



# **Review audit logs**

StorageGRID software

NetApp

December 03, 2025

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# Review audit logs

## Audit messages and logs

These instructions contain information about the structure and content of StorageGRID audit messages and audit logs. You can use this information to read and analyze the audit trail of system activity.

These instructions are for administrators responsible for producing reports of system activity and usage that require analysis of the StorageGRID system's audit messages.

To use the text log file, you must have access to the configured audit share on the Admin Node.

For information about configuring audit message levels and using an external syslog server, see [Configure audit messages and log destinations](#).

## Audit message flow and retention

All StorageGRID services generate audit messages during normal system operation. You should understand how these audit messages move through the StorageGRID system to the `audit.log` file.

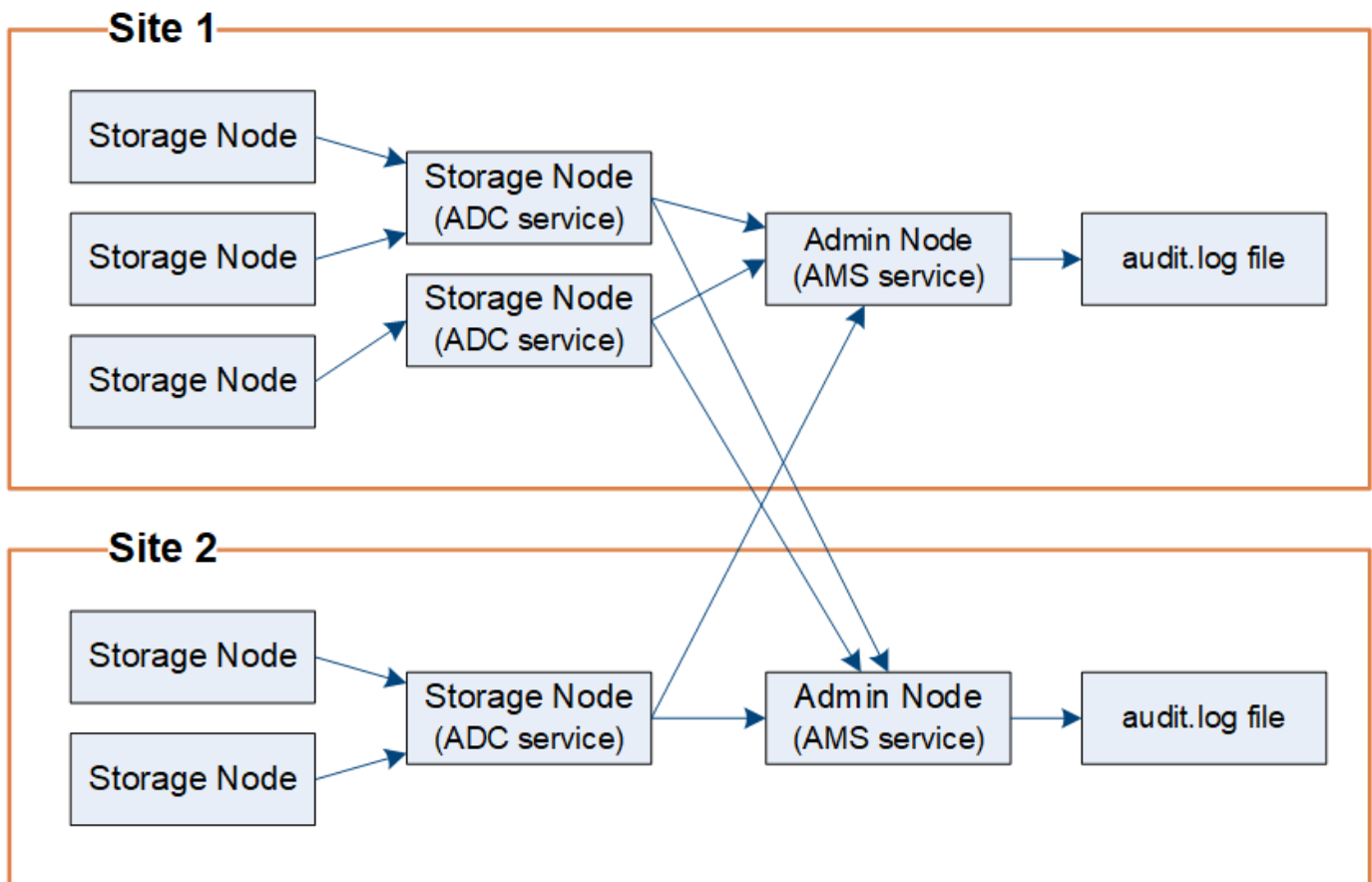
### Audit message flow

Audit messages are processed by Admin Nodes and by those Storage Nodes that have an Administrative Domain Controller (ADC) service.

As shown in the audit message flow diagram, each StorageGRID node sends its audit messages to one of the ADC services at the data center site. The ADC service is automatically enabled for the first three Storage Nodes installed at each site.

In turn, each ADC service acts as a relay and sends its collection of audit messages to every Admin Node in the StorageGRID system, which gives each Admin Node a complete record of system activity.

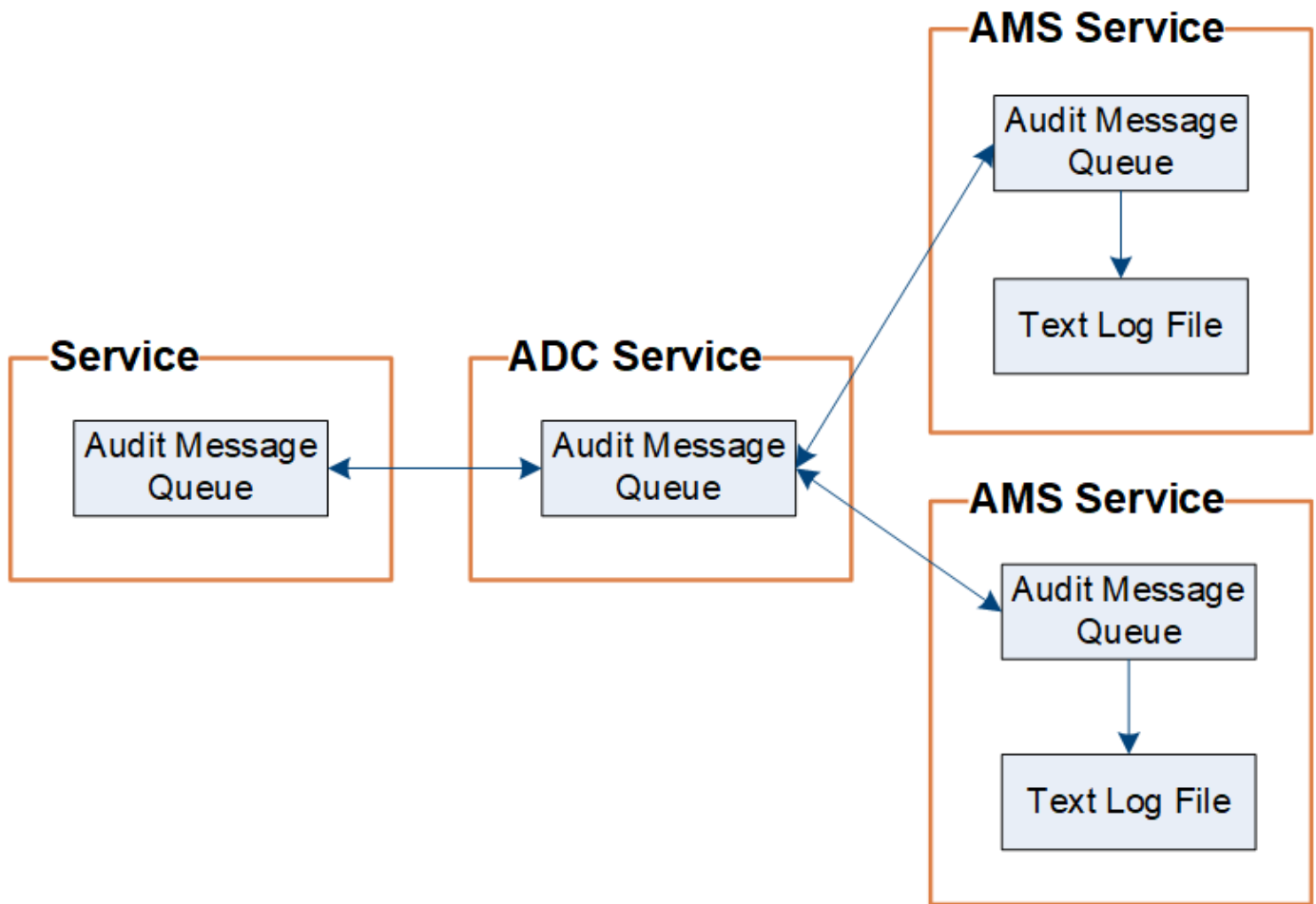
Each Admin Node stores audit messages in text log files; the active log file is named `audit.log`.



### Audit message retention

StorageGRID uses a copy-and-delete process to ensure that no audit messages are lost before they can be written to the audit log.

When a node generates or relays an audit message, the message is stored in an audit message queue on the system disk of the grid node. A copy of the message is always held in an audit message queue until the message is written to the audit log file in the Admin Node's `/var/local/log` directory. This helps prevent loss of an audit message during transport.



The audit message queue can temporarily increase due to network connectivity issues or insufficient audit capacity. As the queues increase, they consume more of the available space in each node's `/var/local/` directory. If the issue persists and a node's audit message directory becomes too full, the individual nodes will prioritize processing their backlog and become temporarily unavailable for new messages.

Specifically, you might see the following behaviors:

- If the `/var/local/log` directory used by an Admin Node becomes full, the Admin Node will be flagged as unavailable to new audit messages until the directory is no longer full. S3 client requests aren't affected. The XAMS (Unreachable Audit Repositories) alarm is triggered when an audit repository is unreachable.
- If the `/var/local/` directory used by a Storage Node with the ADC service becomes 92% full, the node will be flagged as unavailable to audit messages until the directory is only 87% full. S3 client requests to other nodes aren't affected. The NRLY (Available Audit Relays) alarm is triggered when audit relays are unreachable.



If there are no available Storage Nodes with the ADC service, the Storage Nodes store the audit messages locally in the `/var/local/log/localaudit.log` file.

- If the `/var/local/` directory used by a Storage Node becomes 85% full, the node will start refusing S3 client requests with `503 Service Unavailable`.

The following types of issues can cause audit message queues to grow very large:

- The outage of an Admin Node or a Storage Node with the ADC service. If one of the system's nodes is

down, the remaining nodes might become backlogged.

- A sustained activity rate that exceeds the audit capacity of the system.
- The `/var/local/` space on an ADC Storage Node becoming full for reasons unrelated to audit messages. When this happens, the node stops accepting new audit messages and prioritizes its current backlog, which can cause backlogs on other nodes.

### Large audit queue alert and Audit Messages Queued (AMQS) alarm

To help you monitor the size of audit message queues over time, the **Large audit queue** alert and the legacy AMQS alarm are triggered when the number of messages in a Storage Node queue or Admin Node queue reaches certain thresholds.

If the **Large audit queue** alert or the legacy AMQS alarm is triggered, start by checking the load on the system—if there have been a significant number of recent transactions, the alert and the alarm should resolve over time and can be ignored.

If the alert or alarm persists and increases in severity, view a chart of the queue size. If the number is steadily increasing over hours or days, the audit load has likely exceeded the audit capacity of the system. Reduce the client operation rate or decrease the number of audit messages logged by changing the audit level for Client Writes and Client Reads to Error or Off. See [Configure audit messages and log destinations](#).

### Duplicate messages

The StorageGRID system takes a conservative approach if a network or node failure occurs. For this reason, duplicate messages might exist in the audit log.

## Access audit log file

The audit share contains the active `audit.log` file and any compressed audit log files. You can access audit log files directly from the command line of the Admin Node.

### Before you begin

- You have [specific access permissions](#).
- You must have the `Passwords.txt` file.
- You must know the IP address of an Admin Node.

### Steps

1. Log in to an Admin Node:

- a. Enter the following command: `ssh admin@primary_Admin_Node_IP`
- b. Enter the password listed in the `Passwords.txt` file.
- c. Enter the following command to switch to root: `su -`
- d. Enter the password listed in the `Passwords.txt` file.

When you are logged in as root, the prompt changes from `$` to `#`.

2. Go to the directory containing the audit log files:

```
cd /var/local/log
```

3. View the current or a saved audit log file, as required.

## Audit log file rotation

Audit logs files are saved to an Admin Node's `/var/local/log` directory. The active audit log files are named `audit.log`.



Optionally, you can change the destination of audit logs and send audit information to an external syslog server. Local logs of audit records continue to be generated and stored when an external syslog server is configured. See [Configure audit messages and log destinations](#).

Once a day, the active `audit.log` file is saved, and a new `audit.log` file is started. The name of the saved file indicates when it was saved, in the format `yyyy-mm-dd.txt`. If more than one audit log is created in a single day, the file names use the date the file was saved, appended by a number, in the format `yyyy-mm-dd.txt.n`. For example, `2018-04-15.txt` and `2018-04-15.txt.1` are the first and second log files created and saved on 15 April 2018.

After a day, the saved file is compressed and renamed, in the format `yyyy-mm-dd.txt.gz`, which preserves the original date. Over time, this results in the consumption of storage allocated for audit logs on the Admin Node. A script monitors the audit log space consumption and deletes log files as necessary to free space in the `/var/local/log` directory. Audit logs are deleted based on the date they were created, with the oldest being deleted first. You can monitor the script's actions in the following file: `/var/local/log/manage-audit.log`.

This example shows the active `audit.log` file, the previous day's file (`2018-04-15.txt`), and the compressed file for the prior day (`2018-04-14.txt.gz`).

```
audit.log
2018-04-15.txt
2018-04-14.txt.gz
```

## Audit log file format

### Audit log file format

The audit log files are found on every Admin Node and contain a collection of individual audit messages.

Each audit message contains the following:

- The Coordinated Universal Time (UTC) of the event that triggered the audit message (ATIM) in ISO 8601 format, followed by a space:

`YYYY-MM-DDTHH:MM:SS.UUUUUU`, where `UUUUUU` are microseconds.

- The audit message itself, enclosed within square brackets and beginning with `AUDT`.

The following example shows three audit messages in an audit log file (line breaks added for readability).

These messages were generated when a tenant created an S3 bucket and added two objects to that bucket.

