, the environmental variable MDS_OT_INODES_ALLOWED in <i>/etc/oca/customer.env</i> has to be set to a higher value. Please contact Quest Support for assistance

ID	Issue
	making this change.
QS-9021	<p data-bbox="325 315 1337 376">During object direct installation, if the message "Failed to validate object direct connection string!" may be received if the certificate has been changed or is expired on the QoreStor server.</p> <p data-bbox="325 387 467 414">Workaround</p> <p data-bbox="325 425 804 452">Purge the certificate with the command below</p> <pre data-bbox="325 463 817 490">cloud_tier --purge-ssl-certificate</pre>
QS-9177	<p data-bbox="325 521 1390 600">When configuring the Rapid NFS client with Secure Connect, You may mount the plug-in with either the IP address or the fully qualified domain name (FQDN). If you use the FQDN, you must also add an entry in the <code>/etc/hosts</code> file on the QoreStor system and verify that the hostname is resolvable.</p>
QS-10018	<p data-bbox="325 627 1358 687">When writing to an NFS container on a system with 24GB or less of memory, some customers may receive "out of memory" errors.</p> <p data-bbox="325 698 464 725">Workaround:</p> <p data-bbox="325 736 1070 763">On the QoreStor system, run the command <code>sysctl -a grep tcp_mem</code>.</p> <p data-bbox="325 775 1390 835">This will return your tcp memory consumption, like the example value below. The return indicates your minimum, average, and maximum values.</p> <pre data-bbox="325 846 890 873">net.ipv4.tcp_mem = 285198 380264 570396</pre> <p data-bbox="325 884 1358 945">Using the command below, set the <code>tcp_mem</code> maximum value to the average value (380264, in the example above). Note that your values will be different. The value in the center is the average.</p> <p data-bbox="325 956 927 983">sysctl -w "net.ipv4.tcp_mem=285198 380264 380264"</p>
QS-10042	<p data-bbox="325 1014 1390 1133">When attempting to delete a bucket containing a large amount of data, QoreStor will appear to freeze. This is due to an AWS S3 limitation that requires the objects within a bucket to be deleted before the bucket can be deleted. During the bucket delete operation, the objects are enumerated and deleted one at a time.</p> <p data-bbox="325 1144 475 1171">Workaround:</p> <p data-bbox="325 1182 1273 1209">Before deleting the bucket, delete the objects within the bucket using the AWS S3 console.</p>
QS-10117	<p data-bbox="325 1240 983 1267">System stops while upgrading from the user interface terminal.</p>
QS-10772	<p data-bbox="325 1321 1233 1348">Replication update fails with replication between QoreStor 7.1.3 and the DR appliance.</p> <p data-bbox="325 1359 475 1386">Workaround:</p> <p data-bbox="325 1397 1390 1458">For DR-to-QoreStor replication, update replication by way of the QoreStor user interface or command line interface.</p>
QS-11329	<p data-bbox="325 1489 1358 1516">During replication, crash may occur on a target if the replication source has archive tier configured.</p>
QS-11588	<p data-bbox="325 1570 1390 1597">When there is not enough space under <code>/opt</code> to install or upgrade QoreStor, an error message occurs.</p> <p data-bbox="325 1608 475 1635">Workaround:</p> <p data-bbox="325 1646 711 1673">Free space under the <code>/opt</code> partition.</p>
QS-11613	<p data-bbox="325 1704 1098 1731">During replication, QoreStor is unable to locate a specific blockmap entry.</p> <p data-bbox="325 1742 475 1769">Workaround:</p> <p data-bbox="325 1780 1369 1841">If a replication source already has archive tier replication, do not configure archive tier replication on the replication target.</p>

