



Monitor system health

StorageGRID

NetApp
March 02, 2022

Table of Contents

- Monitor system health 1
 - Monitor node connection states 2
 - View current alerts 3
 - View resolved alerts 6
 - View a specific alert 9
 - View legacy alarms 12

Monitor system health

You should monitor the overall health of your StorageGRID system on a daily basis.

About this task

The StorageGRID system is fault tolerant and can continue to operate even when parts of the grid are unavailable. The first sign of a potential issue with your StorageGRID system is likely to be an alert or an alarm (legacy system) and not necessarily an issue with system operations. Paying attention to system health can help you detect minor issues before they affect operations or grid efficiency.

The Health panel on the Grid Manager Dashboard provides a summary of issues that might be affecting your system. You should investigate any issues that are shown on the Dashboard.



To be notified of alerts as soon as they are triggered, you can set up email notifications for alerts or configure SNMP traps.

Steps

1. Sign in to the Grid Manager to view the Dashboard.
2. Review the information in the Health panel.



When issues exist, links appear that allow you to view additional details:

| Link | Indicates |
|--------------------------|--|
| Grid details | Appears if any nodes are disconnected (connection state Unknown or Administratively Down). Click the link, or click the blue or gray icon to determine which node or nodes are affected. |
| Current alerts | Appears if any alerts are currently active. Click the link, or click Critical , Major , or Minor to see the details on the ALERTS > Current page. |
| Recently resolved alerts | Appears if any alerts triggered in the past week are now resolved. Click the link to see the details on the ALERTS > Resolved page. |

| Link | Indicates |
|---------|--|
| License | Appears if there is an issue with the software license for this StorageGRID system. Click the link to see the details on the MAINTENANCE > System > License page. |

Related information

- [Administer StorageGRID](#)
- [Set up email notifications for alerts](#)
- [Use SNMP monitoring](#)

Monitor node connection states


If one or more nodes are disconnected from the grid, critical StorageGRID operations might be affected. You must monitor node connection states and address any issues promptly.

What you'll need

- You must be signed in to the Grid Manager using a [supported web browser](#).



About this task

Nodes can have one of three connection states:

- **Not connected - Unknown** : The node is not connected to the grid for an unknown reason. For example, the network connection between nodes has been lost or the power is down. The **Unable to communicate with node** alert might also be triggered. Other alerts might be active as well. This situation requires immediate attention.



A node might appear as Unknown during managed shutdown operations. You can ignore the Unknown state in these cases.

- **Not connected - Administratively down** : The node is not connected to the grid for an expected reason. For example, the node, or services on the node, has been gracefully shut down, the node is rebooting, or the software is being upgraded. One or more alerts might also be active.
- **Connected** : The node is connected to the grid.

Steps

1. If a blue or gray icon appears on the Health panel of the Dashboard, click the icon or click **Grid details**. (The blue or gray icons and the **Grid details** link appear only if at least one node is disconnected from the grid.)

The Overview page for the first blue node in the node tree appears. If there are no blue nodes, the Overview page for the first gray node in the tree appears.

In the example, the Storage Node named DC1-S3 has a blue icon. The **Connection State** on the Node Information panel is **Unknown**, and the **Unable to communicate with node** alert is active. The alert indicates that one or more services are unresponsive, or the node cannot be reached.

DC2-ARC1 (Archive Node)

Overview | Hardware | Network | Storage | Tasks

Node information

Name: DC2-ARC1
 Type: Archive Node
 ID: 202ef603-db47-4c90-8b19-afba46e82393
 Connection state: **Unknown**
 Software version: 11.6.0 (build 20210924.1557.00a5eb9)
 IP addresses: 172.16.1.236 - eth0 (Grid Network)
 10.224.1.236 - eth1 (Admin Network)
[Show additional IP addresses](#)

Alerts

| Alert name | Severity | Time triggered | Current values |
|---------------------------------|----------|----------------|--|
| Unable to communicate with node | Major | 9 days ago | Unresponsive services: arc, dynip, ssm |

2. If a node has a blue icon, follow these steps:

- Select each alert in the table, and follow the recommended actions.