2019-08-07T18:43:30.247711

```
[AUDT:[RSLT(FC32):SUCS][CNID(UI64):1565149504991681][TIME(UI64):73520][SAI
P(IPAD):"10.224.2.255"][S3AI(CSTR):"17530064241597054718"]
[SACC(CSTR):"s3tenant"][S3AK(CSTR):"SGKH9100SCkNB8M3MTWNt-
PhoTDwB9JOk7PtyLkQmA=="][SUSR(CSTR):"urn:sgws:identity::175300642415970547
18:root"]
[SBAI(CSTR):"17530064241597054718"][SBAC(CSTR):"s3tenant"][S3BK(CSTR):"buc
ket1"][AVER(UI32):10][ATIM(UI64):1565203410247711]
[ATYP(FC32):SPUT][ANID(UI32):12454421][AMID(FC32):S3RQ][ATID(UI64):7074142
142472611085]]
```

2019-08-07T18:43:30.783597

```
[AUDT:[RSLT(FC32):SUCS][CNID(UI64):1565149504991696][TIME(UI64):120713][SA
IP(IPAD):"10.224.2.255"][S3AI(CSTR):"17530064241597054718"]
[SACC(CSTR):"s3tenant"][S3AK(CSTR):"SGKH9100SCkNB8M3MTWNt-
PhoTDwB9JOk7PtyLkQmA=="][SUSR(CSTR):"urn:sgws:identity::175300642415970547
18:root"]
[SBAI(CSTR):"17530064241597054718"][SBAC(CSTR):"s3tenant"][S3BK(CSTR):"buc
ket1"][S3KY(CSTR):"fh-small-0"]
[CBID(UI64):0x779557A069B2C037][UUID(CSTR):"94BA6949-38E1-4B0C-BC80-
EB44FB4FCC7F"][CSIZ(UI64):1024][AVER(UI32):10]
[ATIM(UI64):1565203410783597][ATYP(FC32):SPUT][ANID(UI32):12454421][AMID(F
C32):S3RQ][ATID(UI64):8439606722108456022]]
```

2019-08-07T18:43:30.784558

```
[AUDT:[RSLT(FC32):SUCS][CNID(UI64):1565149504991693][TIME(UI64):121666][SA
IP(IPAD):"10.224.2.255"][S3AI(CSTR):"17530064241597054718"]
[SACC(CSTR):"s3tenant"][S3AK(CSTR):"SGKH9100SCkNB8M3MTWNt-
PhoTDwB9JOk7PtyLkQmA=="][SUSR(CSTR):"urn:sgws:identity::175300642415970547
18:root"]
[SBAI(CSTR):"17530064241597054718"][SBAC(CSTR):"s3tenant"][S3BK(CSTR):"buc
ket1"][S3KY(CSTR):"fh-small-2000"]
[CBID(UI64):0x180CBD8E678EED17][UUID(CSTR):"19CE06D0-D2CF-4B03-9C38-
E578D66F7ADD"][CSIZ(UI64):1024][AVER(UI32):10]
[ATIM(UI64):1565203410784558][ATYP(FC32):SPUT][ANID(UI32):12454421][AMID(F
C32):S3RQ][ATID(UI64):13489590586043706682]]
```

In their default format, the audit messages in the audit log files aren't easy to read or interpret. You can use the [audit-explain tool](#) to obtain simplified summaries of the audit messages in the audit log. You can use the [audit-sum tool](#) to summarize how many write, read, and delete operations were logged and how long these operations took.



## Use audit-explain tool

You can use the `audit-explain` tool to translate the audit messages in the audit log in to an easy-to-read format.

### Before you begin

- You have [specific access permissions](#).
- You must have the `Passwords.txt` file.
- You must know the IP address of the primary Admin Node.

### About this task

The `audit-explain` tool, available on the primary Admin Node, provides simplified summaries of the audit messages in an audit log.



The `audit-explain` tool is primarily intended for use by technical support during troubleshooting operations. Processing `audit-explain` queries can consume a large amount of CPU power, which might impact StorageGRID operations.

This example shows typical output from the `audit-explain` tool. These four [SPUT](#) audit messages were generated when the S3 tenant with account ID 92484777680322627870 used S3 PUT requests to create a bucket named "bucket1" and add three objects to that bucket.

```
SPUT S3 PUT bucket bucket1 account:92484777680322627870 usec:124673
SPUT S3 PUT object bucket1/part1.txt tenant:92484777680322627870
cbid:9DCB157394F99FE5 usec:101485
SPUT S3 PUT object bucket1/part2.txt tenant:92484777680322627870
cbid:3CFBB07AB3D32CA9 usec:102804
SPUT S3 PUT object bucket1/part3.txt tenant:92484777680322627870
cbid:5373D73831ECC743 usec:93874
```

The `audit-explain` tool can do the following:

- Process plain or compressed audit logs. For example:

```
audit-explain audit.log
```

```
audit-explain 2019-08-12.txt.gz
```

- Process multiple files simultaneously. For example:

```
audit-explain audit.log 2019-08-12.txt.gz 2019-08-13.txt.gz
```

```
audit-explain /var/local/log/*
```

- Accept input from a pipe, which allows you to filter and preprocess the input using the `grep` command or other means. For example:

```
grep SPUT audit.log | audit-explain
```

```
grep bucket-name audit.log | audit-explain
```

Because audit logs can be very large and slow to parse, you can save time by filtering parts that you want to look at and running `audit-explain` on the parts, instead of the entire file.



The `audit-explain` tool does not accept compressed files as piped input. To process compressed files, provide their file names as command-line arguments, or use the `zcat` tool to decompress the files first. For example:

```
zcat audit.log.gz | audit-explain
```

Use the `help` (`-h`) option to see the available options. For example:

```
$ audit-explain -h
```

### Steps

1. Log in to the primary Admin Node:
  - a. Enter the following command: `ssh admin@primary_Admin_Node_IP`
  - b. Enter the password listed in the `Passwords.txt` file.
  - c. Enter the following command to switch to root: `su -`
  - d. Enter the password listed in the `Passwords.txt` file.

When you are logged in as root, the prompt changes from `$` to `#`.

2. Enter the following command, where `/var/local/log/audit.log` represents the name and the location of the file or files you want to analyze:

```
$ audit-explain /var/local/log/audit.log
```

The `audit-explain` tool prints human-readable interpretations of all messages in the specified file or files.



To reduce line lengths and to aid readability, timestamps aren't shown by default. If you want to see the timestamps, use the `timestamp` (`-t`) option.

## Use audit-sum tool

You can use the `audit-sum` tool to count the write, read, head, and delete audit messages and to see the minimum, maximum, and average time (or size) for each operation type.

### Before you begin

- You have [specific access permissions](#).
- You must have the `Passwords.txt` file.
- You must know the IP address of the primary Admin Node.

### About this task

The `audit-sum` tool, available on the primary Admin Node, summarizes how many write, read, and delete operations were logged and how long these operations took.



The `audit-sum` tool is primarily intended for use by technical support during troubleshooting operations. Processing `audit-sum` queries can consume a large amount of CPU power, which might impact StorageGRID operations.

This example shows typical output from the `audit-sum` tool. This example shows how long protocol operations took.

```
message group      count      min(sec)      max(sec)
average(sec)
=====
=====
IDEL               274
SDEL              213371      0.004         20.934
0.352
SGET              201906      0.010         1740.290
1.132
SHEA              22716       0.005         2.349
0.272
SPUT              1771398      0.011         1770.563
0.487
```

The `audit-sum` tool provides counts and times for the following S3, Swift, and ILM audit messages in an audit log.



Audit codes are removed from the product and documentation as features are deprecated. If you encounter an audit code that is not listed here, check the previous versions of this topic for older SG releases. For example, [StorageGRID 11.8 Using audit sum tool documentation](#).

Code	Description	Refer to
IDEL	ILM Initiated Delete: Logs when ILM starts the process of deleting an object.	<a href="#">IDEL: ILM Initiated Delete</a>
SDEL	S3 DELETE: Logs a successful transaction to delete an object or bucket.	<a href="#">SDEL: S3 DELETE</a>
SGET	S3 GET: Logs a successful transaction to retrieve an object or list the objects in a bucket.	<a href="#">SGET: S3 GET</a>
SHEA	S3 HEAD: Logs a successful transaction to check for the existence of an object or bucket.	<a href="#">SHEA: S3 HEAD</a>
SPUT	S3 PUT: Logs a successful transaction to create a new object or bucket.	<a href="#">SPUT: S3 PUT</a>
WDEL	Swift DELETE: Logs a successful transaction to delete an object or container.	<a href="#">WDEL: Swift DELETE</a>

Code	Description	Refer to
WGET	Swift GET: Logs a successful transaction to retrieve an object or list the objects in a container.	<a href="#">WGET: Swift GET</a>
WHEA	Swift HEAD: Logs a successful transaction to check for the existence of an object or container.	<a href="#">WHEA: Swift HEAD</a>
WPUT	Swift PUT: Logs a successful transaction to create a new object or container.	<a href="#">WPUT: Swift PUT</a>

The `audit-sum` tool can do the following:

- Process plain or compressed audit logs. For example:

```
audit-sum audit.log
```

```
audit-sum 2019-08-12.txt.gz
```

- Process multiple files simultaneously. For example:

```
audit-sum audit.log 2019-08-12.txt.gz 2019-08-13.txt.gz
```

```
audit-sum /var/local/log/*
```

- Accept input from a pipe, which allows you to filter and preprocess the input using the `grep` command or other means. For example:

```
grep WGET audit.log | audit-sum
```

```
grep bucket1 audit.log | audit-sum
```

```
grep SPUT audit.log | grep bucket1 | audit-sum
```



This tool does not accept compressed files as piped input. To process compressed files, provide their file names as command-line arguments, or use the `zcat` tool to decompress the files first. For example:

```
audit-sum audit.log.gz
```

```
zcat audit.log.gz | audit-sum
```

You can use command-line options to summarize operations on buckets separately from operations on objects or to group message summaries by bucket name, by time period, or by target type. By default, the summaries show the minimum, maximum, and average operation time, but you can use the `size (-s)` option to look at object size instead.

Use the `help (-h)` option to see the available options. For example:

```
$ audit-sum -h
```

## Steps

1. Log in to the primary Admin Node:
  - a. Enter the following command: `ssh admin@primary_Admin_Node_IP`
  - b. Enter the password listed in the `Passwords.txt` file.
  - c. Enter the following command to switch to root: `su -`
  - d. Enter the password listed in the `Passwords.txt` file.

When you are logged in as root, the prompt changes from `$` to `#`.

2. If you want to analyze all messages related to write, read, head, and delete operations, follow these steps:
  - a. Enter the following command, where `/var/local/log/audit.log` represents the name and the location of the file or files you want to analyze:

```
$ audit-sum /var/local/log/audit.log
```

This example shows typical output from the `audit-sum` tool. This example shows how long protocol operations took.

message group	count	min(sec)	max(sec)
average(sec)			
=====	=====	=====	=====
=====			
IDEL	274		
SDEL	213371	0.004	20.934
0.352			
SGET	201906	0.010	1740.290
1.132			
SHEA	22716	0.005	2.349
0.272			
SPUT	1771398	0.011	1770.563
0.487			

In this example, SGET (S3 GET) operations are the slowest on average at 1.13 seconds, but SGET and SPUT (S3 PUT) operations both show long worst-case times of about 1,770 seconds.

- b. To show the slowest 10 retrieval operations, use the `grep` command to select only SGET messages and add the long output option (`-l`) to include object paths:

```
grep SGET audit.log | audit-sum -l
```

The results include the type (object or bucket) and path, which allows you to grep the audit log for other messages relating to these particular objects.

```

Total:          201906 operations
Slowest:        1740.290 sec
Average:         1.132 sec
Fastest:         0.010 sec
Slowest operations:
    time(usec)      source ip      type      size(B) path
    =====
    1740289662    10.96.101.125      object    5663711385
backup/r9010aQ8JB-1566861764-4519.iso
    1624414429    10.96.101.125      object    5375001556
backup/r9010aQ8JB-1566861764-6618.iso
    1533143793    10.96.101.125      object    5183661466
backup/r9010aQ8JB-1566861764-4518.iso
    70839         10.96.101.125      object      28338
bucket3/dat.1566861764-6619
    68487         10.96.101.125      object      27890
bucket3/dat.1566861764-6615
    67798         10.96.101.125      object      27671
bucket5/dat.1566861764-6617
    67027         10.96.101.125      object      27230
bucket5/dat.1566861764-4517
    60922         10.96.101.125      object      26118
bucket3/dat.1566861764-4520
    35588         10.96.101.125      object      11311
bucket3/dat.1566861764-6616
    23897         10.96.101.125      object      10692
bucket3/dat.1566861764-4516

```

From this example output, you can see that the three slowest S3 GET requests were for objects about 5 GB in size, which is much larger than the other objects. The large size accounts for the slow worst-case retrieval times.

3. If you want to determine what sizes of objects are being ingested into and retrieved from your grid, use the size option (-s):

```
audit-sum -s audit.log
```

message group average (MB)	count	min (MB)	max (MB)
=====	=====	=====	=====
IDEL 1654.502	274	0.004	5000.000
SDEL 1.695	213371	0.000	10.504
SGET 14.920	201906	0.000	5000.000
SHEA 2.967	22716	0.001	10.504
SPUT 2.495	1771398	0.000	5000.000

In this example, the average object size for SPUT is under 2.5 MB, but the average size for SGET is much larger. The number of SPUT messages is much higher than the number of SGET messages, indicating that most objects are never retrieved.

4. If you want to determine if retrievals were slow yesterday:

- a. Issue the command on the appropriate audit log and use the group-by-time option (`-gt`), followed by the time period (for example, 15M, 1H, 10S):

```
grep SGET audit.log | audit-sum -gt 1H
```

message group average(sec)	count	min(sec)	max(sec)
=====	=====	=====	=====
2019-09-05T00 1.254	7591	0.010	1481.867
2019-09-05T01 1.115	4173	0.011	1740.290
2019-09-05T02 1.562	20142	0.011	1274.961
2019-09-05T03 1.254	57591	0.010	1383.867
2019-09-05T04 1.405	124171	0.013	1740.290
2019-09-05T05 1.562	420182	0.021	1274.511
2019-09-05T06 5.562	1220371	0.015	6274.961
2019-09-05T07 2.002	527142	0.011	1974.228
2019-09-05T08 1.105	384173	0.012	1740.290
2019-09-05T09 1.354	27591	0.010	1481.867

These results show that S3 GET traffic spiked between 06:00 and 07:00. The max and average times are both considerably higher at these times as well, and they did not ramp up gradually as the count increased. This suggests that capacity was exceeded somewhere, perhaps in the network or in the grid's ability to process requests.