ID	Issue
QS-11818	New backups jobs fail with Backup Exec 20.x after stubbing the existing data. Workaround: Delete the Changer.cfg meta file in the CIFS container, which triggers the start of a new backup job.
QS-11819	Received the following error: RDA SRVR RDA_OPEN_FILE : failed to add open image to hash map for LSU 9 scid 1152921504606847079 (Bad file descriptor).
QS-11851	The directory uploading using AWS CLI to Object Tier may become unresponsive if the directory has large files.
QS-11936	Netvault Backup Jobs may stall if cloud upload on QoreStor is not happening because of cloud provider experiencing high request rate.
QS-11972	Adding replication between DR 4.0.4 and QoreStor 7.1 fails. Workaround: Run the replication commands on QoreStor.
QS-12017	QoreStor cannot add replication in a situation when there are two Secure Connect server processes and one is in unknown state after upgrade. Workaround: Stop the old Secure Connect server in the unknown process.
QS-12113	Alert generated for OFSCK scan is still present after QoreStor becomes operational.
QS-12117	During replication, the error "Failed to set ns txlog csn on scid" occurs. Workaround: You can ignore these messages. Replication eventually succeeds.
QS-12154	QoreStor is not operational after Disaster Recovery from cloud tier.
QS-12228	Storage group encryption once disabled cannot be enabled.
QS-12240	Replication add from migrated QS between RDA containers may fail.
QS-12260	VTL tape export is successful even without cloud replication configured.
QS-14826	CIFS install option not visible when VTL is chosen during installation. NOTE: CIFS module is required for VTL backups.
QS-14868	CWF : "authenticate --leave" fails to disjoin system from domain in case domain controller is not reachable/ trust is broken. Workaround: It is advised to retry "authenticate --leave" operations after "service ocards restart" or a system reboot.

Product Licensing

QoreStor offers a backend capacity licensing model to allow for simple integration with other Quest Data Protection products.

- **Standalone license** - QoreStor is licensed by the amount of backend capacity required. Standalone licenses are available as either **perpetual** licenses (with no expiration), or **term** licenses, which expire after a specified period of time.
- **i** | **NOTE:** Term licenses are intended for specific customer use cases, i.e., licensing according to yearly billing cycles. A perpetual license is appropriate for most customers.

QoreStor licenses are additive, meaning that if you purchase a 5 TB license now, and a 10 TB license in the future, you will have 15 TB total capacity.

- **i** | **NOTE:** Licenses for QoreStor are specific to the QoreStor server. When installing a license, the System ID for your QoreStor server is required. You can obtain the System ID with the command **system --show | grep "System ID"**

Evaluating QoreStor

QoreStor offers two methods for evaluation:

- **Default installation** - If no license is installed, QoreStor defaults to a no-cost, 1TB capacity installation supported by the QoreStor Community. This option requires no license and does not expire.
 - If a license is applied to a server running in this mode, the free 1 TB is **not** added to the purchased license capacity.
- **Full capacity trial** - available on the Quest Software Trial site, which provides a 30-day evaluation license for up to 360TB and access to Quest Support. After the evaluation period has expired, the QoreStor server will operate in Manual Intervention mode until a license is applied. To use QoreStor beyond that time frame, you will need to purchase a perpetual standalone license.
 - If a longer trial period is required, please contact Quest Sales.

If you have purchased a standalone license, you can install it using the **system --license** command, as described in the *QoreStor Command Line Reference Guide*.

- **i** | **NOTE:** When ordering a license, the System ID for your QoreStor server is required. You can obtain the System ID with the command **system --show | grep "System ID"**

Supported software and hardware

For a complete list of the supported hardware and software for QoreStor, see the *QoreStor Interoperability Guide*. You can download this guide by visiting: <http://support.quest.com/qorestor> and selecting your specific QoreStor version, which opens the product support page to view product documentation for your system.

Other information you may need

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

<http://support.quest.com/QoreStor>

Table 3: QoreStor documentation

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

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

About us

Quest provides software solutions for the rapidly-changing world of enterprise IT. We help simplify the challenges caused by data explosion, cloud expansion, hybrid datacenters, security threats, and regulatory requirements. We are a global provider to 130,000 companies across 100 countries, including 95% of the Fortune 500 and 90% of the Global 1000. Since 1987, we have built a portfolio of solutions that now includes database management, data protection, identity and access management, Microsoft platform management, and unified endpoint management. With Quest, organizations spend less time on IT administration and more time on business innovation. For more information, visit www.quest.com.

