Troubleshoot lost and missing object data

StorageGRID software

NetApp
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Objects can be retrieved for several reasons, including read requests from a client application, background verifications of replicated object data, ILM re-evaluations, and the restoration of object data during the recovery of a Storage Node.

The StorageGRID system uses location information in an object's metadata to determine from which location to retrieve the object. If a copy of the object is not found in the expected location, the system attempts to retrieve another copy of the object from elsewhere in the system, assuming that the ILM policy contains a rule to make two or more copies of the object.

If this retrieval is successful, the StorageGRID system replaces the missing copy of the object. Otherwise, the **Objects lost** alert is triggered, as follows:

- For replicated copies, if another copy can't be retrieved, the object is considered lost, and the alert is triggered.
- For erasure-coded copies, if a copy can't be retrieved from the expected location, the Corrupt Copies Detected (ECOR) attribute is incremented by one before an attempt is made to retrieve a copy from another location. If no other copy is found, the alert is triggered.

You should investigate all **Objects lost** alerts immediately to determine the root cause of the loss and to determine if the object might still exist in an offline, or otherwise currently unavailable, Storage Nodes. See Investigate lost objects.

In the case where object data without copies is lost, there is no recovery solution. However, you must reset the Lost objects counter to prevent known lost objects from masking any new lost objects. See Reset lost and missing object counts.

Investigate lost objects

When the **Objects lost** alert is triggered, you must investigate immediately. Collect information about the affected objects and contact technical support.

Before you begin

- You must be signed in to the Grid Manager using a supported web browser.
- You have specific access permissions.
- You must have the `Passwords.txt` file.

About this task

The **Objects lost** alert indicates that StorageGRID believes that there are no copies of an object in the grid. Data might have been permanently lost.

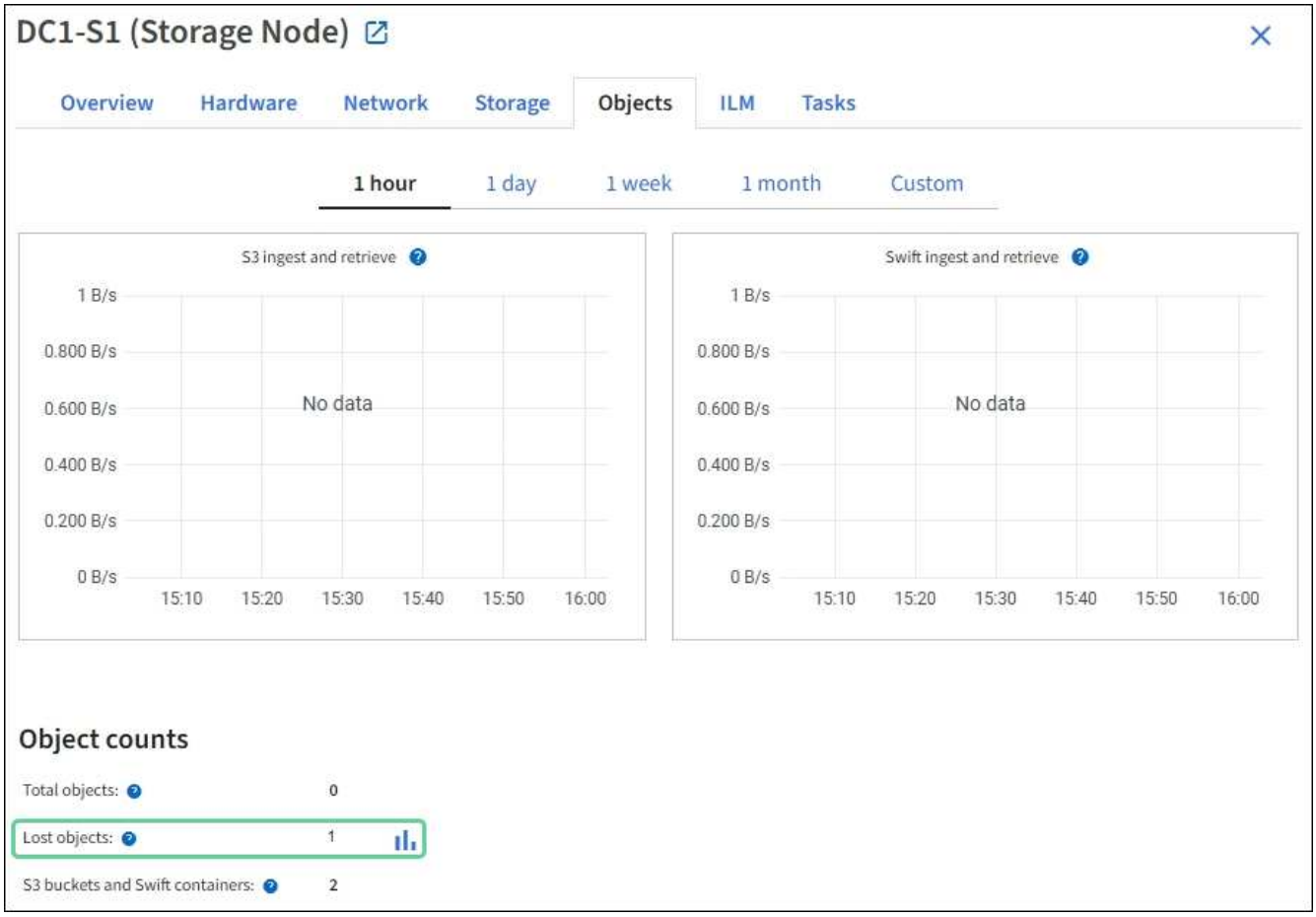
Investigate lost object alerts immediately. You might need to take action to prevent further data loss. In some cases, you might be able to restore a lost object if you take prompt action.