- b. To determine what size objects were being retrieved each hour yesterday, add the size option (-s) to the command:

```
grep SGET audit.log | audit-sum -gt 1H -s
```



message group average(B)	count	min(B)	max(B)
=====	=====	=====	=====
2019-09-05T00 1.976	7591	0.040	1481.867
2019-09-05T01 2.062	4173	0.043	1740.290
2019-09-05T02 2.303	20142	0.083	1274.961
2019-09-05T03 1.182	57591	0.912	1383.867
2019-09-05T04 1.528	124171	0.730	1740.290
2019-09-05T05 2.398	420182	0.875	4274.511
2019-09-05T06 51.328	1220371	0.691	5663711385.961
2019-09-05T07 2.147	527142	0.130	1974.228
2019-09-05T08 1.878	384173	0.625	1740.290
2019-09-05T09 1.354	27591	0.689	1481.867

These results indicate that some very large retrievals occurred when the overall retrieval traffic was at its maximum.

- c. To see more detail, use the [audit-explain tool](#) to review all the SGET operations during that hour:

```
grep 2019-09-05T06 audit.log | grep SGET | audit-explain | less
```

If the output of the `grep` command is expected to be many lines, add the `less` command to show the contents of the audit log file one page (one screen) at a time.

5. If you want to determine if SPUT operations on buckets are slower than SPUT operations for objects:

- a. Start by using the `-go` option, which groups messages for object and bucket operations separately:

```
grep SPUT sample.log | audit-sum -go
```

message group average(sec)	count	min(sec)	max(sec)
=====	=====	=====	=====
SPUT.bucket 0.125	1	0.125	0.125
SPUT.object 0.236	12	0.025	1.019

The results show that SPUT operations for buckets have different performance characteristics than SPUT operations for objects.

- b. To determine which buckets have the slowest SPUT operations, use the `-gb` option, which groups messages by bucket:

```
grep SPUT audit.log | audit-sum -gb
```

message group average(sec)	count	min(sec)	max(sec)
=====	=====	=====	=====
SPUT.cho-non-versioning 1.571	71943	0.046	1770.563
SPUT.cho-versioning 1.415	54277	0.047	1736.633
SPUT.cho-west-region 1.329	80615	0.040	55.557
SPUT.ldt002 0.361	1564563	0.011	51.569

- c. To determine which buckets have the largest SPUT object size, use both the `-gb` and the `-s` options:

```
grep SPUT audit.log | audit-sum -gb -s
```

message group average (B)	count	min (B)	max (B)
=====	=====	=====	=====
=====			
SPUT.cho-non-versioning 21.672	71943	2.097	5000.000
SPUT.cho-versioning 21.120	54277	2.097	5000.000
SPUT.cho-west-region 14.433	80615	2.097	800.000
SPUT.ldt002 0.352	1564563	0.000	999.972

## Audit message format

### Audit message format

Audit messages exchanged within the StorageGRID system include standard information common to all messages and specific content describing the event or activity being reported.

If the summary information provided by the [audit-explain](#) and [audit-sum](#) tools is insufficient, refer to this section to understand the general format of all audit messages.

The following is an example audit message as it might appear in the audit log file:

```
2014-07-17T03:50:47.484627
[AUDT:[RSLT(FC32):VRGN][AVER(UI32):10][ATIM(UI64):1405569047484627][ATYP(FC32):SYSU][ANID(UI32):11627225][AMID(FC32):ARNI][ATID(UI64):9445736326500603516]]
```

Each audit message contains a string of attribute elements. The entire string is enclosed in brackets ([ ]), and each attribute element in the string has the following characteristics:

- Enclosed in brackets [ ]
- Introduced by the string AUDT, which indicates an audit message
- Without delimiters (no commas or spaces) before or after
- Terminated by a line feed character \n

Each element includes an attribute code, a data type, and a value that are reported in this format:

```
[ATTR(type):value] [ATTR(type):value] ...  
[ATTR(type):value]\n
```

The number of attribute elements in the message depends on the event type of the message. The attribute elements aren't listed in any particular order.

The following list describes the attribute elements:

- `ATTR` is a four-character code for the attribute being reported. There are some attributes that are common to all audit messages and others that are event-specific.
- `type` is a four-character identifier of the programming data type of the value, such as `UI64`, `FC32`, and so on. The type is enclosed in parentheses ( ).
- `value` is the content of the attribute, typically a numeric or text value. Values always follow a colon (:). Values of data type `CSTR` are surrounded by double quotes "".

## Data types

Different data types are used to store information in audit messages.

Type	Description
UI32	Unsigned long integer (32 bits); it can store the numbers 0 to 4,294,967,295.
UI64	Unsigned double long integer (64 bits); it can store the numbers 0 to 18,446,744,073,709,551,615.
FC32	Four-character constant; a 32-bit unsigned integer value represented as four ASCII characters such as "ABCD."
IPAD	Used for IP addresses.
CSTR	A variable-length array of UTF-8 characters. Characters can be escaped with the following conventions: <ul style="list-style-type: none"><li>• Backslash is \.</li><li>• Carriage return is \r.</li><li>• Double quotes is \".</li><li>• Line feed (new line) is \n.</li><li>• Characters can be replaced by their hexadecimal equivalents (in the format \xHH, where HH is the hexadecimal value representing the character).</li></ul>

## Event-specific data

Each audit message in the audit log records data specific to a system event.

Following the opening `[AUDT:` container that identifies the message itself, the next set of attributes provide

information about the event or action described by the audit message. These attributes are highlighted in the following example:

```
2018-12-05T08:24:45.921845 [AUDT:*[RSLT\(\FC32\):SUCS\]*  
\[TIME\(\UI64\):11454\]\[SAIP\(\IPAD\):"10.224.0.100"\]\[S3AI\(\CSTR\):"60025621595611246499"\]  
\[SACC\(\CSTR\):"account"\]\[S3AK\(\CSTR\):"SGKH4_Nc8SO1H6w3w0nCOFCGgk__E6dYzKlumRs  
KJA=="\]\[SUSR\(\CSTR\):"urn:sgws:identity::60025621595611246499:root"\]  
\[SBAI\(\CSTR\):"60025621595611246499"\]\[SBAC\(\CSTR\):"account"\]\[S3BK\(\CSTR\):"bucket"\]  
\[S3KY\(\CSTR\):"object"\]\[CBID\(\UI64\):0xCC128B9B9E428347\]\[UUID\(\CSTR\):"B975D2CE-E4DA-  
4D14-8A23-1CB4B83F2CD8"\]\[CSIZ\(\UI64\):30720\][AVER(UI32):10]  
\[ATIM(UI64):1543998285921845\]\[ATYP(\FC32):SHEA\][ANID(UI32):12281045][AMID(FC32):S3RQ]  
\[ATID(UI64):15552417629170647261\]]
```

The `ATYP` element (underlined in the example) identifies which event generated the message. This example message includes the `SHEA` message code (`[ATYP(FC32):SHEA]`), indicating it was generated by a successful S3 HEAD request.

## Common elements in audit messages

All audit messages contain the common elements.

Code	Type	Description
AMID	FC32	Module ID: A four-character identifier of the module ID that generated the message. This indicates the code segment within which the audit message was generated.
ANID	UI32	Node ID: The grid node ID assigned to the service that generated the message. Each service is allocated a unique identifier at the time the StorageGRID system is configured and installed. This ID can't be changed.
ASES	UI64	Audit Session Identifier: In previous releases, this element indicated the time at which the audit system was initialized after the service started up. This time value was measured in microseconds since the operating system epoch (00:00:00 UTC on 1 January, 1970).  <b>Note:</b> This element is obsolete and no longer appears in audit messages.
ASQN	UI64	Sequence Count: In previous releases, this counter was incremented for each generated audit message on the grid node (ANID) and reset to zero at service restart.  <b>Note:</b> This element is obsolete and no longer appears in audit messages.
ATID	UI64	Trace ID: An identifier that is shared by the set of messages that were triggered by a single event.

Code	Type	Description
ATIM	UI64	<p>Timestamp: The time the event was generated that triggered the audit message, measured in microseconds since the operating system epoch (00:00:00 UTC on 1 January, 1970). Note that most available tools for converting the timestamp to local date and time are based on milliseconds.</p> <p>Rounding or truncation of the logged timestamp might be required. The human-readable time that appears at the beginning of the audit message in the <code>audit.log</code> file is the ATIM attribute in ISO 8601 format. The date and time are represented as <code>YYYY-MMDDTHH:MM:SS.UUUUUU</code>, where the <code>T</code> is a literal string character indicating the beginning of the time segment of the date. <code>UUUUUU</code> are microseconds.</p>
ATYP	FC32	Event Type: A four-character identifier of the event being logged. This governs the "payload" content of the message: the attributes that are included.
AVER	UI32	Version: The version of the audit message. As the StorageGRID software evolves, new versions of services might incorporate new features in audit reporting. This field enables backward compatibility in the AMS service to process messages from older versions of services.
RSLT	FC32	Result: The result of event, process, or transaction. If is not relevant for a message, <code>NONE</code> is used rather than <code>SUCS</code> so that the message is not accidentally filtered.

## Audit message examples

You can find detailed information in each audit message. All audit messages use the same format.

The following is an example audit message as it might appear in the `audit.log` file:

```
2014-07-17T21:17:58.959669
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):246979][S3AI(CSTR):"bc644d
381a87d6cc216adcd963fb6f95dd25a38aa2cb8c9a358e8c5087a6af5f"][
S3AK(CSTR):"UJXDKKQOXB7YARDS71Q2"][S3BK(CSTR):"s3small11"][S3K
Y(CSTR):"hello1"][CBID(UI64):0x50C4F7AC2BC8EDF7][CSIZ(UI64):0
][AVER(UI32):10][ATIM(UI64):1405631878959669][ATYP(FC32):SPUT
][ANID(UI32):12872812][AMID(FC32):S3RQ][ATID(UI64):1579224144
102530435]]
```

The audit message contains information about the event being recorded, as well as information about the audit message itself.

To identify which event is recorded by the audit message, look for the ATYP attribute (highlighted below):

```
2014-07-17T21:17:58.959669
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):246979][S3AI(CSTR):"bc644d
381a87d6cc216adcd963fb6f95dd25a38aa2cb8c9a358e8c5087a6af5f"] [
S3AK(CSTR):"UJXDKKQOXB7YARDS71Q2"] [S3BK(CSTR):"s3small11"] [S3K
Y(CSTR):"hello1"] [CBID(UI64):0x50C4F7AC2BC8EDF7] [CSIZ(UI64):0
] [AVER(UI32):10] [ATIM(UI64):1405631878959669] [ATYP(FC32):SP
UT] [ANID(UI32):12872812] [AMID(FC32):S3RQ] [ATID(UI64):1579224
144102530435]]
```

The value of the ATYP attribute is SPUT. **SPUT** represents an S3 PUT transaction, which logs the ingest of an object to a bucket.

The following audit message also shows the bucket to which the object is associated:

```
2014-07-17T21:17:58.959669
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):246979][S3AI(CSTR):"bc644d
381a87d6cc216adcd963fb6f95dd25a38aa2cb8c9a358e8c5087a6af5f"] [
S3AK(CSTR):"UJXDKKQOXB7YARDS71Q2"] [S3BK\ (CSTR\): "s3small11"] [S3
KY(CSTR):"hello1"] [CBID(UI64):0x50C4F7AC2BC8EDF7] [CSIZ(UI64):
0] [AVER(UI32):10] [ATIM(UI64):1405631878959669] [ATYP(FC32):SPU
T] [ANID(UI32):12872812] [AMID(FC32):S3RQ] [ATID(UI64):157922414
4102530435]]
```

To discover when the PUT event occurred, note the Universal Coordinated Time (UTC) timestamp at the beginning of the audit message. This value is a human-readable version of the ATIM attribute of the audit message itself:

```
2014-07-17T21:17:58.959669
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):246979][S3AI(CSTR):"bc644d
381a87d6cc216adcd963fb6f95dd25a38aa2cb8c9a358e8c5087a6af5f"] [
S3AK(CSTR):"UJXDKKQOXB7YARDS71Q2"] [S3BK(CSTR):"s3small11"] [S3K
Y(CSTR):"hello1"] [CBID(UI64):0x50C4F7AC2BC8EDF7] [CSIZ(UI64):0
] [AVER(UI32):10] [ATIM\ (UI64\): 1405631878959669] [ATYP(FC32):SP
UT] [ANID(UI32):12872812] [AMID(FC32):S3RQ] [ATID(UI64):15792241
44102530435]]
```

ATIM records the time, in microseconds, since the beginning of the UNIX epoch. In the example, the value 1405631878959669 translates to Thursday, 17-Jul-2014 21:17:59 UTC.

## Audit messages and the object lifecycle

## When are audit message generated?

Audit messages are generated each time an object is ingested, retrieved, or deleted. You can identify these transactions in the audit log by locating S3 API-specific audit messages.

Audit messages are linked through identifiers specific to each protocol.

Protocol	Code
Linking S3 operations	S3BK (bucket), S3KY (key), or both
Linking Swift operations	WCON (container), WOBJ (object), or both
Linking internal operations	CBID (object's internal identifier)

### Timing of audit messages

Because of factors such as timing differences between grid nodes, object size, and network delays, the order of audit messages generated by the different services can vary from that shown in the examples in this section.

## Object ingest transactions

You can identify client ingest transactions in the audit log by locating S3 API-specific audit messages.

Not all audit messages generated during an ingest transaction are listed in the following tables. Only the messages required to trace the ingest transaction are included.

### S3 ingest audit messages

Code	Name	Description	Trace	See
SPUT	S3 PUT transaction	An S3 PUT ingest transaction has completed successfully.	CBID, S3BK, S3KY	<a href="#">SPUT: S3 PUT</a>
ORLM	Object Rules Met	The ILM policy has been satisfied for this object.	CBID	<a href="#">ORLM: Object Rules Met</a>

### Swift ingest audit messages

Code	Name	Description	Trace	See
WPUT	Swift PUT transaction	A Swift PUT ingest transaction has successfully completed.	CBID, WCON, WOBJ	<a href="#">WPUT: Swift PUT</a>
ORLM	Object Rules Met	The ILM policy has been satisfied for this object.	CBID	<a href="#">ORLM: Object Rules Met</a>



## Example: S3 object ingest

The series of audit messages below is an example of the audit messages generated and saved to the audit log when an S3 client ingests an object to a Storage Node (LDR service).

In this example, the active ILM policy includes the Make 2 Copies ILM rule.



Not all audit messages generated during a transaction are listed in the example below. Only those related to the S3 ingest transaction (SPUT) are listed.

This example assumes that an S3 bucket has been previously created.