Contacting Quest

For sales or other inquiries, visit www.quest.com/contact.

Technical support resources

Technical support is available to Quest customers with a valid maintenance contract and customers who have trial versions. You can access the Quest Support Portal at <https://support.quest.com>.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request
- View Knowledge Base articles
- Sign up for product notifications
- Download software and technical documentation
- View how-to-videos
- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product

Third party components

This product contains the following third-party components. For third-party license information, and copies of third party licenses not reproduced below, go to <https://www.quest.com/legal/license-agreements.aspx>.

Source code for components marked with an asterisk (*) is available at <https://opensource.quest.com/>. For items marked with a †, a copy of the license can be found at <https://www.quest.com/legal/license-agreements.aspx>

Component	License	Notes
afero 1.2.1		Copyright ©2015 The Go Authors Copyright ©2015 Steve Francia <spf@spf13.com>
@angular/cdk 7.3.7	MIT N/A	Copyright © 2019 Google LLC.
angular2-jwt 0.2.3†	MIT 1.0	Copyright (c) 2017 Auth0 Inc.
Angular-jwt 1.0†	MIT 1.0	Copyright (c) 2017 Auth0 Inc.
AWS CPP SDK 1.0	Apache 2.0	Copyright Notice - AWS CPP SDK 1.0 AWS SDK for C++ Copyright 2015 Amazon.com, Inc. or its affiliates. All Rights Reserved. This product includes software developed by Amazon Technologies, Inc (http://www.amazon.com/) A copy of the license can be found below at Apache 2.0
aws-sdk-go 1.20.21	Apache 2.0	Copyright Notice - aws-sdk-go 1.20.21 AWS SDK for Go Copyright 2015 Amazon.com, Inc. or its affiliates. All Rights Reserved. Copyright 2014-2015 Stripe, Inc.
Azure Storage Client Library 3.0.0	Apache 2.0	Copyright Notice - Azure Storage Client Library 3.0.0 // ----- // ----- // <copyright file="cloud_block_blob.cpp" company="Microsoft"> // Copyright 2013 Microsoft Corporation // // Licensed under the Apache License, Version 2.0 (the "License"); // you may not use this file except in compliance with the License.

Component	License	Notes
		<pre>// You may obtain a copy of the License at // // http://www.apache.org/licenses/LICENSE-2.0 // // Unless required by applicable law or // agreed to in writing, software // distributed under the License is // distributed on an "AS IS" BASIS, // WITHOUT WARRANTIES OR // CONDITIONS OF ANY KIND, either // express or implied. // See the License for the specific language // governing permissions and // limitations under the License. // </copyright> A copy of the license can be found below at Apache 2.0</pre>
Boost 1.63 [‡]	Boost 1.0	Copyright (c) 2001-2010 Joel de Guzman Copyright (c) 2010 Eric Niebler Copyright (c) 2015 John Fletcher
bzip2 [‡]	BSD Simple	
C++ REST SDK 1.0 [‡]	MIT 1.0	Copyright (c) Microsoft Corporation
cli v1.20.0 [‡]	MIT 1.0	Copyright (c) 2016 Jeremy Saenz & Contributors
color-convert 1.9.3	MIT Template 2020	Copyright 2011-2016 Heather Arthur and Josh Junon
color-go 1.7.0 [‡]	MIT 1.0	Copyright (c) 2013 Fatih Arslan
core-js 2.5.3 [‡]	MIT	Copyright (c) 2014-2016 Denis Pushkarev
crewjam/saml	BSD 2-Clause Simplified	Copyright (c) 2015, Ross Kinder
Crypto-Go v0.0.0-20181203042331-505ab145d0a9 [‡]	BSD-Crypto-Go 1.0	Copyright (c) 2009 The Go Authors. All rights reserved.
cURL 7.57.0 [‡]	MIT	Copyright (c) 1996 - 2016, Daniel Stenberg, <daniel@haxx.se>, and many contributors, see the THANKS file.
D3 3 [‡]	BSD 3-Clause License	Copyright (c) 2013, Michael Bostock All rights reserved.

Component	License	Notes
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Version 2.1, February 1999

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