

IBM Cloud Object Storage System
3.17.0 November Maintenance V2

Release Notes



This edition applies to IBM Cloud Object Storage System™ and is valid until replaced by new editions.

© **Copyright International Business Machines Corporation 2023.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

- Support information..... V**
- Chapter 1. New Features and Improvements in ClevOS 3.17.0..... 1**
- Chapter 2. New Features and Improvements in ClevOS 3.16.8..... 3**
- Chapter 3. Interface Modifications..... 5**
- Chapter 4. Resolved Issues..... 7**
 - Resolved issues in 3.17.0 November Maintenance..... 7
 - Resolved issues in 3.17.0..... 7
 - Resolved issues in 3.16.8 September Maintenance..... 8
 - Resolved issues in 3.16.8..... 8
- Chapter 5. Product Alert Notifications..... 9**
- Chapter 6. Known issues.....11**
 - Upgrading and Installation..... 12
 - Container.....12
 - Alerting and Reporting.....12
 - System Behavior..... 13
 - Storage Pools..... 13
 - Data Evacuation..... 13
 - System Configuration.....13
 - Deleting objects..... 13
 - Manager Web Interface..... 14
 - Vaults.....14
 - Vault Mirrors.....14
 - Vault migration..... 14
- Chapter 7. Supported Hardware Platforms..... 15**
 - IBM Cloud Object Storage Appliances..... 15
 - Hewlett Packard Enterprise.....15
 - Seagate.....16
 - Cisco..... 16
 - Dell..... 16
 - Lenovo..... 17
 - Quanta Cloud Technology (QCT)..... 17
- Chapter 8. Incompatible Hardware and Firmware with ClevOS..... 19**
 - Broadcom..... 19
 - Hewlett Packard.....19
 - IBM Cloud Object Storage Appliances..... 19
 - Seagate.....20
 - Supermicro..... 20
- Notices.....21**
 - Trademarks..... 22

Support information

Technical support contacts.

For more information on the product or help with troubleshooting, contact IBM Support at ibm.com/mysupport or visit the [Directory of worldwide contacts](#).

Chapter 1. New Features and Improvements in ClevOS 3.17.0

COS BCDR Manager DB Backup to Cloud Bucket (1818)

You can configure the IBM COS Manager™ database backup on an S3 bucket using either the Manager UI or the REST API. The backup file can be uploaded to the specified endpoint bucket. If the backup was to an S3 bucket, the file must be transferred from the remote server to a local disk prior to restore, similar to using FTP for a Manager database backup.

A new **backupType** option, **s3Bucket**, was added to **Configure system backup settings**. Further, the **backupType** option **remote** has been changed to **ftp**. Note that the API is backwards compatible and supports both the **ftp** and **remote** options.

See *IBM Manager Administration Guide* and *IBM REST API Developer Guide* for details.

Chapter 2. New Features and Improvements in ClevOS 3.16.8

There are no new features in this release.

Chapter 3. Interface Modifications

API Updates for ClevOS 3.17.0 have been referenced in the following documentation:

- REST API Developer Guide

You can configure the Manager database backup on an S3 bucket using either the Manager UI or the REST API. The backup file can be uploaded to the specified endpoint bucket. If the backup was to an S3 bucket, the file must be transferred from the remote server to a local disk prior to restore (configured with the REST API **systemRestore.adm**), similar to using FTP for a Manager database backup.

A new **backupType** option, **s3Bucket**, was added to the REST API **systemBackupSettings.adm**. Further, the **backupType** option **remote** has been changed to **ftp**. Note that the API is backwards compatible and supports both the **ftp** and **remote** options.

API updates for ClevOS 3.16.7:

- COS-80887, Fixed handling of multiple header fields with the same name for AWS signature authentication. Previously only the first header field was used in signature calculation.
- COS-88662, New error alert added for 500 errors caused by a failure on a remote store. Previously this type of 500 error would show up as uncategorized, but now generates a more specific root caused alert in the event console, as well as in the **error_ root_cause** field in the access log as **REMOTE_STORE_FAILURE**.