### SPUT: S3 PUT

The SPUT message is generated to indicate that an S3 PUT transaction has been issued to create an object in a specific bucket.

```
2017-07-
17T21:17:58.959669[AUDT:[RSLT(FC32):SUCS][TIME(UI64):25771][SAIP(IPAD):"10
.96.112.29"][S3AI(CSTR):"70899244468554783528"][SACC(CSTR):"test"][S3AK(CS
TR):"SGKHyalRU_5cLflqajtaFmxJn946lAWRJfBF33gAOg=="][SUSR(CSTR):"urn:sgws:i
dentity::70899244468554783528:root"][SBAI(CSTR):"70899244468554783528"][SB
AC(CSTR):"test"][S3BK(CSTR):"example"][S3KY(CSTR):"testobject-0-
3"][CBID\ (UI64\):0x8EF52DF8025E63A8][CSIZ(UI64):30720][AVER(UI32):10][ATIM
(UI64):150032627859669][ATYP\ (FC32\):SPUT][ANID(UI32):12086324][AMID(FC32)
:S3RQ][ATID(UI64):14399932238768197038]]
```

### ORLM: Object Rules Met

The ORLM message indicates that the ILM policy has been satisfied for this object. The message includes the object's CBID and the name of the ILM rule that was applied.

For replicated objects, the LOCS field includes the LDR node ID and volume ID of the object locations.

```
2019-07-
17T21:18:31.230669[AUDT:[CBID\ (UI64\):0x50C4F7AC2BC8EDF7][RULE(CSTR):"Make
2 Copies"][STAT(FC32):DONE][CSIZ(UI64):0][UUID(CSTR):"0B344E18-98ED-4F22-
A6C8-A93ED68F8D3F"][LOCS(CSTR):"CLDI 12828634 2148730112, CLDI 12745543
2147552014"][RSLT(FC32):SUCS][AVER(UI32):10][ATYP\ (FC32\):ORLM][ATIM(UI64)
:1563398230669][ATID(UI64):15494889725796157557][ANID(UI32):13100453][AMID
(FC32):BCMS]]
```

For erasure-coded objects, the LOCS field includes the erasure-coding profile ID and the erasure coding group ID

```
2019-02-23T01:52:54.647537
[AUDT:[CBID(UI64):0xFA8ABE5B5001F7E2][RULE(CSTR):"EC_2_plus_1"][STAT(FC32):DONE][CSIZ(UI64):10000][UUID(CSTR):"E291E456-D11A-4701-8F51-D2F7CC9AFECA"][LOCS(CSTR):"CLEC 1 A471E45D-A400-47C7-86AC-12E77F229831"][RSLT(FC32):SUCS][AVER(UI32):10][ATIM(UI64):1550929974537]\[ATYP\ (FC32\):ORLM\][ANID(UI32):12355278][AMID(FC32):ILMX][ATID(UI64):4168559046473725560]]
```

The PATH field includes S3 bucket and key information or Swift container and object information, depending on which API was used.

```
2019-09-15.txt:2018-01-24T13:52:54.131559
[AUDT:[CBID(UI64):0x82704DFA4C9674F4][RULE(CSTR):"Make 2 Copies"][STAT(FC32):DONE][CSIZ(UI64):3145729][UUID(CSTR):"8C1C9CAC-22BB-4880-9115-CE604F8CE687"][PATH(CSTR):"frisbee_Bucket1/GridDataTests151683676324774_1_1vf9d"][LOCS(CSTR):"CLDI 12525468, CLDI 12222978"][RSLT(FC32):SUCS][AVER(UI32):10][ATIM(UI64):1568555574559][ATYP(FC32):ORLM][ANID(UI32):12525468][AMID(FC32):OBDI][ATID(UI64):344833886538369336]]
```

## Object delete transactions

You can identify object delete transactions in the audit log by locating S3 API-specific audit messages.

Not all audit messages generated during a delete transaction are listed in the following tables. Only messages required to trace the delete transaction are included.

### S3 delete audit messages

Code	Name	Description	Trace	See
SDEL	S3 Delete	Request made to delete the object from a bucket.	CBID, S3KY	<a href="#">SDEL: S3 DELETE</a>

### Swift delete audit messages

Code	Name	Description	Trace	See
WDEL	Swift Delete	Request made to delete the object from a container, or the container.	CBID, WOBJ	<a href="#">WDEL: Swift DELETE</a>

## Example: S3 object deletion

When an S3 client deletes an object from a Storage Node (LDR service), an audit message is generated and saved to the audit log.



Not all audit messages generated during a delete transaction are listed in the example below. Only those related to the S3 delete transaction (SDEL) are listed.

### SDEL: S3 Delete

Object deletion begins when the client sends a DeleteObject request to an LDR service. The message contains the bucket from which to delete the object and the object's S3 Key, which is used to identify the object.

```
2017-07-
17T21:17:58.959669[AUDT:[RSLT(FC32):SUCS][TIME(UI64):14316][SAIP(IPAD):"10
.96.112.29"][S3AI(CSTR):"70899244468554783528"][SACC(CSTR):"test"][S3AK(CS
TR):"SGKHyalRU_5cLflqajtaFmxJn946lAWRJfBF33gAOg=="][SUSR(CSTR):"urn:sgws:i
dentity::70899244468554783528:root"][SBAI(CSTR):"70899244468554783528"][SB
AC(CSTR):"test"]\[S3BK\CSTR\):"example"\\[S3KY\CSTR\):"testobject-0-
7"\][CBID(UI64):0x339F21C5A6964D89][CSIZ(UI64):30720][AVER(UI32):10][ATI
M(UI64):150032627859669][ATYP\ (FC32\) :SDEL][ANID(UI32):12086324][AMID(FC32
):S3RQ][ATID(UI64):4727861330952970593]]
```

## Object retrieve transactions

You can identify object retrieve transactions in the audit log by locating S3 API-specific audit messages.

Not all audit messages generated during a retrieve transaction are listed in the following tables. Only messages required to trace the retrieve transaction are included.

### S3 retrieval audit messages

Code	Name	Description	Trace	See
SGET	S3 GET	Request made to retrieve an object from a bucket.	CBID, S3BK, S3KY	<a href="#">SGET: S3 GET</a>

### Swift retrieval audit messages

Code	Name	Description	Trace	See
WGET	Swift GET	Request made to retrieve an object from a container.	CBID, WCON, WOBJ	<a href="#">WGET: Swift GET</a>

## Example: S3 object retrieval

When an S3 client retrieves an object from a Storage Node (LDR service), an audit message is generated and saved to the audit log.

Note that not all audit messages generated during a transaction are listed in the example below. Only those related to the S3 retrieval transaction (SGET) are listed.

### SGET: S3 GET

Object retrieval begins when the client sends a `GetObject` request to an LDR service. The message contains the bucket from which to retrieve the object and the object's S3 Key, which is used to identify the object.

```
2017-09-20T22:53:08.782605
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):47807][SAIP(IPAD):"10.96.112.26"][S3AI(
CSTR):"43979298178977966408"][SACC(CSTR):"s3-account-
a"][S3AK(CSTR):"SGKht7GzEcu0yXhFhT_rL5mep4nJt1w75GBh-
O_FEW=="][SUSR(CSTR):"urn:sgws:identity::43979298178977966408:root"][SBAI(
CSTR):"43979298178977966408"][SBAC(CSTR):"s3-account-
a"]\[S3BK\CSTR\):"bucket-
anonymous"\]\[S3KY\CSTR\):"Hello.txt"\][CBID(UI64):0x83D70C6F1F662B02][CS
IZ(UI64):12][AVER(UI32):10][ATIM(UI64):1505947988782605]\[ATYP\ (FC32\):SGE
T\][ANID(UI32):12272050][AMID(FC32):S3RQ][ATID(UI64):17742374343649889669]
]
```

If the bucket policy allows, a client can anonymously retrieve objects, or can retrieve objects from a bucket that is owned by a different tenant account. The audit message contains information about the bucket owner's tenant account so that you can track these anonymous and cross-account requests.

In the following example message, the client sends a `GetObject` request for an object stored in a bucket that they don't own. The values for SBAI and SBAC record the bucket owner's tenant account ID and name, which differs from the tenant account ID and name of the client recorded in S3AI and SACC.

```
2017-09-20T22:53:15.876415
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):53244][SAIP(IPAD):"10.96.112.26"]\[S3AI
\CSTR\):"17915054115450519830"\]\[SACC\CSTR\):"s3-account-
b"\][S3AK(CSTR):"SGKHpoblWlP_kBkqSCbTi754Ls81BUog67I2LlSiUg=="][SUSR(CSTR)
:"urn:sgws:identity::17915054115450519830:root"]\[SBAI\CSTR\):"4397929817
8977966408"\]\[SBAC\CSTR\):"s3-account-a"\][S3BK(CSTR):"bucket-
anonymous"]\[S3KY(CSTR):"Hello.txt"]\[CBID(UI64):0x83D70C6F1F662B02][CSIZ(UI
64):12][AVER(UI32):10][ATIM(UI64):1505947995876415][ATYP(FC32):SGET][ANID(
UI32):12272050][AMID(FC32):S3RQ][ATID(UI64):6888780247515624902]]
```

## Example: S3 Select on an object

When an S3 client issues an S3 Select query on an object, audit messages are generated and saved to the audit log.

Note that not all audit messages generated during a transaction are listed in the example below. Only those related to the S3 Select transaction (SelectObjectContent) are listed.

Each query results in two audit messages: one that performs the authorization of the S3 Select request (the S3SR field is set to "select") and a subsequent standard GET operation that retrieves the data from storage during processing.

```
2021-11-08T15:35:30.750038
[AUDT:[RSLT(FC32):SUCS][CNID(UI64):1636385730715700][TIME(UI64):29173][SAI
P(IPAD):"192.168.7.44"][S3AI(CSTR):"63147909414576125820"][SACC(CSTR):"Ten
ant1636027116"][S3AK(CSTR):"AUFD1XNVZ905F3TW7KSU"][SUSR(CSTR):"urn:sgws:id
entity::63147909414576125820:root"][SBAI(CSTR):"63147909414576125820"][SBA
C(CSTR):"Tenant1636027116"][S3BK(CSTR):"619c0755-9e38-42e0-a614-
05064f74126d"][S3KY(CSTR):"SUB-
EST2020_ALL.csv"][CBID(UI64):0x0496F0408A721171][UUID(CSTR):"D64B1A4A-
9F01-4EE7-B133-
08842A099628"][CSIZ(UI64):0][S3SR(CSTR):"select"][AVER(UI32):10][ATIM(UI64
):1636385730750038][ATYP(FC32):SPOS][ANID(UI32):12601166][AMID(FC32):S3RQ]
[ATID(UI64):1363009709396895985]]
```

```
2021-11-08T15:35:32.604886
[AUDT:[RSLT(FC32):SUCS][CNID(UI64):1636383069486504][TIME(UI64):430690][SA
IP(IPAD):"192.168.7.44"][HTRH(CSTR):"{\"x-forwarded-
for\": \"unix:\"}"]][S3AI(CSTR):"63147909414576125820"][SACC(CSTR):"Tenant16
36027116"][S3AK(CSTR):"AUFD1XNVZ905F3TW7KSU"][SUSR(CSTR):"urn:sgws:identit
y::63147909414576125820:root"][SBAI(CSTR):"63147909414576125820"][SBAC(CST
R):"Tenant1636027116"][S3BK(CSTR):"619c0755-9e38-42e0-a614-
05064f74126d"][S3KY(CSTR):"SUB-
EST2020_ALL.csv"][CBID(UI64):0x0496F0408A721171][UUID(CSTR):"D64B1A4A-
9F01-4EE7-B133-
08842A099628"][CSIZ(UI64):10185581][MTME(UI64):1636380348695262][AVER(UI32
):10][ATIM(UI64):1636385732604886][ATYP(FC32):SGET][ANID(UI32):12733063][A
MID(FC32):S3RQ][ATID(UI64):16562288121152341130]]
```

## Metadata update messages

Audit messages are generated when an S3 client updates an object's metadata.

### S3 metadata update audit messages

Code	Name	Description	Trace	See
SUPD	S3 Metadata Updated	Generated when an S3 client updates the metadata for an ingested object.	CBID, S3KY, HTRH	<a href="#">SUPD: S3 Metadata Updated</a>

## Example: S3 metadata update

The example shows a successful transaction to update the metadata for an existing S3 object.

### SUPD: S3 Metadata Update

The S3 client makes a request (SUPD) to update the specified metadata (`x-amz-meta-*`) for the S3 object (S3KY). In this example, request headers are included in the field HTRH because it has been configured as an audit protocol header (**CONFIGURATION > Monitoring > Audit and syslog server**). See [Configure audit messages and log destinations](#).

```
2017-07-11T21:54:03.157462
[AUDT:[RSLT(FC32):SUCS][TIME(UI64):17631][SAIP(IPAD):"10.96.100.254"]
[HTRH(CSTR):"{\"accept-encoding\": \"identity\", \"authorization\": \"AWS
LIUF17FGJARQHPY2E761:jul/hnZs/uNY+aVvV0lTSYhEGts=\",
\"content-length\": \"0\", \"date\": \"Tue, 11 Jul 2017 21:54:03
GMT\", \"host\": \"10.96.99.163:18082\",
\"user-agent\": \"aws-cli/1.9.20 Python/2.7.6 Linux/3.13.0-119-generic
botocore/1.3.20\",
\"x-amz-copy-source\": \"/testbkt1/testobj1\", \"x-amz-metadata-
directive\": \"REPLACE\", \"x-amz-meta-city\": \"Vancouver\"}"]
[S3AI(CSTR):"20956855414285633225"][SACC(CSTR):"acct1"][S3AK(CSTR):"SGKHyy
v9ZQqWRbJSQc5vI7mgioJwrdplShE02AUaww=="]
[SUSR(CSTR):"urn:sgws:identity::20956855414285633225:root"]
[SBAI(CSTR):"20956855414285633225"][SBAC(CSTR):"acct1"][S3BK(CSTR):"testbk
t1"]
[S3KY(CSTR):"testobj1"][CBID(UI64):0xCB1D5C213434DD48][CSIZ(UI64):10][AVER
(UI32):10]
[ATIM(UI64):1499810043157462][ATYP(FC32):SUPD][ANID(UI32):12258396][AMID(F
C32):S3RQ]
[ATID(UI64):8987436599021955788]]
```

## Audit messages

### Audit message descriptions

Detailed descriptions of audit messages returned by the system are listed in the following sections. Each audit message is first listed in a table that groups related messages by the class of activity that the message represents. These groupings are useful both for understanding the types of activities that are audited, and for selecting the desired type of audit message filtering.

The audit messages are also listed alphabetically by their four-character codes. This alphabetic list enables you to find information about specific messages.

The four-character codes used throughout this chapter are the ATYP values found in the audit messages as shown in the following example message:

```
2014-07-17T03:50:47.484627
```

```
\[AUDT:[RSLT(FC32):VRGN][AVER(UI32):10][ATIM(UI64):1405569047484627][ATYP\  
(FC32\):SYSU][ANID(UI32):11627225][AMID(FC32):ARNI][ATID(UI64):94457363265  
00603516]]
```

For information about setting audit message levels, changing log destinations, and using an external syslog server for your audit information, see [Configure audit messages and log destinations](#)

## Audit message categories

### System audit messages

The audit messages belonging to the system audit category are used for events related to the auditing system itself, grid node states, system-wide task activity (grid tasks), and service backup operations.