Steps

1. Select **NODES**.

2. Select ***Storage Node*** > **Objects**.
3. Review the number of Lost objects shown in the Object counts table.

   This number indicates the total number of objects this grid node detects as missing from the entire StorageGRID system. The value is the sum of the Lost objects counters of the Data store component within the LDR and DDS services.



4. From an Admin Node, access the audit log to determine the unique identifier (UUID) of the object that triggered the **Objects lost** alert:
   a. Log in to the grid node:
      i. Enter the following command: `ssh admin@grid_node_IP`
      ii. Enter the password listed in the `Passwords.txt` file.
      iii. Enter the following command to switch to root: `su -`
      iv. Enter the password listed in the `Passwords.txt` file. When you are logged in as root, the prompt changes from `$` to `#`.
   b. Change to the directory where the audit logs are located.

      The audit log directory and applicable nodes depend on your audit destination settings.

Option	Destination
Local nodes (default)	`/var/local/log/localaudit.log`

Option	Destination
Admin Nodes/local nodes	• Admin Nodes (Primary and Non-Primary): `/var/local/audit/export/audit.log` • All nodes: The `/var/local/log/localaudit.log` file is typically empty or missing in this mode.
External syslog server	`/var/local/log/localaudit.log`

Depending on your audit destination settings, enter: `cd /var/local/log` or `/var/local/audit/export/`

To learn more, refer to Select audit information destinations.

c. Use grep to extract the Object Lost (OLST) audit messages. Enter: `grep OLST audit_file_name`

d. Note the UUID value included in the message.

```
Admin: # grep OLST audit.log
2020-02-12T19:18:54.780426
[AUDT:[CBID(UI64):0x38186FE53E3C49A5][UUID(CSTR):"926026C4-00A4-449B-
AC72-BCCA72DD1311"]
[PATH(CSTR):"source/cats"][NOID(UI32):12288733][VOLI(UI64):3222345986
][RSLT(FC32):NONE][AVER(UI32):10]
[ATIM(UI64):1581535134780426][ATYP(FC32):OLST][ANID(UI32):12448208][A
MID(FC32):ILMX][ATID(UI64):7729403978647354233]]
```

5. Look up the metadata for the lost object by using the UUID:

a. Select **ILM** > **Object metadata lookup**.

b. Enter the UUID, and select **Look Up**.

c. Review the locations in the metadata, and take the appropriate action:

Metadata	Conclusion
Object <object_identifier> not found	If the object is not found, the message "ERROR":"" is returned. If the object is not found, you can reset the count of **Objects lost** to clear the alert. The lack of an object indicates that the object was intentionally deleted.