API updates for ClevOS 3.16.6:

- COS-90696, Beginning in the ClevOS 3.16.6.75 release, Device level APIs require the use of GCM mode in TLS cipher suites. Update client-side TLS cipher suite to support GCM mode.

API updates for ClevOS 3.16.4 have been referenced in the following documentation:

- REST API Developer Guide

COS-86003, Basic Authentication is now supported in the Device Level API as part of F1796 (update to Edit System Device Level API Configuration). Added new parameter **authenticated**.

API updates for ClevOS 3.16.3 have been referenced in the following documentation:

- REST API Developer Guide

You can enable or disable IP addresses and network types independent of each other using the resource configuration API (**configureExtendedCOSAPISettings.adm**). The existing property firewall rules are split in two separate properties - firewall rules for IP addresses and firewall rules for network types.

Chapter 4. Resolved Issues

Resolved issues in 3.17.0 November Maintenance

Table 1. Resolved issues

Issue	Description
COS-94352	Resolved an issue where the ZSS write cache could potentially become inefficient resulting in high CPU utilization and performance impacts.
COS-94351	Resolved an issue where the ZSS slice deletion throttle for fanout was not being utilized when fanout metadata was missing.
COS-94347	Improved configuration options for better control of ZSS fanout metadata behavior.
COS-93483	Increased the number of connections between Slicestor [®] Devices from 1 to 4 to increase the network throughput for activities such as system expansion and rebuilding.
COS-93220	Improved several disk monitoring configuration options on Slicestor [®] Devices to allow for device tuning without requiring a process restart.
COS-92853	Resolved an issue that would result in the storage service crashing on Slicestor [®] Devices in the presence of invalid drive metadata.
COS-84446	Resolved an issue that could result in user I/O errors and/or increased I/O latencies when performing system expansion or set removal operations.
COS-82452	The upgrade directory containing the upgrade file persists across container restarts on Docker Manager instances.
COS-15189	The external-agents directory containing external agent bundles persists across container restarts on Docker Manager instances.

Resolved issues in 3.17.0

Table 2. Resolved issues

Issue	Description
COS-90490	Resolved an issue that could result in a process crash on Accesser [®] Appliances or Slicestor [®] Devices experiencing a certain level of load.
COS-85995	Significant updates have been made to the ClevOS operating system. External agents that are not properly self-contained and have dependencies on operating system components may be impacted. It is recommended to verify external agent behavior as part of any upgrade activities.

Resolved issues in 3.16.8 September Maintenance

Table 3. Resolved issues

Issue	Description
COS-82433	An issue was resolved where the Accesser® Appliance requests graph would fail to load if there were more than 200 unique combinations of resource/request/response for a selected time frame.

Resolved issues in 3.16.8

Table 4. Resolved issues

Issue	Description
COS-90447	Resolved an issue where Slicestor® Devices would erroneously report a data drive multiple times when unable to accurately retrieve vendor attributes from the drive.
COS-89434	Improved the handling of the InterSocketAddress string in logs such as <code>Access.log</code> and <code>report.log</code> .
COS-88826	Resolved an issue where the storage service on Slicestor® Devices crashed and restarted in scenarios where index operations became hung.
COS-72024	Zone Slice Storage now checks if storage is available before performing writes and deletes.
COS-60397	To avoid an out of memory condition on Accesser® Devices, S3 POST Object requests will allow only 1000 form fields to be set in the body of the request. If this limit or the maximum size of a field is exceeded, the request will fail with a 400 HTTP status code indicating a bad request.
COS-36651	Resolved an issue where all data drives on a Slicestor® Device will transition to an offline state if an OS-only reinstall is performed and the Slicestor® Device is then registered with a new Manager Appliance.

Chapter 5. Product Alert Notifications

IBM® clients with an IBM ID may sign up to receive product alert notifications that contain important information that may impact the use of the IBM Cloud Object Storage System™. In order to receive these notifications, clients need to subscribe to the "IBM Cloud Object Storage System™" product in [MyNotifications](#). The table below represents the alert notifications that are applicable while running this latest version of ClevOS™ at the time of this release note publication. For any questions regarding the content of these product notifications, contact IBM Support.