Code	Message title and description	See
ECMC	Missing Erasure-Coded Data Fragment: Indicates that a missing erasure-coded data fragment has been detected.	<a href="#">ECMC: Missing Erasure-Coded Data Fragment</a>
ECOC	Corrupt Erasure-Coded Data Fragment: Indicates that a corrupt erasure-coded data fragment has been detected.	<a href="#">ECOC: Corrupt Erasure-Coded Data Fragment</a>
ETAF	Security Authentication Failed: A connection attempt using Transport Layer Security (TLS) failed.	<a href="#">ETAF: Security Authentication Failed</a>
GNRG	GNDS Registration: A service updated or registered information about itself in the StorageGRID system.	<a href="#">GNRG: GNDS Registration</a>
GNUR	GNDS Unregistration: A service has unregistered itself from the StorageGRID system.	<a href="#">GNUR: GNDS Unregistration</a>
GTED	Grid Task Ended: The CMN service finished processing the grid task.	<a href="#">GTED: Grid Task Ended</a>
GTST	Grid Task Started: The CMN service started to process the grid task.	<a href="#">GTST: Grid Task Started</a>
GTSU	Grid Task Submitted: A grid task was submitted to the CMN service.	<a href="#">GTSU: Grid Task Submitted</a>
LLST	Location Lost: This audit message is generated when a location is lost.	<a href="#">LLST: Location Lost</a>

Code	Message title and description	See
OLST	Object Lost: A requested object cannot be located within the StorageGRID system.	<a href="#">OLST: System Detected Lost Object</a>
SADD	Security Audit Disable: Audit message logging was turned off.	<a href="#">SADD: Security Audit Disable</a>
SADE	Security Audit Enable: Audit message logging has been restored.	<a href="#">SADE: Security Audit Enable</a>
SVRF	Object Store Verify Fail: A content block failed verification checks.	<a href="#">SVRF: Object Store Verify Fail</a>
SVRU	Object Store Verify Unknown: Unexpected object data detected in the object store.	<a href="#">SVRU: Object Store Verify Unknown</a>
SYSD	Node Stop: A shutdown was requested.	<a href="#">SYSD: Node Stop</a>
SYST	Node Stopping: A service initiated a graceful stop.	<a href="#">SYST: Node Stopping</a>
SYSU	Node Start: A service started; the nature of the previous shutdown is indicated in the message.	<a href="#">SYSU: Node Start</a>

### Object storage audit messages

The audit messages belonging to the object storage audit category are used for events related to the storage and management of objects within the StorageGRID system. These include object storage and retrievals, grid-node to grid-node transfers, and verifications.



Audit codes are removed from the product and documentation as features are deprecated. If you encounter an audit code that is not listed here, check the previous versions of this topic for older SG releases. For example, [StorageGRID 11.8 object storage audit messages](#).

Code	Description	See
BROR	Bucket Read Only Request: A bucket entered or exited read-only mode.	<a href="#">BROR: Bucket Read Only Request</a>
CBSE	Object Send End: The source entity completed a grid-node to grid-node data transfer operation.	<a href="#">CBSE: Object Send End</a>
CBRE	Object Receive End: The destination entity completed a grid-node to grid-node data transfer operation.	<a href="#">CBRE: Object Receive End</a>



Code	Description	See
CGRR	Cross-Grid Replication Request: StorageGRID attempted a cross-grid replication operation to replicate objects between buckets in a grid federation connection.	<a href="#">CGRR: Cross-Grid Replication Request</a>
EBDL	Empty Bucket Delete: The ILM scanner deleted an object in a bucket that is deleting all objects (performing an empty bucket operation).	<a href="#">EBDL: Empty Bucket Delete</a>
EBKR	Empty Bucket Request: A user sent a request to turn empty bucket on or off (that is, to delete bucket objects or to stop deleting objects).	<a href="#">EBKR: Empty Bucket Request</a>
SCMT	Object Store Commit: A content block was completely stored and verified, and can now be requested.	<a href="#">SCMT: Object Store Commit Request</a>
SREM	Object Store Remove: A content block was deleted from a grid node, and can no longer be requested directly.	<a href="#">SREM: Object Store Remove</a>

### Client read audit messages

Client read audit messages are logged when an S3 client application makes a request to retrieve an object.

Code	Description	Used by	See
S3SL	S3 Select request: Logs a completion after an S3 Select request has been returned to the client. The S3SL message can include error message and error code details. The request might not have been successful.	S3 client	<a href="#">S3SL: S3 Select request</a>
SGET	S3 GET: Logs a successful transaction to retrieve an object or list the objects in a bucket.  <b>Note:</b> If the transaction operates on a subresource, the audit message will include the field S3SR.	S3 client	<a href="#">SGET: S3 GET</a>
SHEA	S3 HEAD: Logs a successful transaction to check for the existence of an object or bucket.	S3 client	<a href="#">SHEA: S3 HEAD</a>
WGET	Swift GET: Logs a successful transaction to retrieve an object or list the objects in a container.	Swift client	<a href="#">WGET: Swift GET</a>
WHEA	Swift HEAD: Logs a successful transaction to check for the existence of an object or container.	Swift client	<a href="#">WHEA: Swift HEAD</a>

## Client write audit messages

Client write audit messages are logged when an S3 client application makes a request to create or modify an object.

Code	Description	Used by	See
OVWR	Object Overwrite: Logs a transaction to overwrite one object with another object.	S3 and Swift clients	<a href="#">OVWR: Object Overwrite</a>
SDEL	S3 DELETE: Logs a successful transaction to delete an object or bucket.  <b>Note:</b> If the transaction operates on a subresource, the audit message will include the field S3SR.	S3 client	<a href="#">SDEL: S3 DELETE</a>
SPOS	S3 POST: Logs a successful transaction to restore an object from AWS Glacier storage to a Cloud Storage Pool.	S3 client	<a href="#">SPOS: S3 POST</a>
SPUT	S3 PUT: Logs a successful transaction to create a new object or bucket.  <b>Note:</b> If the transaction operates on a subresource, the audit message will include the field S3SR.	S3 client	<a href="#">SPUT: S3 PUT</a>
SUPD	S3 Metadata Updated: Logs a successful transaction to update the metadata for an existing object or bucket.	S3 client	<a href="#">SUPD: S3 Metadata Updated</a>
WDEL	Swift DELETE: Logs a successful transaction to delete an object or container.	Swift client	<a href="#">WDEL: Swift DELETE</a>
WPUT	Swift PUT: Logs a successful transaction to create a new object or container.	Swift client	<a href="#">WPUT: Swift PUT</a>

## Management audit message

The Management category logs user requests to the Management API.

Code	Message title and description	See
MGAU	Management API audit message: A log of user requests.	<a href="#">MGAU: Management audit message</a>

## ILM audit messages

The audit messages belonging to the ILM audit category are used for events related to

information lifecycle management (ILM) operations.

Code	Message title and description	See
IDEL	ILM Initiated Delete: This audit message is generated when ILM starts the process of deleting an object.	<a href="#">IDEL: ILM Initiated Delete</a>
LKCU	Overwritten Object Cleanup. This audit message is generated when an overwritten object is automatically removed to free up storage space.	<a href="#">LKCU: Overwritten Object Cleanup</a>
ORLM	Object Rules Met: This audit message is generated when object data is stored as specified by the ILM rules.	<a href="#">ORLM: Object Rules Met</a>

## Audit message reference

### BROR: Bucket Read Only Request

The LDR service generates this audit message when a bucket enters or exits read-only mode. For example, a bucket enters read-only mode while all objects are being deleted.

Code	Field	Description
BKHD	Bucket UUID	The bucket ID.
BROV	Bucket read-only request value	Whether the bucket is being made read-only or is leaving the read-only state (1 = read-only, 0 = not-read-only).
BROS	Bucket read-only reason	The reason the bucket is being made read-only or leaving the read-only state. For example, emptyBucket.
S3AI	S3 tenant account ID	The ID of the tenant account that sent the request. An empty value indicates anonymous access.
S3BK	S3 bucket	The S3 bucket name.

### CBRB: Object Receive Begin

During normal system operations, content blocks are continuously transferred between different nodes as data is accessed, replicated and retained. When transfer of a content block from one node to another is initiated, this message is issued by the destination entity.

Code	Field	Description
CNID	Connection Identifier	The unique identifier of the node-to-node session/connection.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block being transferred.
CTDR	Transfer Direction	Indicates if the CBID transfer was push-initiated or pull-initiated:  PUSH: The transfer operation was requested by the sending entity.  PULL: The transfer operation was requested by the receiving entity.
CTSR	Source Entity	The node ID of the source (sender) of the CBID transfer.
CTDS	Destination Entity	The node ID of the destination (receiver) of the CBID transfer.
CTSS	Start Sequence Count	Indicates the first sequence count requested. If successful, the transfer begins from this sequence count.
CTES	Expected End Sequence Count	Indicates the last sequence count requested. If successful, the transfer is considered complete when this sequence count has been received.
RSLT	Transfer Start Status	Status at the time the transfer was started:  SUCS: Transfer started successfully.

This audit message means a node-to-node data transfer operation was initiated on a single piece of content, as identified by its Content Block Identifier. The operation requests data from "Start Sequence Count" to "Expected End Sequence Count". Sending and receiving nodes are identified by their node IDs. This information can be used to track system data flow, and when combined with storage audit messages, to verify replica counts.

### **CBRE: Object Receive End**

When transfer of a content block from one node to another is completed, this message is issued by the destination entity.

Code	Field	Description
CNID	Connection Identifier	The unique identifier of the node-to-node session/connection.
CBID	Content Block Identifier	The unique identifier of the content block being transferred.

Code	Field	Description
CTDR	Transfer Direction	Indicates if the CBID transfer was push-initiated or pull-initiated:  PUSH: The transfer operation was requested by the sending entity.  PULL: The transfer operation was requested by the receiving entity.
CTSR	Source Entity	The node ID of the source (sender) of the CBID transfer.
CTDS	Destination Entity	The node ID of the destination (receiver) of the CBID transfer.
CTSS	Start Sequence Count	Indicates the sequence count on which the transfer started.
CTAS	Actual End Sequence Count	Indicates the last sequence count successfully transferred. If the Actual End Sequence Count is the same as the Start Sequence Count, and the Transfer Result was not successful, no data was exchanged.
RSLT	Transfer Result	The result of the transfer operation (from the perspective of the sending entity):  SUCS: transfer successfully completed; all requested sequence counts were sent.  CONL: connection lost during transfer  CTMO: connection timed-out during establishment or transfer  UNRE: destination node ID unreachable  CRPT: transfer ended due to reception of corrupt or invalid data

This audit message means a node-to-node data transfer operation was completed. If the Transfer Result was successful, the operation transferred data from "Start Sequence Count" to "Actual End Sequence Count". Sending and receiving nodes are identified by their node IDs. This information can be used to track system data flow and to locate, tabulate, and analyze errors. When combined with storage audit messages, it can also be used to verify replica counts.

### **CBSB: Object Send Begin**

During normal system operations, content blocks are continuously transferred between different nodes as data is accessed, replicated and retained. When transfer of a content block from one node to another is initiated, this message is issued by the source entity.

Code	Field	Description
CNID	Connection Identifier	The unique identifier of the node-to-node session/connection.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block being transferred.
CTDR	Transfer Direction	Indicates if the CBID transfer was push-initiated or pull-initiated:  PUSH: The transfer operation was requested by the sending entity.  PULL: The transfer operation was requested by the receiving entity.
CTSR	Source Entity	The node ID of the source (sender) of the CBID transfer.
CTDS	Destination Entity	The node ID of the destination (receiver) of the CBID transfer.
CTSS	Start Sequence Count	Indicates the first sequence count requested. If successful, the transfer begins from this sequence count.
CTES	Expected End Sequence Count	Indicates the last sequence count requested. If successful, the transfer is considered complete when this sequence count has been received.
RSLT	Transfer Start Status	Status at the time the transfer was started:  SUCS: transfer started successfully.

This audit message means a node-to-node data transfer operation was initiated on a single piece of content, as identified by its Content Block Identifier. The operation requests data from "Start Sequence Count" to "Expected End Sequence Count". Sending and receiving nodes are identified by their node IDs. This information can be used to track system data flow, and when combined with storage audit messages, to verify replica counts.

### CBSE: Object Send End

When transfer of a content block from one node to another is completed, this message is issued by the source entity.

Code	Field	Description
CNID	Connection Identifier	The unique identifier of the node-to-node session/connection.
CBID	Content Block Identifier	The unique identifier of the content block being transferred.

Code	Field	Description
CTDR	Transfer Direction	Indicates if the CBID transfer was push-initiated or pull-initiated:  PUSH: The transfer operation was requested by the sending entity.  PULL: The transfer operation was requested by the receiving entity.
CTSR	Source Entity	The node ID of the source (sender) of the CBID transfer.
CTDS	Destination Entity	The node ID of the destination (receiver) of the CBID transfer.
CTSS	Start Sequence Count	Indicates the sequence count on which the transfer started.
CTAS	Actual End Sequence Count	Indicates the last sequence count successfully transferred. If the Actual End Sequence Count is the same as the Start Sequence Count, and the Transfer Result was not successful, no data was exchanged.
RSLT	Transfer Result	The result of the transfer operation (from the perspective of the sending entity):  SUCS: Transfer successfully completed; all requested sequence counts were sent.  CONL: connection lost during transfer  CTMO: connection timed-out during establishment or transfer  UNRE: destination node ID unreachable  CRPT: transfer ended due to reception of corrupt or invalid data

This audit message means a node-to-node data transfer operation was completed. If the Transfer Result was successful, the operation transferred data from "Start Sequence Count" to "Actual End Sequence Count". Sending and receiving nodes are identified by their node IDs. This information can be used to track system data flow and to locate, tabulate, and analyze errors. When combined with storage audit messages, it can also be used to verify replica counts.

### **CGRR: Cross-Grid Replication Request**

This message is generated when StorageGRID attempts a cross-grid replication operation to replicate objects between buckets in a grid federation connection.