Metadata	Conclusion
Locations > 0	If there are locations listed in the output, the **Objects lost** alert might be a false positive. Confirm that the objects exist. Use the Node ID and filepath listed in the output to confirm that the object file is in the listed location. (The procedure for searching for potentially lost objects explains how to use the Node ID to find the correct Storage Node.) If the objects exist, you can reset the count of **Objects lost** to clear the alert.
Locations = 0	If there are no locations listed in the output, the object is potentially missing. You can try to search for and restore the object yourself, or you can contact technical support. Technical support might ask you to determine if there is a storage recovery procedure in progress. See the information about restoring object data using Grid Manager and restoring object data to a storage volume.

Search for and restore potentially lost objects

It might be possible to find and restore objects that have triggered an **Object lost** alert and a legacy Lost Objects (LOST) alarm and that you have identified as potentially lost.

Before you begin

- You have the UUID of any lost object, as identified in Investigate lost objects.
- You have the `Passwords.txt` file.

About this task

You can follow this procedure to look for replicated copies of the lost object elsewhere in the grid. In most cases, the lost object will not be found. However, in some cases, you might be able to find and restore a lost replicated object if you take prompt action.

Contact technical support for assistance with this procedure.

Steps

1. From an Admin Node, search the audit logs for possible object locations:
   a. Log in to the grid node:
      i. Enter the following command: `ssh admin@grid_node_IP`
      ii. Enter the password listed in the `Passwords.txt` file.
      iii. Enter the following command to switch to root: `su -`
      iv. Enter the password listed in the `Passwords.txt` file. When you are logged in as root, the prompt changes from `$` to `#`.

b. Change to the directory where the audit logs are located.

The audit log directory and applicable nodes depend on your audit destination settings.

Option	Destination
Local nodes (default)	`/var/local/log/localaudit.log`
Admin Nodes/local nodes	• Admin Nodes (Primary and Non-Primary): `/var/local/audit/export/audit.log` • All nodes: The `/var/local/log/localaudit.log` file is typically empty or missing in this mode.
External syslog server	`/var/local/log/localaudit.log`

Depending on your audit destination settings, enter: `cd /var/local/log` or `/var/local/audit/export/`

To learn more, refer to Select audit information destinations.

c. Use grep to extract the audit messages associated with the potentially lost object and send them to an output file. Enter: `grep uuid-value audit_file_name > output_file_name`

For example:

```
Admin: # grep 926026C4-00A4-449B-AC72-BCCA72DD1311 audit.log >
/var/local/tmp/messages_about_lost_object.txt
```

d. Use grep to extract the Location Lost (LLST) audit messages from this output file. Enter: `grep LLST output_file_name`

For example:

```
Admin: # grep LLST /var/local/tmp/messages_about_lost_objects.txt
```

An LLST audit message looks like this example message.

```
[AUDT:[NOID(UI32):12448208][CBIL(UI64):0x38186FE53E3C49A5]
[UUID(CSTR):"926026C4-00A4-449B-AC72-BCCA72DD1311"][LTYP(FC32):CLDI]
[PCLD(CSTR):"/var/local/rangedb/1/p/17/11/00rH0%DkRs&LgA#3tN6"]
[TSRC(FC32):SYST][RSLT(FC32):NONE][AVER(UI32):10][ATIM(UI64):15815351
34379225]
[ATYP(FC32):LLST][ANID(UI32):12448208][AMID(FC32):CLSM][ATID(UI64):70
86871083190743409]]
```

e. Find the PCLD field and the NOID field in the LLST message.

   If present, the value of PCLD is the complete path on disk to the missing replicated object copy. The value of NOID is the node id of the LDR where a copy of the object might be found.

   If you find an object location, you might be able to restore the object.

f. Find the Storage Node associated with this LDR node ID. In the Grid Manager, select **SUPPORT** > **Tools** > **Grid topology**. Then select ***Data Center*** > ***Storage Node*** > **LDR**.

   The Node ID for the LDR service is in the Node Information table. Review the information for each Storage Node until you find the one that hosts this LDR.

2. Determine if the object exists on the Storage Node indicated in the audit message:

   a. Log in to the grid node:

      i. Enter the following command: `ssh admin@grid_node_IP`

      ii. Enter the password listed in the `Passwords.txt` file.

      iii. Enter the following command to switch to root: `su -`

      iv. Enter the password listed in the `Passwords.txt` file.