Alert Notification Title	Impacted ClevOS™ Releases	Alert Notification Published Date
Discontinue use of IBM COS Insight™	All ClevOS releases	Dec 1, 2022
Potential impact to IO performance on ZSS Slicestor devices	All ClevOS releases	Nov 11, 2022
Multi-Manager communication error during upgrade	Upgrade from a release prior to ClevOS 3.16.6.73	Nov 9, 2022
Device level API's required TLS cipher suite updated in ClevOS 3.16.6.75	3.16.6.75 and future releases	July 13, 2022
Slicestor® disk model WUH721818AL4200 firmware issue	All ClevOS releases	Apr 29, 2022
Software Signature Verification issue impacting ClevOS™ upgrades	3.15 and 3.16	Feb 18, 2022
Format updated in API response for multipart copy.	3.15.8.97 and future releases	Dec 2, 2021
IBM Cloud Object Storage On-Premise Adopts Continuous Delivery Software Support Lifecycle (Updated for 3.17.0).	3.16.0, 3.17.0	Oct 29, 2021
Performance implications of non-homogenous COS storage pool expansions	All ClevOS releases	Jun 30, 2021
API changes related to S3 Object Versioning	3.15.7 and future releases	Apr 19, 2021
Issue with adding multiple drives in a IBM COS Slicestor® appliance	All ClevOS releases	Jul 20, 2020
A firmware issue can cause IBM COS Gen2 HW nodes to fail to boot up	ClevOS independent	Jun 18, 2020
Java™ version incompatibility preventing IPMI access	ClevOS independent	Mar 12, 2018

Table 5. Product Alert Notifications for the IBM Cloud® Object Storage System (continued)

Alert Notification Title	Impacted ClevOS™ Releases	Alert Notification Published Date
<u>IPMI Configured via nut Command Does Not Persist on Device Restart</u>	ClevOS independent	Jun 27, 2017
<u>Drive-managed Shingled Magnetic Recording (SMR) drives are not approved and should not be used with named-object protocol workloads</u>	ClevOS independent	Mar 16, 2017
<u>IBM COS Slicestor® 2584 Fails to Attach Drives</u>	ClevOS independent	Feb 2, 2017

Chapter 6. Known issues

Table 6. Known issues

Issue	Failing Condition	Disposition
COS-58128	DLM cannot process more than 16 hot-swap events at once.	This issue will be fixed in a future release.
COS-50579	There is a known issue where slice data being reallocated from one Slicestor device to another would not be appropriately removed from the source Slicestor device if the reallocation process was erroneously marked as complete."	This issue still exists in 3.14.3 because the change was reverted in the latest fix.
COS-11201	In the Event Console of the Manager User Interface, the event details section for failing disk migration events contains a parameter that is called Migration Progress. However, it is not clear what this value represents.	This value corresponds to the percentage of failing disk migration that is complete.
COS-11355	Replacing a failed drive with another failed drive results in an inconsistent view on the Manager User Interface. On the Monitor Device page, in the "Summary of device health" section, both the replaced failed drive and the new failed drive are shown. The "Drive Information and Actions" view of the drive layout shows the replaced failed drive. On the Maintenance page, the FRU report contains the replaced failed drive.	Perform another replacement of the failed drive with a good drive.
COS-13575	The "stop migration" operation for failing disk migration on the Manager User Interface (UI) can take ~20 seconds to complete after being initiated by the user. The button continues to be enabled during this time. This issue exists for dispose and reset disk operations as well.	Do not hit the button again until the operation completes. If the drive stays in the same state for more than 20 seconds, perform a refresh of the page. If the drive continues to stay in this state, follow the recommended action that is provided in the Manager Administration Guide under disk lifecycle management.
COS-10031	When resuming a drive in the DIAGNOSTIC state from the Manager User Interface, it can take ~20 seconds to complete. The resume button is not disabled during this time.	Do not hit the resume button until the operation completes. If the drive stays in the DIAGNOSTIC state for more than 20 seconds, perform a refresh of the page. If the drive continues to stay in this state, follow the recommended action that is provided in the Manager Administration Guide under disk lifecycle management.