Code	Field	Description
CSIZ	Object Size	The size of the object in bytes.  The CSIZ attribute was introduced in StorageGRID 11.8. As a result, cross-grid replication requests spanning a StorageGRID 11.7 to 11.8 upgrade might have an inaccurate total object size.
S3AI	S3 tenant account ID	The ID of the tenant account that owns the bucket from which the object is being replicated.
GFID	Grid federation connection ID	The ID of the grid federation connection being used for cross-grid replication.
OPER	CGR operation	The type of cross-grid replication operation that was attempted: <ul style="list-style-type: none"> <li>• 0 = Replicate object</li> <li>• 1 = Replicate multipart object</li> <li>• 2 = Replicate delete marker</li> </ul>
S3BK	S3 bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name.
VSID	Version ID	The version ID of the specific version of an object that was being replicated.
RSLT	Result Code	Returns successful (SUCS) or general error (GERR).

### EBDL: Empty Bucket Delete

The ILM scanner deleted an object in a bucket that is deleting all objects (performing an empty bucket operation).

Code	Field	Description
CSIZ	Object Size	The size of the object in bytes.
PATH	S3 Bucket/Key	The S3 bucket name and S3 key name.
SEGC	Container UUID	UUID of the container for the segmented object. This value is available only if the object is segmented.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.



Code	Field	Description
RSLT	Result of the delete operation	The result of event, process, or transaction. If is not relevant for a message, NONE is used rather than SUCS so that the message is not accidentally filtered.

### EBKR: Empty Bucket Request

This message indicates a user sent a request to turn empty bucket on or off (that is, to delete bucket objects or to stop deleting objects).

Code	Field	Description
BUID	Bucket UUID	The bucket ID.
EBJS	Empty Bucket JSON Configuration	Contains the JSON representing the current Empty Bucket configuration.
S3AI	S3 tenant account ID	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.

### ECMC: Missing Erasure-Coded Data Fragment

This audit message indicates that the system has detected a missing erasure-coded data fragment.

Code	Field	Description
VCMC	VCS ID	The name of the VCS that contains the missing chunk.
MCID	Chunk ID	The identifier of the missing erasure-coded fragment.
RSLT	Result	This field has the value 'NONE'. RSLT is a mandatory message field, but is not relevant for this particular message. 'NONE' is used rather than 'SUCS' so that this message is not filtered.

### ECOC: Corrupt Erasure-Coded Data Fragment

This audit message indicates that the system has detected a corrupt erasure-coded data fragment.

Code	Field	Description
VCCO	VCS ID	The name of the VCS that contains the corrupt chunk.

Code	Field	Description
VLID	Volume ID	The RangeDB Volume that contains the corrupt erasure-coded fragment.
CCID	Chunk ID	The identifier of the corrupt erasure-coded fragment.
RSLT	Result	This field has the value 'NONE'. RSLT is a mandatory message field, but is not relevant for this particular message. 'NONE' is used rather than 'SUCS' so that this message is not filtered.

### ETAF: Security Authentication Failed

This message is generated when a connection attempt using Transport Layer Security (TLS) has failed.

Code	Field	Description
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection over which the authentication failed.
RUID	User Identity	A service dependent identifier representing the identity of the remote user.
RSLT	Reason Code	<p>The reason for the failure:</p> <p>SCNI: Secure connection establishment failed.</p> <p>CERM: Certificate was missing.</p> <p>CERT: Certificate was invalid.</p> <p>CERE: Certificate was expired.</p> <p>CERR: Certificate was revoked.</p> <p>CSGN: Certificate signature was invalid.</p> <p>CSGU: Certificate signer was unknown.</p> <p>UCRM: User credentials were missing.</p> <p>UCRI: User credentials were invalid.</p> <p>UCRU: User credentials were disallowed.</p> <p>TOUT: Authentication timed out.</p>

When a connection is established to a secure service that uses TLS, the credentials of the remote entity are verified using the TLS profile and additional logic built into the service. If this authentication fails due to invalid, unexpected, or disallowed certificates or credentials, an audit message is logged. This enables queries for

unauthorized access attempts and other security-related connection problems.

The message could result from a remote entity having an incorrect configuration, or from attempts to present invalid or disallowed credentials to the system. This audit message should be monitored to detect attempts to gain unauthorized access to the system.

### **GNRG: GNDS Registration**

The CMN service generates this audit message when a service has updated or registered information about itself in the StorageGRID system.

<b>Code</b>	<b>Field</b>	<b>Description</b>
RSLT	Result	The result of the update request: <ul style="list-style-type: none"><li>• SUCS: Successful</li><li>• SUNV: Service Unavailable</li><li>• GERR: Other failure</li></ul>
GNID	Node ID	The node ID of the service that initiated the update request.
GNTP	Device Type	The grid node's device type (for example, BLDR for an LDR service).
GNDV	Device Model version	The string identifying the grid node's device model version in the DMDL bundle.
GNGP	Group	The group to which the grid node belongs (in the context of link costs and service-query ranking).
GNIA	IP Address	The grid node's IP address.

This message is generated whenever a grid node updates its entry in the Grid Nodes Bundle.

### **GNUR: GNDS Unregistration**

The CMN service generates this audit message when a service has unregistered information about itself from the StorageGRID system.

<b>Code</b>	<b>Field</b>	<b>Description</b>
RSLT	Result	The result of the update request: <ul style="list-style-type: none"><li>• SUCS: Successful</li><li>• SUNV: Service Unavailable</li><li>• GERR: Other failure</li></ul>
GNID	Node ID	The node ID of the service that initiated the update request.

### GTED: Grid Task Ended

This audit message indicates that the CMN service has finished processing the specified grid task and has moved the task to the Historical table. If the result is SUCS, ABRT, or ROLF, there will be a corresponding Grid Task Started audit message. The other results indicate that processing of this grid task never started.

Code	Field	Description
TSID	Task ID	<p>This field uniquely identifies a generated grid task and allows the grid task to be managed over its lifecycle.</p> <p><b>Note:</b> The Task ID is assigned at the time that a grid task is generated, not the time that it is submitted. It is possible for a given grid task to be submitted multiple times, and in this case the Task ID field is not sufficient to uniquely link the Submitted, Started, and Ended audit messages.</p>
RSLT	Result	<p>The final status result of the grid task:</p> <ul style="list-style-type: none"><li>• SUCS: The grid task completed successfully.</li><li>• ABRT: The grid task was terminated without a rollback error.</li><li>• ROLF: The grid task was terminated and was unable to complete the rollback process.</li><li>• CANC: The grid task was canceled by the user before it was started.</li><li>• EXPR: The grid task expired before it was started.</li><li>• IVLD: The grid task was invalid.</li><li>• AUTH: The grid task was unauthorized.</li><li>• DUPL: The grid task was rejected as a duplicate.</li></ul>

### GTST: Grid Task Started

This audit message indicates that the CMN service has started to process the specified grid task. The audit message immediately follows the Grid Task Submitted message for grid tasks initiated by the internal Grid Task Submission service and selected for automatic activation. For grid tasks submitted into the Pending table, this message is generated when the user starts the grid task.

Code	Field	Description
TSID	Task ID	<p>This field uniquely identifies a generated grid task and allows the task to be managed over its lifecycle.</p> <p><b>Note:</b> The Task ID is assigned at the time that a grid task is generated, not the time that it is submitted. It is possible for a given grid task to be submitted multiple times, and in this case the Task ID field is not sufficient to uniquely link the Submitted, Started, and Ended audit messages.</p>
RSLT	Result	<p>The result. This field has only one value:</p> <ul style="list-style-type: none"> <li>• SUCS: The grid task was started successfully.</li> </ul>

### GTSU: Grid Task Submitted

This audit message indicates that a grid task has been submitted to the CMN service.

Code	Field	Description
TSID	Task ID	<p>Uniquely identifies a generated grid task and allows the task to be managed over its lifecycle.</p> <p><b>Note:</b> The Task ID is assigned at the time that a grid task is generated, not the time that it is submitted. It is possible for a given grid task to be submitted multiple times, and in this case the Task ID field is not sufficient to uniquely link the Submitted, Started, and Ended audit messages.</p>
TTYP	Task Type	The type of grid task.
TVER	Task Version	A number indicating the version of the grid task.
TDSC	Task Description	A human-readable description of the grid task.
VATS	Valid After Timestamp	The earliest time (UINT64 microseconds from January 1, 1970 - UNIX time) at which the grid task is valid.
VBTS	Valid Before Timestamp	The latest time (UINT64 microseconds from January 1, 1970 - UNIX time) at which the grid task is valid.
TSRC	Source	<p>The source of the task:</p> <ul style="list-style-type: none"> <li>• TXTB: The grid task was submitted through the StorageGRID system as a signed text block.</li> <li>• GRID: The grid task was submitted through the internal Grid Task Submission Service.</li> </ul>

Code	Field	Description
ACTV	Activation Type	<p>The type of activation:</p> <ul style="list-style-type: none"> <li>• AUTO: The grid task was submitted for automatic activation.</li> <li>• PEND: The grid task was submitted into the pending table. This is the only possibility for the TXTB source.</li> </ul>
RSLT	Result	<p>The result of the submission:</p> <ul style="list-style-type: none"> <li>• SUCS: The grid task was submitted successfully.</li> <li>• FAIL: The task has been moved directly to the historical table.</li> </ul>

### IDEL: ILM Initiated Delete

This message is generated when ILM starts the process of deleting an object.

The IDEL message is generated in either of these situations:

- **For objects in compliant S3 buckets:** This message is generated when ILM starts the process of auto-deleting an object because its retention period has expired (assuming the auto-delete setting is enabled and legal hold is off).
- **For objects in non-compliant S3 buckets.** This message is generated when ILM starts the process of deleting an object because no placement instructions in the active ILM policies currently apply to the object.

Code	Field	Description
CBID	Content Block Identifier	The CBID of the object.
CMPA	Compliance: Auto delete	For objects in compliant S3 buckets only. 0 (false) or 1 (true), indicating whether a compliant object should be deleted automatically when its retention period ends, unless the bucket is under a legal hold.
CMPL	Compliance: Legal hold	For objects in compliant S3 buckets only. 0 (false) or 1 (true), indicating whether the bucket is currently under a legal hold.
CMPR	Compliance: Retention period	For objects in compliant S3 buckets only. The length of the object's retention period in minutes.
CTME	Compliance: Ingest time	For objects in compliant S3 buckets only. The object's ingest time. You can add the retention period in minutes to this value to determine when the object can be deleted from the bucket.
DMRK	Delete Marker Version ID	The version ID of the delete marker created when deleting an object from a versioned bucket. Operations on buckets don't include this field.

Code	Field	Description
CSIZ	Content size	The size of the object in bytes.
LOCS	Locations	<p>The storage location of object data within the StorageGRID system. The value for LOCS is "" if the object has no locations (for example, it has been deleted).</p> <p>CLEC: for erasure-coded objects, the erasure-coding profile ID and the erasure coding group ID that is applied to the object's data.</p> <p>CLDI: for replicated objects, the LDR node ID and the volume ID of the object's location.</p> <p>CLNL: ARC node ID of the object's location if the object data is archived.</p>
PATH	S3 Bucket/Key	The S3 bucket name and S3 key name.
RSLT	Result	<p>The result of the ILM operation.</p> <p>SUCS: The ILM operation was successful.</p>
RULE	Rules Label	<ul style="list-style-type: none"> <li>• If an object in a compliant S3 bucket is being deleted automatically because its retention period has expired, this field is blank.</li> <li>• If the object is being deleted because there are no more placement instructions that currently apply to the object, this field shows the human-readable label of the last ILM rule that applied to the object.</li> </ul>
SGRP	Site (Group)	If present, the object was deleted at the site specified, which is not the site where the object was ingested.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of the specific version of an object that was deleted. Operations on buckets and objects in unversioned buckets don't include this field.

### LKCU: Overwritten Object Cleanup

This message is generated when StorageGRID removes an overwritten object that previously required cleanup to free up storage space. An object is overwritten when an S3 client writes an object to a path already containing a object. The removal process occurs automatically and in the background.

Code	Field	Description
CSIZ	Content size	The size of the object in bytes.

Code	Field	Description
LTyp	Type of cleanup	<i>Internal use only.</i>
LUID	Removed Object UUID	The identifier of the object that was removed.
PATH	S3 Bucket/Key	The S3 bucket name and S3 key name.
SEGC	Container UUID	UUID of the container for the segmented object. This value is available only if the object is segmented.
UUID	Universally Unique Identifier	The identifier of the object that still exists. This value is available only if the object has not been deleted.

### LKDM: Leaked Object Cleanup

This message is generated when a leaked chunk has been cleaned or deleted. A chunk can be part of a replicated object or an erasure-encoded object.

Code	Field	Description
CLOC	Chunk location	The file path of the leaked chunk that got deleted.
CTYP	Chunk type	Type of chunk:  ec: Erasure-coded object chunk  repl: Replicated object chunk
LTyp	Leak type	The five types of leaks that can be detected:  object_leaked: Object doesn't exist in the grid  location_leaked: Object exists in the grid, but found location doesn't belong to object  mup_seg_leaked: Multipart upload was stopped or not completed, and the segment/part was left out  segment_leaked: Parent UUID/CBID (associated container object) is valid but doesn't contain this segment  no_parent: Container object is deleted, but object segment was left out and not deleted



Code	Field	Description
CTIM	Chunk create time	Time the leaked chunk was created.
UUID	Universally Unique Identifier	The identifier of the object the chunk belongs to.
CBID	Content Block Identifier	CBID of the object the leaked chunk belongs to.
CSIZ	Content size	The size of the chunk in bytes.

### LLST: Location Lost

This message is generated whenever a location for an object copy (replicated or erasure-coded) can't be found.

Code	Field	Description
CBIL	CBID	The affected CBID.
ECPR	Erasure-Coding Profile	For erasure-coded object data. The ID of the erasure-coding profile used.
LTYP	Location Type	CLDI (Online): For replicated object data  CLEC (Online): For erasure-coded object data  CLNL (Nearline): For archived replicated object data
NOID	Source Node ID	The node ID on which the locations were lost.
PCLD	Path to replicated object	The complete path to the disk location of the lost object data. Only returned when LTYP has a value of CLDI (that is, for replicated objects).  Takes the form <code>/var/local/rangedb/2/p/13/13/00oJs6X%{h{U)SeUFxE@</code>
RSLT	Result	Always NONE. RSLT is a mandatory message field, but is not relevant for this message. NONE is used rather than SUCS so that this message is not filtered.
TSRC	Triggering Source	USER: User triggered  SYST: System triggered

Code	Field	Description
UUID	Universally Unique ID	The identifier of the affected object in the StorageGRID system.

### MGAU: Management audit message

The Management category logs user requests to the Management API. Every HTTP request that is not a GET or HEAD request to a valid API URI logs a response containing the username, IP, and type of request to the API. Invalid API URIs (such as /api/v3-authorize) and invalid requests to valid API URIs are not logged.