For example, you might need to restart a service that has stopped or restart the host for the node.

- If you are unable to bring the node back online, contact technical support.

3. If a node has a gray icon, follow these steps:

Gray nodes are expected during maintenance procedures and might be associated with one or more alerts. Based on the underlying issue, these “administratively down” nodes often go back online with no intervention.

- Review the Alerts section, and determine if any alerts are affecting this node.
- If one or more alerts are active, select each alert in the table, and follow the recommended actions.
- If you are unable to bring the node back online, contact technical support.

Related information

[Alerts reference](#)

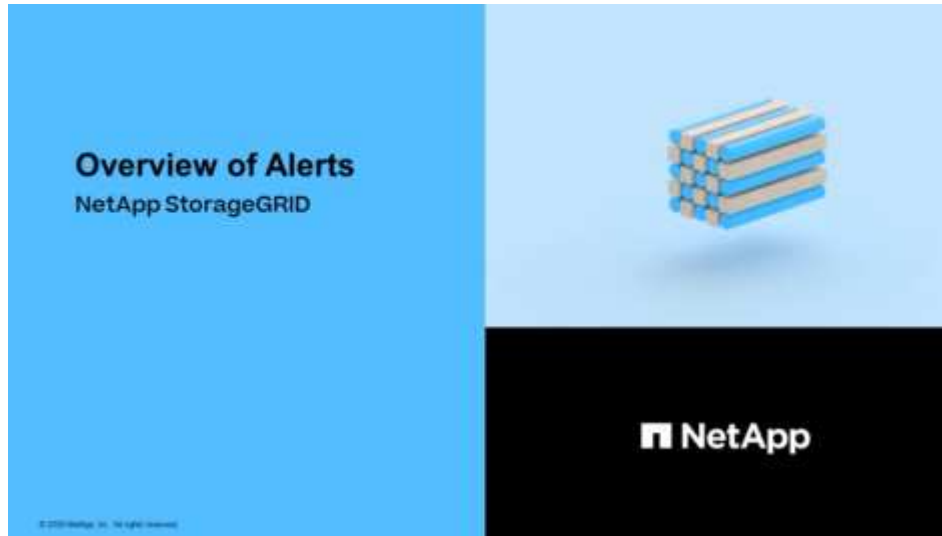
[Recover and maintain](#)

View current alerts

When an alert is triggered, an alert icon is displayed on the Dashboard. An alert icon is also displayed for the node on the Nodes page. An email notification might also be sent, unless the alert has been silenced.

What you'll need

- You must be signed in to the Grid Manager using a [supported web browser](#).
- Optionally, you have watched the video: [Video: Overview of Alerts](#).



Steps

1. If one or more alerts are active, do either of the following:
 - From the Health panel on the Dashboard, click the alert icon or click **Current alerts**. (An alert icon and the **Current alerts** link appear only if at least one alert is currently active.)
 - Select **ALERTS > Current**.

The Current Alerts page appears. It lists all alerts currently affecting your StorageGRID system.

Current Alerts [Learn more](#)

View the current alerts affecting your StorageGRID system.




| Name | Severity | Time triggered | Site / Node | Status | Current values |
|--|------------|---|--------------------------------|----------|---|
| Unable to communicate with node One or more services are unresponsive or cannot be reached by the metrics collection job. | 2 Major | 9 minutes ago (newest) 19 minutes ago (oldest) | | 2 Active | |
| Low root disk capacity The space available on the root disk is low. | Minor | 25 minutes ago | Data Center 1 / DC1-S1-99-51 | Active | Disk space available: 2.00 GB Total disk space: 21.00 GB |
| Expiration of server certificate for Storage API Endpoints The server certificate used for the storage API endpoints is about to expire. | Major | 31 minutes ago | Data Center 1 / DC1-ADM1-99-49 | Active | Days remaining: 14 |
| Expiration of server certificate for Management Interface The server certificate used for the management interface is about to expire. | Minor | 31 minutes ago | Data Center 1 / DC1-ADM1-99-49 | Active | Days remaining: 30 |
| Low installed node memory The amount of installed memory on a node is low. | 8 Critical | a day ago (newest) a day ago (oldest) | | 8 Active | |