Table 6. Known issues (continued)

Issue	Failing Condition	Disposition
COS-10445	When using the storage command from the localadmin shell on a Slicestor® device, it is possible to resume all drives that are currently in the DIAGNOSTIC state. However, in some cases, this process can take too long, which will cause the command to return an error code -15 due to a timeout.	Despite the error, the resume process is continuing in the background. The storage list command can be used to monitor the progress of resume process.
COS-13504	When failing a quarantined drive, it is possible that after data has been migrated off the failing drive, the Manager event console will report that no data migration was attempted.	No action is required. Despite the event description, data migration will always be attempted unless the user specifically chooses to skip migration via the localadmin shell storage command.
COS-23962	Vault quotas are static and do not update when storage pool capacities change. If a system expansion, set replacement, or set removal is performed on the storage pool, vault quotas for any vaults on that pool will not update to consider the new capacity.	The user-defined vault quotas work as expected. However, they cannot be consistent with the current storage pool capacity. For example, a vault quota can be higher than total storage pool capacity after a set removal.

Upgrading and Installation

Table 7. Upgrading and Installation

Issue	Failing Condition	Disposition
	Nothing to report.	

Container

Table 8. Container

Issue	Failing Condition	Disposition
COS-15401	If a user attempts to create a management vault by using "manual configuration" (accessed through the Configure Management Vault page) based on an existing vault template, management vault creation fails with the following message: "Cannot create a management vault from this template. It is deployed to access pools with standard vaults"	Use the "automatic configuration" available on the Configure Management Vault page.

Alerting and Reporting

Table 9. Alerting and reporting

Issue	Failing Condition	Disposition
	Nothing to report.	

System Behavior

Table 10. System behavior

Issue	Failing Condition	Disposition
	Nothing to report.	

Storage Pools

Table 11. Storage pools

Issue	Failing Condition	Disposition
COS-2642	On the *Monitor Storage Pool Page, the Reallocation Progress graph, which displays historical data, is inaccurate when a device is down or statistics are not collected for a window of time.	The Data Reallocation progress bar, available at the top of the *Monitor Storage Pool Page, is always accurate. This view reflects the status and should be used to monitor progress of the data reallocation activity.

Data Evacuation

Table 12. Data evacuation

Issue	Failing Condition	Disposition
	Nothing to report.	

System Configuration

Table 13. System configuration

Issue	Failing Condition	Disposition
	Nothing to report.	

Deleting objects

Table 14. Deleting objects

Issue	Failing Condition	Disposition
	Nothing to report.	

Manager Web Interface

Issue	Failing Condition	Disposition
COS-10031	When resuming a drive in the DIAGNOSTIC state from the Manager User Interface, it may take ~20 seconds to complete. The resume button is not disabled during this time.	Do not hit the resume button until the operation completes. If the drive stays in the DIAGNOSTIC state for more than 20 seconds, perform a refresh of the page. If the drive continues to stay in this state, follow the recommended action that is provided in the Manager Administration Guide under disk lifecycle management.
COS-23764	Upon network failure while going through the one time setup process in the manager, a network error page appears. When the network comes back, reload the page, at which point an internal server error page appears in some scenarios.	Log out of the internal server error page and log back into the manager, which will take you through one time setup again.

Vaults

Issue	Failing Condition	Disposition
	Nothing to report.	

Vault Mirrors

Issue	Failing Condition	Disposition
	Nothing to report.	

Vault migration

Issue	Failing Condition	Disposition
COS-12442	When a vault migration finishes the work that is contained in its TODO queue, it kicks off a process to calculate the exact count of the number of objects that are migrated as part of the migration. This process of calculating the exact size is performed by each device in the target pool, and can take a long time to complete for large migrations.	

