



# **Audit log file and message formats**

## **StorageGRID**

NetApp  
March 02, 2022

# Table of Contents

- Audit log file and message formats ..... 1
  - Audit log file format ..... 1
  - Audit message format ..... 14

# Audit log file and message formats

You can use audit logs to gather information about your system and troubleshoot issues. You should understand the format of the audit log file and the general format used for audit messages.

## 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 are not 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.

## Related information

[Use audit-explain tool](#)

[Use audit-sum tool](#)

## Use audit-explain tool

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

### What you'll need

- You must 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 process plain or compressed audit logs. For example:

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

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

The `audit-explain` tool can also process multiple files at once. For example:

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

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

Finally, the `audit-explain` tool can 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
```

Since 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:

- Enter the following command: `ssh admin@primary_Admin_Node_IP`
- Enter the password listed in the `Passwords.txt` file.

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

```
$ audit-explain /var/local/audit/export/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 are not shown by default. If you want to see the timestamps, use the `timestamp (-t)` option.

## Related information

[SPUT: S3 PUT](#)

## 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.

**What you'll need**

- You must 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:

Code	Description	Refer to
ARCT	Archive Retrieve from Cloud-Tier	<a href="#">ARCT: Archive Retrieve from Cloud-Tier</a>
ASCT	Archive Store Cloud-Tier	<a href="#">ASCT: Archive Store Cloud-Tier</a>
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>

Code	Description	Refer to
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>
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 process plain or compressed audit logs. For example:

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

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

The `audit-sum` tool can also process multiple files at once. For example:

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

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

Finally, the `audit-sum` tool can also 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.
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/audit/export/audit.log` represents the name and the location of the file or files you want to analyze:

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

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

message group average(sec)	count	min(sec)	max(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

### Related information

[Use audit-explain tool](#)

## 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 are not 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 " ".

### Related information

[Use audit-explain tool](#)

[Use audit-sum tool](#)

[Audit messages](#)

[Common elements in audit messages](#)

[Data types](#)

[Audit message examples](#)

## 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.

Type	Description
CSTR	<p>A variable-length array of UTF-8 characters. Characters can be escaped with the following conventions:</p> <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.

### Related information

[Common elements in audit messages](#)

[Audit messages](#)

## 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 cannot 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.
ATIM	UI64	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.  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 T is a literal string character indicating the beginning of the time segment of the date. <code>UUUUUU</code> are microseconds.
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, NONE is used rather than SUCS 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 a sample 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):"bc644d381a87d6cc216adcd963fb6f95dd25a38aa2cb8c9a358e8c5087a6af5f"] [S3AK(CSTR):"UJXDKKQOXB7YARDS71Q2"] [S3BK(CSTR):"s3small11"] [S3KY(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):1579224144102530435]]
```

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.

#### Related information

[SPUT: S3 PUT](#)

[Common elements in audit messages](#)

## Copyright Information

Copyright © 2022 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system- without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

## Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.