By default, alerts are shown as follows:



- The most recently triggered alerts are shown first.
- Multiple alerts of the same type are shown as a group.
- Alerts that have been silenced are not shown.
- For a specific alert on a specific node, if the thresholds are reached for more than one severity, only the most severe alert is shown. That is, if alert thresholds are reached for the minor, major, and critical severities, only the critical alert is shown.

The Current Alerts page is refreshed every two minutes.

2. Review the information in the table.

| Column header | Description |
|----------------|---|
| Name | The name of the alert and its description. |
| Severity | <p>The severity of the alert. If multiple alerts are grouped, the title row shows how many instances of that alert are occurring at each severity.</p> <ul style="list-style-type: none"> Critical : An abnormal condition exists that has stopped the normal operations of a StorageGRID node or service. You must address the underlying issue immediately. Service disruption and loss of data might result if the issue is not resolved. Major : An abnormal condition exists that is either affecting current operations or approaching the threshold for a critical alert. You should investigate major alerts and address any underlying issues to ensure that the abnormal condition does not stop the normal operation of a StorageGRID node or service. Minor : The system is operating normally, but an abnormal condition exists that could affect the system's ability to operate if it continues. You should monitor and resolve minor alerts that do not clear on their own to ensure they do not result in a more serious problem. |
| Time triggered | How long ago the alert was triggered. If multiple alerts are grouped, the title row shows times for the most recent instance of the alert (<i>newest</i>) and the oldest instance of the alert (<i>oldest</i>). |
| Site/Node | The name of the site and node where the alert is occurring. If multiple alerts are grouped, the site and node names are not shown in the title row. |
| Status | Whether the alert is active or has been silenced. If multiple alerts are grouped and All alerts is selected in the drop-down, the title row shows how many instances of that alert are active and how many instances have been silenced. |
| Current values | <p>The current value of the metric that caused the alert to be triggered. For some alerts, additional values are shown to help you understand and investigate the alert. For example, the values shown for a Low object data storage alert include the percentage of disk space used, the total amount of disk space, and the amount of disk space used.</p> <p>Note: If multiple alerts are grouped, current values are not shown in the title row.</p> |


3. To expand and collapse groups of alerts:

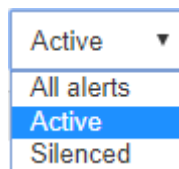
- To show the individual alerts in a group, click the down caret  in the heading, or click the group's name.
- To hide the individual alerts in a group, click the up caret  in the heading, or click the group's name.