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

   b. Determine if the file path for the object exists.

      For the file path of the object, use the value of PCLD from the LLST audit message.

      For example, enter:

      ```
      ls '/var/local/rangedb/1/p/17/11/00rH0%DkRs&LgA%#3tN6'
      ```

      Always enclose the object file path in single quotes in commands to escape any special characters.

      - If the object path is not found, the object is lost and can’t be restored using this procedure. Contact technical support.
      - If the object path is found, continue with the next step. You can attempt to restore the found object back to StorageGRID.

3. If the object path was found, attempt to restore the object to StorageGRID:

   a. From the same Storage Node, change the ownership of the object file so that it can be managed by StorageGRID. Enter: `chown ldr-user:bycast 'file_path_of_object'`

   b. Telnet to localhost 1402 to access the LDR console. Enter: `telnet 0 1402`

   c. Enter: `cd /proc/STOR`

   d. Enter: `Object_Found 'file_path_of_object'`

      For example, enter:

```
Object_Found '/var/local/rangedb/1/p/17/11/00rH0%DkRs&LgA%#3tN6'
```

Issuing the `Object_Found` command notifies the grid of the object's location. It also triggers the active ILM policies, which make additional copies as specified in each policy.

> If the Storage Node where you found the object is offline, you can copy the object to any Storage Node that is online. Place the object in any /var/local/rangedb directory of the online Storage Node. Then, issue the `Object_Found` command using that file path to the object.

- If the object can't be restored, the `Object_Found` command fails. Contact technical support.
- If the object was successfully restored to StorageGRID, a success message appears. For example:

```
ade 12448208: /proc/STOR > Object_Found
'/var/local/rangedb/1/p/17/11/00rH0%DkRs&LgA%#3tN6'

ade 12448208: /proc/STOR > Object found succeeded.
First packet of file was valid. Extracted key: 38186FE53E3C49A5
Renamed '/var/local/rangedb/1/p/17/11/00rH0%DkRs&LgA%#3tN6' to
'/var/local/rangedb/1/p/17/11/00rH0%DkRt78Ila#3udu'
```

Continue with the next step.

4. If the object was successfully restored to StorageGRID, verify that the new locations were created:
   a. Sign in to the Grid Manager using a supported web browser.
   b. Select **ILM** > **Object metadata lookup**.
   c. Enter the UUID, and select **Look Up**.
   d. Review the metadata, and verify the new locations.
5. From an Admin Node, search the audit logs for the ORLM audit message for this object to confirm that information lifecycle management (ILM) has placed copies as required.
   a. Log in to the grid node:
      i. Enter the following command: `ssh admin@grid_node_IP`
      ii. Enter the password listed in the `Passwords.txt` file.
      iii. Enter the following command to switch to root: `su -`
      iv. Enter the password listed in the `Passwords.txt` file. When you are logged in as root, the prompt changes from `$` to `#`.
   b. Change to the directory where the audit logs are located. Refer to substep 1. b .
   c. Use grep to extract the audit messages associated with the object to an output file. Enter: `grep uuid-value audit_file_name > output_file_name`

      For example:

```
Admin: # grep 926026C4-00A4-449B-AC72-BCCA72DD1311 audit.log >
/var/local/tmp/messages_about_restored_object.txt
```

d. Use grep to extract the Object Rules Met (ORLM) audit messages from this output file. Enter: `grep ORLM output_file_name`

   For example:

```
Admin: # grep ORLM /var/local/tmp/messages_about_restored_object.txt
```

   An ORLM audit message looks like this example message.

```
[AUDT:[CBID(UI64):0x38186FE53E3C49A5][RULE(CSTR):"Make 2 Copies"]
[STAT(FC32):DONE][CSIZ(UI64):0][UUID(CSTR):"926026C4-00A4-449B-AC72-
BCCA72DD1311"]
[LOCS(CSTR):"**CLDI 12828634 2148730112**, CLDI 12745543 2147552014"]
[RSLT(FC32):SUCS][AVER(UI32):10][ATYP(FC32):ORLM][ATIM(UI64):15633982
30669]
[ATID(UI64):15494889725796157557][ANID(UI32):13100453][AMID(FC32):BCM
S]]
```

e. Find the LOCS field in the audit message.