Code	Field	Description
MDIP	Destination IP Address	The server (destination) IP address.
MDNA	Domain name	The host domain name.
MPAT	Request PATH	The request path.
MPQP	Request query parameters	The query parameters for the request.
MRBD	Request body	<p>The content of the request body. While the response body is logged by default, the request body is logged in certain cases when the response body is empty. Because the following information is not available in the response body, it is taken from the request body for the following POST methods:</p> <ul style="list-style-type: none"> <li>• Username and account ID in <b>POST authorize</b></li> <li>• New subnets configuration in <b>POST /grid/grid-networks/update</b></li> <li>• New NTP servers in <b>POST /grid/ntp-servers/update</b></li> <li>• Decommissioned server IDs in <b>POST /grid/servers/decommission</b></li> </ul> <p><b>Note:</b> Sensitive information is either deleted (for example, an S3 access key) or masked with asterisks (for example, a password).</p>
MRMD	Request method	<p>The HTTP request method:</p> <ul style="list-style-type: none"> <li>• POST</li> <li>• PUT</li> <li>• DELETE</li> <li>• PATCH</li> </ul>
MRSC	Response code	The response code.

Code	Field	Description
MRSP	Response body	The content of the response (the response body) is logged by default.  <b>Note:</b> Sensitive information is either deleted (for example, an S3 access key) or masked with asterisks (for example, a password).
MSIP	Source IP address	The client (source) IP address.
MUUN	User URN	The URN (uniform resource name) of the user who sent the request.
RSLT	Result	Returns successful (SUCS) or the error reported by the backend.

### OLST: System Detected Lost Object

This message is generated when the DDS service can't locate any copies of an object within the StorageGRID system.

Code	Field	Description
CBID	Content Block Identifier	The CBID of the lost object.
NOID	Node ID	If available, the last known direct or near-line location of the lost object. It is possible to have just the Node ID without a Volume ID if the volume information is not available.
PATH	S3 Bucket/Key	If available, the S3 bucket name and S3 key name.
RSLT	Result	This field has the value NONE. RSLT is a mandatory message field, but is not relevant for this message. NONE is used rather than SUCS so that this message is not filtered.
UUID	Universally Unique ID	The identifier of the lost object within the StorageGRID system.
VOLI	Volume ID	If available, the Volume ID of the Storage Node for the last known location of the lost object.

### ORLM: Object Rules Met

This message is generated when the object is successfully stored and copied as specified by the ILM rules.



The ORLM message is not generated when an object is successfully stored by the default Make 2 Copies rule if another rule in the policy uses the Object Size advanced filter.

Code	Field	Description
BUID	Bucket Header	Bucket ID field. Used for internal operations. Appears only if STAT is PRGD.
CBID	Content Block Identifier	The CBID of the object.
CSIZ	Content size	The size of the object in bytes.
LOCS	Locations	<p>The storage location of object data within the StorageGRID system. The value for LOCS is "" if the object has no locations (for example, it has been deleted).</p> <p>CLEC: for erasure-coded objects, the erasure-coding profile ID and the erasure coding group ID that is applied to the object's data.</p> <p>CLDI: for replicated objects, the LDR node ID and the volume ID of the object's location.</p> <p>CLNL: ARC node ID of the object's location if the object data is archived.</p>
PATH	S3 Bucket/Key	The S3 bucket name and S3 key name.
RSLT	Result	<p>The result of the ILM operation.</p> <p>SUCS: The ILM operation was successful.</p>
RULE	Rules Label	The human-readable label given to the ILM rule applied to this object.
SEGC	Container UUID	UUID of the container for the segmented object. This value is available only if the object is segmented.
SGCB	Container CBID	CBID of the container for the segmented object. This value is available only for segmented and multipart objects.
STAT	Status	<p>The status of ILM operation.</p> <p>DONE: ILM operations against the object have completed.</p> <p>DFER: The object has been marked for future ILM re-evaluation.</p> <p>PRGD: The object has been deleted from the StorageGRID system.</p> <p>NLOC: The object data can no longer be found in the StorageGRID system. This status might indicate that all copies of object data are missing or damaged.</p>
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.

Code	Field	Description
VSID	Version ID	The version ID of a new object created in a versioned bucket. Operations on buckets and objects in unversioned buckets don't include this field.

The ORLM audit message can be issued more than once for a single object. For instance, it is issued whenever one of the following events occur:

- ILM rules for the object are satisfied forever.
- ILM rules for the object are satisfied for this epoch.
- ILM rules have deleted the object.
- The background verification process detects that a copy of replicated object data is corrupt. The StorageGRID system performs an ILM evaluation to replace the corrupt object.

#### Related information

- [Object ingest transactions](#)
- [Object delete transactions](#)

#### OVWR: Object Overwrite

This message is generated when an external (client-requested) operation causes one object to be overwritten by another object.

Code	Field	Description
CBID	Content Block Identifier (new)	The CBID for the new object.
CSIZ	Previous Object Size	The size, in bytes, of the object being overwritten.
OCBD	Content Block Identifier (previous)	The CBID for the previous object.
UUID	Universally Unique ID (new)	The identifier of the new object within the StorageGRID system.
OID	Universally Unique ID (previous)	The identifier for the previous object within the StorageGRID system.
PATH	S3 Object Path	The S3 object path used for both the previous and new object
RSLT	Result Code	Result of the Object Overwrite transaction. Result is always:  SUCS: Successful

Code	Field	Description
SGRP	Site (Group)	If present, the overwritten object was deleted at the site specified, which is not the site where the overwritten object was ingested.

### S3SL: S3 Select request

This message logs a completion after an S3 Select request has been returned to the client. The S3SL message can include error message and error code details. The request might not have been successful.

Code	Field	Description
BYSC	Bytes Scanned	Number of bytes scanned (received) from Storage Nodes.  BYSC and BYPR are likely to be different if the object is compressed. If the object is compressed BYSC would have the compressed byte count and BYPR would be the bytes after decompression.
BYPR	Bytes Processed	Number of bytes processed. Indicates how many bytes of "Bytes Scanned" were actually processed or acted upon by an S3 Select job.
BYRT	Bytes Returned	Number of bytes that an S3 Select job returned to the client.
REPR	Records Processed	Number of records or rows that an S3 Select job received from Storage Nodes.
RERT	Records Returned	Number of records or rows an S3 Select job returned to the client.
JOFI	Job Finished	Indicates if the S3 Select job finished processing or not. If this is false, then the job failed to finish and the error fields will likely have data in them. The client might have received partial results, or no results at all.
REID	Request ID	Identifier for the S3 Select request.
EXTM	Execution Time	The time, in seconds, it took for the S3 Select Job to complete.
ERMG	Error Message	Error message that the S3 Select job generated.
ERTY	Error Type	Error type that the S3 Select job generated.
ERST	Error Stacktrace	Error Stacktrace that the S3 Select job generated.
S3BK	S3 bucket	The S3 bucket name.

Code	Field	Description
S3AK	S3 Access Key ID (request sender)	The S3 access key ID for the user that sent the request.
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request.
S3KY	S3 Key	The S3 key name, not including the bucket name.

#### **SADD: Security Audit Disable**

This message indicates that the originating service (node ID) has turned off audit message logging; audit messages are no longer being collected or delivered.

Code	Field	Description
AETM	Enable Method	The method used to disable the audit.
AEUN	User Name	The user name that executed the command to disable audit logging.
RSLT	Result	This field has the value NONE. RSLT is a mandatory message field, but is not relevant for this message. NONE is used rather than SUCS so that this message is not filtered.

The message implies that logging was previously enabled, but has now been disabled. This is typically used only during bulk ingest to improve system performance. Following the bulk activity, auditing is restored (SADE) and the capability to disable auditing is then permanently blocked.

#### **SADE: Security Audit Enable**

This message indicates that the originating service (node ID) has restored audit message logging; audit messages are again being collected and delivered.

Code	Field	Description
AETM	Enable Method	The method used to enable the audit.
AEUN	User Name	The user name that executed the command to enable audit logging.
RSLT	Result	This field has the value NONE. RSLT is a mandatory message field, but is not relevant for this message. NONE is used rather than SUCS so that this message is not filtered.

The message implies that logging was previously disabled (SADD), but has now been restored. This is typically only used during bulk ingest to improve system performance. Following the bulk activity, auditing is

restored and the capability to disable auditing is then permanently blocked.

### SCMT: Object Store Commit

Grid content is not made available or recognized as stored until it has been committed (meaning it has been stored persistently). Persistently stored content has been completely written to disk, and has passed related integrity checks. This message is issued when a content block is committed to storage.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block committed to permanent storage.
RSLT	Result Code	Status at the time the object was stored to disk:  SUCS: Object successfully stored.

This message means a given content block has been completely stored and verified, and can now be requested. It can be used to track data flow within the system.

### SDEL: S3 DELETE

When an S3 client issues a DELETE transaction, a request is made to remove the specified object or bucket, or to remove a bucket/object subresource. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on buckets don't include this field.
CNCH	Consistency Control Header	The value of the Consistency-Control HTTP request header, if present in the request.
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection.
CSIZ	Content Size	The size of the deleted object in bytes. Operations on buckets don't include this field.
DMRK	Delete Marker Version ID	The version ID of the delete marker created when deleting an object from a versioned bucket. Operations on buckets don't include this field.
GFID	Grid Federation Connection ID	The connection ID of the grid federation connection associated with a cross-grid replication delete request. Only included in audit logs on the destination grid.



Code	Field	Description
GFSA	Grid Federation Source Account ID	The account ID of the tenant on the source grid for a cross-grid replication delete request. Only included in audit logs on the destination grid.
HTRH	HTTP Request Header	<p>List of logged HTTP request header names and values as selected during configuration.</p> <p>X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).</p> <p>x-amz-bypass-governance-retention is automatically included if it is present in the request.</p>
MTME	Last Modified Time	The Unix timestamp, in microseconds, indicating when the object was last modified.
RSLT	Result Code	<p>Result of the DELETE transaction. Result is always:</p> <p>SUCS: Successful</p>
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.
S3AK	S3 Access Key ID (request sender)	The hashed S3 access key ID for the user that sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name. Operations on buckets don't include this field.
S3SR	S3 Subresource	The bucket or object subresource being operated on, if applicable.
SACC	S3 tenant account name (request sender)	The name of the tenant account for the user who sent the request. Empty for anonymous requests.
SAIP	IP address (request sender)	The IP address of the client application that made the request.
SBAC	S3 tenant account name (bucket owner)	The tenant account name for the bucket owner. Used to identify cross-account or anonymous access.

Code	Field	Description
SBAI	S3 tenant account ID (bucket owner)	The tenant account ID of the owner of the target bucket. Used to identify cross-account or anonymous access.
SGRP	Site (Group)	If present, the object was deleted at the site specified, which is not the site where the object was ingested.
SUSR	S3 User URN (request sender)	The tenant account ID and the user name of the user making the request. The user can either be a local user or an LDAP user. For example: <code>urn:sgws:identity::03393893651506583485:root</code>  Empty for anonymous requests.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUDM	Universally Unique Identifier for a Delete Marker	The identifier of a delete marker. Audit log messages specify either UUDM or UUID, where UUDM indicates a delete marker created as a result of an object delete request, and UUID indicates an object.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of the specific version of an object that was deleted. Operations on buckets and objects in unversioned buckets don't include this field.

## SGET: S3 GET

When an S3 client issues a GET transaction, a request is made to retrieve an object or list the objects in a bucket, or to remove a bucket/object subresource. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on buckets don't include this field.
CNCH	Consistency Control Header	The value of the Consistency-Control HTTP request header, if present in the request.

Code	Field	Description
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection.
CSIZ	Content Size	The size of the retrieved object in bytes. Operations on buckets don't include this field.
HTRH	HTTP Request Header	List of logged HTTP request header names and values as selected during configuration.  X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).
LITY	ListObjectsV2	A <i>v2 format</i> response was requested. For details, see <a href="#">AWS ListObjectsV2</a> . For GET bucket operations only.
NCHD	Number of Children	Includes keys and common prefixes. For GET bucket operations only.
RANG	Range Read	For range read operations only. Indicates the range of bytes that was read by this request. The value after the slash (/) shows the size of the entire object.
RSLT	Result Code	Result of the GET transaction. Result is always:  SUCS: Successful
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.
S3AK	S3 Access Key ID (request sender)	The hashed S3 access key ID for the user that sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name. Operations on buckets don't include this field.
S3SR	S3 Subresource	The bucket or object subresource being operated on, if applicable.
SACC	S3 tenant account name (request sender)	The name of the tenant account for the user who sent the request. Empty for anonymous requests.

Code	Field	Description
SAIP	IP address (request sender)	The IP address of the client application that made the request.
SBAC	S3 tenant account name (bucket owner)	The tenant account name for the bucket owner. Used to identify cross-account or anonymous access.
SBAI	S3 tenant account ID (bucket owner)	The tenant account ID of the owner of the target bucket. Used to identify cross-account or anonymous access.
SUSR	S3 User URN (request sender)	The tenant account ID and the user name of the user making the request. The user can either be a local user or an LDAP user. For example: <code>urn:sgws:identity::03393893651506583485:root</code>  Empty for anonymous requests.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
TRNC	Truncated or Not Truncated	Set to false if all results were returned. Set to true if more results are available to return. For GET bucket operations only.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of the specific version of an object that was requested. Operations on buckets and objects in unversioned buckets don't include this field.

## SHEA: S3 HEAD

When an S3 client issues a HEAD transaction, a request is made to check for the existence of an object or bucket and retrieve the metadata about an object. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on buckets don't include this field.

Code	Field	Description
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection.
CSIZ	Content Size	The size of the checked object in bytes. Operations on buckets don't include this field.
HTRH	HTTP Request Header	List of logged HTTP request header names and values as selected during configuration.  X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).
RSLT	Result Code	Result of the GET transaction. Result is always:  SUCS: Successful
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.
S3AK	S3 Access Key ID (request sender)	The hashed S3 access key ID for the user that sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name. Operations on buckets don't include this field.
SACC	S3 tenant account name (request sender)	The name of the tenant account for the user who sent the request. Empty for anonymous requests.
SAIP	IP address (request sender)	The IP address of the client application that made the request.
SBAC	S3 tenant account name (bucket owner)	The tenant account name for the bucket owner. Used to identify cross-account or anonymous access.
SBAI	S3 tenant account ID (bucket owner)	The tenant account ID of the owner of the target bucket. Used to identify cross-account or anonymous access.

Code	Field	Description
SUSR	S3 User URN (request sender)	The tenant account ID and the user name of the user making the request. The user can either be a local user or an LDAP user. For example: <code>urn:sgws:identity::03393893651506583485:root</code>  Empty for anonymous requests.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of the specific version of an object that was requested. Operations on buckets and objects in unversioned buckets don't include this field.