Chapter 7. Supported Hardware Platforms

IBM Cloud Object Storage Appliances

Table 19. Minimum Version of ClevOS Compatible with IBM Hardware Platforms

Product Name	Machine Type (1Yr/3Yr Warranty)	Model	Minimum ClevOS
IBM COS Accesser® 3105	3401/3403	A00	3.8.1
IBM COS Accesser® 4105	3401/3403	A01	3.8.1
IBM COS Accesser® 3110	4958/4957	A10	3.14.4
IBM COS Manager™ 3105	3401/3403	M01	3.8.1
IBM COS Manager™ 3110	4958/4957	M10	3.14.4
IBM COS Slicestor® 2212	3401/3403	S00	3.8.1
IBM COS Slicestor® 2448	3401/3403	S01	3.8.1
IBM COS Slicestor® 3448	3401/3403	S02	3.8.3
IBM COS Slicestor® 2584 (AP-TL-1)	3401/3403	S03	3.8.1
IBM COS Slicestor® 2584 (AP-LS-1)	3401/3403	S03	3.13.1
IBM COS Slicestor® 2212A	3401/3403	S10	3.10.0
IBM COS Slicestor® 12	4958/4957	C10/J10	3.14.4
IBM COS Slicestor® 53	4958/4957	C10/J11	3.14.4
IBM COS Slicestor® 106	4958/4957	C10/J12	3.14.4
IBM COS Slicestor® 92 IBM Cloud Object Storage System™	4958/4957	C10/J15	3.15.5

Note: □ Requires RPQ

Hewlett Packard Enterprise

Table 20. Minimum Version of ClevOS Compatible with Hewlett Packard Enterprise Hardware

Appliance	Model	Minimum ClevOS
Manager Appliance	DL360P Gen8	3.2.1
Manager Appliance	DL360 Gen9	3.5.0
Manager Appliance	DL380 Gen9	3.5.0
Manager Appliance	DL360 Gen10	3.14.0
Accesser® Device	DL360P Gen8	3.2.1
Accesser® Device	DL360 Gen9	3.5.0
Accesser® Device	DL360 Gen10	3.14.0
Accesser® Device	DL380 Gen9	3.5.0

Table 20. Minimum Version of ClevOS Compatible with Hewlett Packard Enterprise Hardware (continued)

Appliance	Model	Minimum ClevOS
Slicestor® Device	SL4540 Gen8	2.9.0
Slicestor® Device	DL380 Gen9	3.5.0
Slicestor® Device	Apollo 4200 Gen9	3.6.0
Slicestor® Device	Apollo 4200 Gen10	3.14.10
Slicestor® Device	Apollo 4510 Gen9	3.6.0
Slicestor® Device	Apollo 4510 Gen10	3.14.0
Slicestor® Device	Apollo 4530 Gen9	3.6.0

Seagate

Table 21. Minimum Version of ClevOS Compatible with Seagate Hardware

Appliance	Model	Minimum ClevOS
Seagate OneStor®	AP-2584 1 AP-TL-1	3.4.2
Seagate Exos®	AP 5U84-Laguna Seca	3.15.0

Cisco

Table 22. Minimum Version of ClevOS Compatible with Cisco Hardware

Appliance	Model	Minimum ClevOS
Cisco Slicestor® Device	UCS C3260	3.7.4
Cisco Slicestor® Device	UCS S3260 (Single Node)	3.12.0
Cisco Slicestor® Device	UCS S3260 (Dual Node)	3.12.0
Cisco Slicestor® Device	UCS S3260 M5 (56 drive configuration)	3.13.1
Cisco Slicestor® Device	UCS S3260 M5 (60 drive configuration)	3.14.3
Cisco Manager Appliance	UCS C220 M4	3.12.0
Cisco Accesser® Device	UCS C220 M4	3.12.0
Cisco Manager Appliance	UCS C220 M5	3.13.6
Cisco Accesser® Device	UCS C220 M5	3.13.6
Cisco Slicestor® Device	UCS C240	3.13.6

Dell

Table 23. Minimum Version of ClevOS Compatible with Dell Hardware

Appliance	Model	Minimum ClevOS
Dell Slicestor® Device	DSS 7000	3.10.1

Table 23. Minimum Version of ClevOS Compatible with Dell Hardware (continued)

Appliance	Model	Minimum ClevOS
Dell Slicestor® Device	R740xd w/ HDD Support	3.14.1
Dell Slicestor® Device	R740xd w/ NVMe Support	3.14.2
Dell Slicestor® Device	R740xd2	3.14.9