   If present, the value of CLDI in LOCS is the node ID and the volume ID where an object copy has been created. This message shows that the ILM has been applied and that two object copies have been created in two locations in the grid.

6. Reset the lost and missing object counts in the Grid Manager.

Reset lost and missing object counts

After investigating the StorageGRID system and verifying that all recorded lost objects are permanently lost or that it is a false alarm, you can reset the value of the Lost Objects attribute to zero.

Before you begin

- You must be signed in to the Grid Manager using a supported web browser.
- You have specific access permissions.

About this task

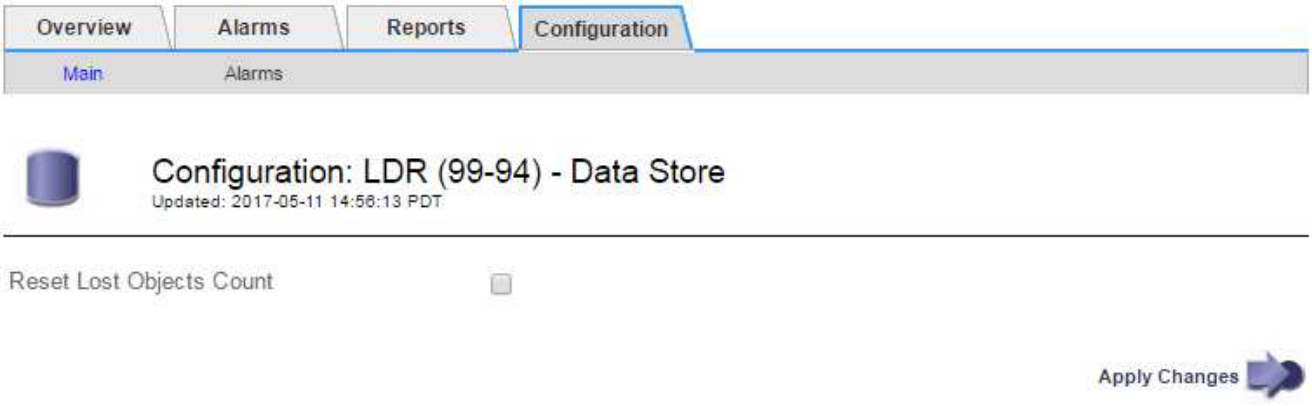
You can reset the Lost Objects counter from either of the following pages:

- **SUPPORT** > **Tools** > **Grid topology** > ***Site*** > ***Storage Node*** > **LDR** > **Data Store** > **Overview** > **Main**
- **SUPPORT** > **Tools** > **Grid topology** > ***Site*** > ***Storage Node*** > **DDS** > **Data Store** > **Overview** > **Main**

These instructions show resetting the counter from the **LDR** > **Data Store** page.

Steps

1. Select **SUPPORT** > **Tools** > **Grid topology**.
2. Select ***Site*** > ***Storage Node*** > **LDR** > **Data Store** > **Configuration** for the Storage Node that has the **Objects lost** alert or the LOST alarm.
3. Select **Reset Lost Objects Count**.



4. Click **Apply Changes**.

   The Lost Objects attribute is reset to 0 and the **Objects lost** alert and the LOST alarm clear, which can take a few minutes.

5. Optionally, reset other related attribute values that might have been incremented in the process of identifying the lost object.

   a. Select ***Site*** > ***Storage Node*** > **LDR** > **Erasure Coding** > **Configuration**.

   b. Select **Reset Reads Failure Count** and **Reset Corrupt Copies Detected Count**.

   c. Click **Apply Changes**.

   d. Select ***Site*** > ***Storage Node*** > **LDR** > **Verification** > **Configuration**.

   e. Select **Reset Missing Objects Count** and **Reset Corrupt Objects Count**.

   f. If you are confident that quarantined objects aren't required, you can select **Delete Quarantined Objects**.

      Quarantined objects are created when background verification identifies a corrupt replicated object copy. In most cases StorageGRID automatically replaces the corrupt object, and it is safe to delete the quarantined objects. However, if the **Objects lost** alert or the LOST alarm is triggered, technical support might want to access the quarantined objects.

   g. Click **Apply Changes**.

   It can take a few moments for the attributes to reset after you click **Apply Changes**.

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