## SPOS: S3 POST

When an S3 client issues a POST Object request, this message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0.
CNCH	Consistency Control Header	The value of the Consistency-Control HTTP request header, if present in the request.
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection.
CSIZ	Content Size	The size of the retrieved object in bytes.
HTRH	HTTP Request Header	List of logged HTTP request header names and values as selected during configuration.  X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).  (Not expected for SPOS).

Code	Field	Description
RSLT	Result Code	Result of the RestoreObject request. Result is always:  SUCS: Successful
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.
S3AK	S3 Access Key ID (request sender)	The hashed S3 access key ID for the user that sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name. Operations on buckets don't include this field.
S3SR	S3 Subresource	The bucket or object subresource being operated on, if applicable.  Set to "select" for an S3 Select operation.
SACC	S3 tenant account name (request sender)	The name of the tenant account for the user who sent the request. Empty for anonymous requests.
SAIP	IP address (request sender)	The IP address of the client application that made the request.
SBAC	S3 tenant account name (bucket owner)	The tenant account name for the bucket owner. Used to identify cross-account or anonymous access.
SBAI	S3 tenant account ID (bucket owner)	The tenant account ID of the owner of the target bucket. Used to identify cross-account or anonymous access.
SRCF	Subresource Configuration	Restore information.
SUSR	S3 User URN (request sender)	The tenant account ID and the user name of the user making the request. The user can either be a local user or an LDAP user. For example: <code>urn:sgws:identity::03393893651506583485:root</code>  Empty for anonymous requests.
TIME	Time	Total processing time for the request in microseconds.

Code	Field	Description
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of the specific version of an object that was requested. Operations on buckets and objects in unversioned buckets don't include this field.

### SPUT: S3 PUT

When an S3 client issues a PUT transaction, a request is made to create a new object or bucket, or to remove a bucket/object subresource. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on buckets don't include this field.
CMPS	Compliance Settings	The compliance settings used when creating the bucket, if present in the request (truncated to the first 1024 characters).
CNCH	Consistency Control Header	The value of the Consistency-Control HTTP request header, if present in the request.
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection.
CSIZ	Content Size	The size of the retrieved object in bytes. Operations on buckets don't include this field.
GFID	Grid Federation Connection ID	The connection ID of the grid federation connection associated with a cross-grid replication PUT request. Only included in audit logs on the destination grid.
GFSA	Grid Federation Source Account ID	The account ID of the tenant on the source grid for a cross-grid replication PUT request. Only included in audit logs on the destination grid.



Code	Field	Description
HTRH	HTTP Request Header	<p>List of logged HTTP request header names and values as selected during configuration.</p> <p>X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).</p> <p>x-amz-bypass-governance-retention is automatically included if it is present in the request.</p>
LKEN	Object Lock Enabled	Value of the request header x-amz-bucket-object-lock-enabled, if present in the request.
LKLH	Object Lock Legal Hold	Value of the request header x-amz-object-lock-legal-hold, if present in the PutObject request.
LKMD	Object Lock Retention Mode	Value of the request header x-amz-object-lock-mode, if present in the PutObject request.
LKRU	Object Lock Retain Until Date	Value of the request header x-amz-object-lock-retain-until-date, if present in the PutObject request. Values are limited to within 100 years of the date the object was ingested.
MTME	Last Modified Time	The Unix timestamp, in microseconds, indicating when the object was last modified.
RSLT	Result Code	<p>Result of the PUT transaction. Result is always:</p> <p>SUCS: Successful</p>
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.
S3AK	S3 Access Key ID (request sender)	The hashed S3 access key ID for the user that sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name. Operations on buckets don't include this field.
S3SR	S3 Subresource	The bucket or object subresource being operated on, if applicable.

Code	Field	Description
SACC	S3 tenant account name (request sender)	The name of the tenant account for the user who sent the request. Empty for anonymous requests.
SAIP	IP address (request sender)	The IP address of the client application that made the request.
SBAC	S3 tenant account name (bucket owner)	The tenant account name for the bucket owner. Used to identify cross-account or anonymous access.
SBAI	S3 tenant account ID (bucket owner)	The tenant account ID of the owner of the target bucket. Used to identify cross-account or anonymous access.
SRCF	Subresource Configuration	The new subresource configuration (truncated to the first 1024 characters).
SUSR	S3 User URN (request sender)	The tenant account ID and the user name of the user making the request. The user can either be a local user or an LDAP user. For example: <code>urn:sgws:identity::03393893651506583485:root</code>  Empty for anonymous requests.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
ULID	Upload ID	Included only in SPUT messages for CompleteMultipartUpload operations. Indicates that all parts have been uploaded and assembled.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of a new object created in a versioned bucket. Operations on buckets and objects in unversioned buckets don't include this field.
VSST	Versioning State	The new versioning state of a bucket. Two states are used: "enabled" or "suspended." Operations on objects don't include this field.

### SREM: Object Store Remove

This message is issued when content is removed from persistent storage and is no longer accessible through regular APIs.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block deleted from permanent storage.
RSLT	Result Code	Indicates the result of the content removal operations. The only defined value is:  SUCS: Content removed from persistent storage

This audit message means a given content block has been deleted from a node and can no longer be requested directly. The message can be used to track the flow of deleted content within the system.

### **SUPD: S3 Metadata Updated**

This message is generated by the S3 API when an S3 client updates the metadata for an ingested object. The message is issued by the server if the metadata update is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on buckets don't include this field.
CNCH	Consistency Control Header	The value of the Consistency-Control HTTP request header, if present in the request, when updating a bucket's compliance settings.
CNID	Connection Identifier	The unique system identifier for the TCP/IP connection.
CSIZ	Content Size	The size of the retrieved object in bytes. Operations on buckets don't include this field.
HTRH	HTTP Request Header	List of logged HTTP request header names and values as selected during configuration.  X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).
RSLT	Result Code	Result of the GET transaction. Result is always:  SUCS: successful
S3AI	S3 tenant account ID (request sender)	The tenant account ID of the user who sent the request. An empty value indicates anonymous access.

Code	Field	Description
S3AK	S3 Access Key ID (request sender)	The hashed S3 access key ID for the user that sent the request. An empty value indicates anonymous access.
S3BK	S3 Bucket	The S3 bucket name.
S3KY	S3 Key	The S3 key name, not including the bucket name. Operations on buckets don't include this field.
SACC	S3 tenant account name (request sender)	The name of the tenant account for the user who sent the request. Empty for anonymous requests.
SAIP	IP address (request sender)	The IP address of the client application that made the request.
SBAC	S3 tenant account name (bucket owner)	The tenant account name for the bucket owner. Used to identify cross-account or anonymous access.
SBAI	S3 tenant account ID (bucket owner)	The tenant account ID of the owner of the target bucket. Used to identify cross-account or anonymous access.
SUSR	S3 User URN (request sender)	The tenant account ID and the user name of the user making the request. The user can either be a local user or an LDAP user. For example: <code>urn:sgws:identity::03393893651506583485:root</code>  Empty for anonymous requests.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
VSID	Version ID	The version ID of the specific version of an object whose metadata was updated. Operations on buckets and objects in unversioned buckets don't include this field.

### SVRF: Object Store Verify Fail

This message is issued whenever a content block fails the verification process. Each time replicated object data is read from or written to disk, several verification and integrity

checks are performed to ensure the data sent to the requesting user is identical to the data originally ingested into the system. If any of these checks fail, the system automatically quarantines the corrupt replicated object data to prevent it from being retrieved again.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block which failed verification.
RSLT	Result Code	Verification failure type:  CRCF: Cyclic redundancy check (CRC) failed.  HMAC: Hash-based message authentication code (HMAC) check failed.  EHSB: Unexpected encrypted content hash.  PHSH: Unexpected original content hash.  SEQC: Incorrect data sequence on disk.  PERR: Invalid structure of disk file.  DERR: Disk error.  FNAM: Bad file name.



This message should be monitored closely. Content verification failures can indicate impending hardware failures.

To determine what operation triggered the message, see the value of the AMID (Module ID) field. For example, an SVFY value indicates that the message was generated by the Storage Verifier module, that is, background verification, and STOR indicates that the message was triggered by content retrieval.

### SVRU: Object Store Verify Unknown

The LDR service's Storage component continuously scans all copies of replicated object data in the object store. This message is issued when an unknown or unexpected copy of replicated object data is detected in the object store and moved to the quarantine directory.

Code	Field	Description
FPTH	File Path	The file path of the unexpected object copy.
RSLT	Result	This field has the value 'NONE'. RSLT is a mandatory message field, but is not relevant for this message. 'NONE' is used rather than 'SUCS' so that this message is not filtered.



The SVRU: Object Store Verify Unknown audit message should be monitored closely. It means unexpected copies of object data were detected in the object store. This situation should be investigated immediately to determine how these copies were created, because it can indicate impending hardware failures.

### **SYSD: Node Stop**

When a service is stopped gracefully, this message is generated to indicate the shutdown was requested. Typically this message is sent only after a subsequent restart, because the audit message queue is not cleared before shutdown. Look for the SYST message, sent at the beginning of the shutdown sequence, if the service has not restarted.

Code	Field	Description
RSLT	Clean Shutdown	The nature of the shutdown:  SUCS: System was cleanly shutdown.

The message does not indicate if the host server is being stopped, only the reporting service. The RSLT of a SYSD can't indicate a "dirty" shutdown, because the message is generated only by "clean" shutdowns.

### **SYST: Node Stopping**

When a service is gracefully stopped, this message is generated to indicate the shutdown was requested and that the service has initiated its shutdown sequence. SYST can be used to determine if the shutdown was requested, before the service is restarted (unlike SYSD, which is typically sent after the service restarts.)

Code	Field	Description
RSLT	Clean Shutdown	The nature of the shutdown:  SUCS: System was cleanly shutdown.

The message does not indicate if the host server is being stopped, only the reporting service. The RSLT code of a SYST message can't indicate a "dirty" shutdown, because the message is generated only by "clean" shutdowns.

### **SYSU: Node Start**

When a service is restarted, this message is generated to indicate if the previous shutdown was clean (commanded) or disorderly (unexpected).

Code	Field	Description
RSLT	Clean Shutdown	<p>The nature of the shutdown:</p> <p>SUCS: System was cleanly shut down.</p> <p>DSDN: System was not cleanly shut down.</p> <p>VRGN: System was started for the first time after server installation (or re-installation).</p>

The message does not indicate if the host server was started, only the reporting service. This message can be used to:

- Detect discontinuity in the audit trail.
- Determine if a service is failing during operation (as the distributed nature of the StorageGRID system can mask these failures). Server Manager restarts a failed service automatically.

### WDEL: Swift DELETE

When a Swift client issues a DELETE transaction, a request is made to remove the specified object or container. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on containers don't include this field.
CSIZ	Content Size	The size of the deleted object in bytes. Operations on containers don't include this field.
HTRH	HTTP Request Header	<p>List of logged HTTP request header names and values as selected during configuration.</p> <p>X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).</p>
MTME	Last Modified Time	The Unix timestamp, in microseconds, indicating when the object was last modified.
RSLT	Result Code	<p>Result of the DELETE transaction. Result is always:</p> <p>SUCS: Successful</p>
SAIP	IP address of requesting client	The IP address of the client application that made the request.

Code	Field	Description
SGRP	Site (Group)	If present, the object was deleted at the site specified, which is not the site where the object was ingested.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
WACC	Swift Account ID	The unique account ID as specified by the StorageGRID system.
WCON	Swift Container	The Swift container name.
WOBJ	Swift Object	The Swift object identifier. Operations on containers don't include this field.
WUSR	Swift Account User	The Swift account username that uniquely identifies the client performing the transaction.

#### WGET: Swift GET

When a Swift client issues a GET transaction, a request is made to retrieve an object, list the objects in a container, or list the containers in an account. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on accounts and containers don't include this field.
CSIZ	Content Size	The size of the retrieved object in bytes. Operations on accounts and containers don't include this field.
HTRH	HTTP Request Header	<p>List of logged HTTP request header names and values as selected during configuration.</p> <p>X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).</p>



Code	Field	Description
RSLT	Result Code	Result of the GET transaction. Result is always  SUCS: successful
SAIP	IP address of requesting client	The IP address of the client application that made the request.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
WACC	Swift Account ID	The unique account ID as specified by the StorageGRID system.
WCON	Swift Container	The Swift container name. Operations on accounts don't include this field.
WOBJ	Swift Object	The Swift object identifier. Operations on accounts and containers don't include this field.
WUSR	Swift Account User	The Swift account username that uniquely identifies the client performing the transaction.

#### WHEA: Swift HEAD

When a Swift client issues a HEAD transaction, a request is made to check for the existence of an account, container, or object, and retrieve any relevant metadata. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on accounts and containers don't include this field.
CSIZ	Content Size	The size of the retrieved object in bytes. Operations on accounts and containers don't include this field.

Code	Field	Description
HTRH	HTTP Request Header	List of logged HTTP request header names and values as selected during configuration.  X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).
RSLT	Result Code	Result of the HEAD transaction. Result is always:  SUCS: successful
SAIP	IP address of requesting client	The IP address of the client application that made the request.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
WACC	Swift Account ID	The unique account ID as specified by the StorageGRID system.
WCON	Swift Container	The Swift container name. Operations on accounts don't include this field.
WOBJ	Swift Object	The Swift object identifier. Operations on accounts and containers don't include this field.
WUSR	Swift Account User	The Swift account username that uniquely identifies the client performing the transaction.

#### WPUT: Swift PUT

When a Swift client issues a PUT transaction, a request is made to create a new object or container. This message is issued by the server if the transaction is successful.

Code	Field	Description
CBID	Content Block Identifier	The unique identifier of the content block requested. If the CBID is unknown, this field is set to 0. Operations on containers don't include this field.

Code	Field	Description
CSIZ	Content Size	The size of the retrieved object in bytes. Operations on containers don't include this field.
HTRH	HTTP Request Header	List of logged HTTP request header names and values as selected during configuration.  X-Forwarded-For is automatically included if it is present in the request and if the X-Forwarded-For value is different from the request sender IP address (SAIP audit field).
MTME	Last Modified Time	The Unix timestamp, in microseconds, indicating when the object was last modified.
RLST	Result Code	Result of the PUT transaction. Result is always:  SUCS: successful
SAIP	IP address of requesting client	The IP address of the client application that made the request.
TIME	Time	Total processing time for the request in microseconds.
TLIP	Trusted Load Balancer IP Address	If the request was routed by a trusted Layer 7 load balancer, the IP address of the load balancer.
UUID	Universally Unique Identifier	The identifier of the object within the StorageGRID system.
WACC	Swift Account ID	The unique account ID as specified by the StorageGRID system.
WCON	Swift Container	The Swift container name.
WOBJ	Swift Object	The Swift object identifier. Operations on containers don't include this field.
WUSR	Swift Account User	The Swift account username that uniquely identifies the client performing the transaction.

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