Lenovo

Table 24. Minimum Version of ClevOS Compatible with Lenovo Hardware

Appliance	Model	Minimum ClevOS
Lenovo Manager Appliance	X3550 M5	3.10.1
Lenovo Accesser® Device	X3550 M5	3.10.1
Lenovo Manager Appliance	X3650 M5	3.10.1
Lenovo Manager Appliance	SR630	3.13.6
Lenovo Accesser® Device	SR630	3.13.6
Lenovo Slicestor® Device	SR650	3.13.6

Quanta Cloud Technology (QCT)

Table 25. Minimum Version of ClevOS Compatible with QCT Hardware

Appliance	Model	Minimum ClevOS
QCT Manager Appliance	QuantaGrid D51PH-1ULH	3.13.4
QCT Accesser® Device	QuantaGrid D51PH-1ULH	3.13.4
QCT Slicestor® Device	QuantaGrid D51PH-1ULH	3.13.4

Chapter 8. Incompatible Hardware and Firmware with ClevOS

The hardware components running firmware revisions listed below are incompatible with ClevOS due to the possibility of unexpected behavior.

Note: If you have any hardware on this list running the firmware revisions listed, please contact L3 support immediately to create an upgrade plan. You can determine your firmware revisions using the Firmware Report that is found under the Maintenance menu.

Broadcom

Table 26. Broadcom Hardware and Firmware Incompatibility with ClevOS

Type	Model	Firmware affected
RAID Controller	Broadcom MegaRAID 9361-8i	4.650.00-6121

Hewlett Packard

Table 27. HP Hardware and Firmware Incompatibility with ClevOS

Type	Model	Firmware affected
RAID Controller	HP-SL4540 Smart Array	6.64
iLO	HPE SL4540 Gen 8	2.30

IBM Cloud Object Storage Appliances

Table 28. IBM COS Hardware and Firmware Incompatibility with ClevOS

Type	Model	Firmware affected
USM	IBM COS Slicestor®2584 (AP-TL-1) 3401/3403 S03	4.1.7
BMC	A3105, A4105, M3105, S2212A, S2448	1.0.125362, 1.0.135362
BMC	A10,C10,M10	< .97
CPLD	A10,C10,M10	< 1818

Table 29. IBM COS Drive Feature Hardware and Firmware Incompatibility with ClevOS

Model Affected	Feature	Capacity	Part manufacturer/model	Firmware affected
J15	AL4D	18TB	WD/WUH721818AL4200	J6Y2

Note: 18TB drives of model WUH721818AL4200 running J6Y2 firmware may be quarantined at elevated rates and require a device power cycle to resume. This issue is resolved in firmware version J6Y3.

Seagate

Table 30. Seagate Hardware and Firmware Incompatibility with ClevOS

Type	Model	Firmware affected
HDD	Seagate ST1000NM0033-9ZM173	SN04

Supermicro

Table 31. Supermicro Hardware and Firmware Incompatibility with ClevOS

Type	Model	Firmware affected
BMC	Supermicro SSG-6048R- E1CR60N	3.60

Notices

This information was developed for products and services offered in the US. This material might be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.*

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

*Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan, Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785*

US

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Trademarks

IBM, the IBM logo, and ibm.com[®] are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at Copyright and trademark information at www.ibm.com/legal/copytrade.shtml.

Accesser[®], Cleversafe[®], ClevOS[™], Dispersed Storage[®], dsNet[®], IBM Cloud Object Storage Accesser[®], IBM Cloud Object Storage Dedicated[™], IBM Cloud Object Storage Insight[™], IBM Cloud Object Storage Manager[™], IBM Cloud Object Storage Slicestor[®], IBM Cloud Object Storage Standard[™], IBM Cloud Object Storage System[™], IBM Cloud Object Storage Vault[™], SecureSlice[™], and Slicestor[®] are trademarks or registered trademarks of Cleversafe, an IBM Company and/or International Business Machines Corp.

Other product and service names might be trademarks of IBM or other companies.



Printed in USA