| | | | | | | | <input checked="" type="checkbox"/> Group alerts | Active ▼ |
|---|----------------------|---|--------------------------|----------|---|--|--|----------|
| Name | Severity | Time triggered | Site / Node | Status | Current values | | | |
| <div>^ Low object data storage</div> <div>The disk space available for storing object data is low.</div> | <div>▲ 5 Minor</div> | <div>a day ago (newest)</div> <div>a day ago (oldest)</div> | | 5 Active | | | | |
| <div>Low object data storage</div> <div>The disk space available for storing object data is low.</div> | <div>▲ Minor</div> | <div>a day ago</div> | DC2 231-236 / DC2-S2-233 | Active | <div>Disk space remaining: 525.17 GB</div> <div>Disk space used: 243.06 KB</div> <div>Disk space used (%): 0.000%</div> | | | |
| <div>Low object data storage</div> <div>The disk space available for storing object data is low.</div> | <div>▲ Minor</div> | <div>a day ago</div> | DC1 225-230 / DC1-S1-226 | Active | <div>Disk space remaining: 525.17 GB</div> <div>Disk space used: 325.65 KB</div> <div>Disk space used (%): 0.000%</div> | | | |
| <div>Low object data storage</div> <div>The disk space available for storing object data is low.</div> | <div>▲ Minor</div> | <div>a day ago</div> | DC2 231-236 / DC2-S3-234 | Active | <div>Disk space remaining: 525.17 GB</div> <div>Disk space used: 381.55 KB</div> <div>Disk space used (%): 0.000%</div> | | | |
| <div>Low object data storage</div> <div>The disk space available for storing object data is low.</div> | <div>▲ Minor</div> | <div>a day ago</div> | DC1 225-230 / DC1-S2-227 | Active | <div>Disk space remaining: 525.17 GB</div> <div>Disk space used: 282.19 KB</div> <div>Disk space used (%): 0.000%</div> | | | |
| <div>Low object data storage</div> <div>The disk space available for storing object data is low.</div> | <div>▲ Minor</div> | <div>a day ago</div> | DC2 231-236 / DC2-S1-232 | Active | <div>Disk space remaining: 525.17 GB</div> <div>Disk space used: 189.24 KB</div> <div>Disk space used (%): 0.000%</div> | | | |

4. To display individual alerts instead of groups of alerts, unselect the **Group alerts** check box at the top of the table.



5. To sort alerts or alert groups, click the up/down arrows  in each column header.
- When **Group alerts** is selected, both the alert groups and the individual alerts within each group are sorted. For example, you might want to sort the alerts in a group by **Time triggered** to find the most recent instance of a specific alert.
 - When **Group alerts** is unselected, the entire list of alerts is sorted. For example, you might want to sort all alerts by **Node/Site** to see all alerts affecting a specific node.
6. To filter the alerts by status, use the drop-down menu at the top of the table.



- Select **All alerts** to view all current alerts (both active and silenced alerts).
 - Select **Active** to view only the current alerts that are active.
 - Select **Silenced** to view only the current alerts that have been silenced. See [Silence alert notifications](#).
7. To view details for a specific alert, select the alert from the table.

A dialog box for the alert appears. See [View a specific alert](#).

View resolved alerts

You can search and view a history of alerts that have been resolved.

What you'll need

- You must be signed in to the Grid Manager using a [supported web browser](#).

Steps

1. To view resolved alerts, do either of the following:

- From the Health panel on the Dashboard, click **Recently resolved alerts**.

The **Recently resolved alerts** link appears only if one or more alerts were triggered in the past week and are now resolved.

- Select **ALERTS > Resolved**. The Resolved Alerts page appears. By default, resolved alerts that were triggered in the last week are shown, with the most recently triggered alerts shown first. The alerts on this page were previously shown on the Current Alerts page or in an email notification.

Resolved Alerts

Search and view alerts that have been resolved.




When triggered Severity Alert rule Node

Last week Filter by severity Filter by rule Filter by node

| Name | | Severity | | Time triggered | Time resolved | Site / Node | Triggered values |
|--|--|----------|--|----------------|---------------|--------------------------|-------------------------|
| Low installed node memory The amount of installed memory on a node is low. | | Critical | | 2 days ago | a day ago | Data Center 1 / DC1-S2 | Total RAM size: 8.37 GB |
| Low installed node memory The amount of installed memory on a node is low. | | Critical | | 2 days ago | a day ago | Data Center 1 / DC1-S3 | Total RAM size: 8.37 GB |
| Low installed node memory The amount of installed memory on a node is low. | | Critical | | 2 days ago | a day ago | Data Center 1 / DC1-S4 | Total RAM size: 8.37 GB |
| Low installed node memory The amount of installed memory on a node is low. | | Critical | | 2 days ago | a day ago | Data Center 1 / DC1-ADM1 | Total RAM size: 8.37 GB |
| Low installed node memory The amount of installed memory on a node is low. | | Critical | | 2 days ago | a day ago | Data Center 1 / DC1-ADM2 | Total RAM size: 8.37 GB |
| Low installed node memory The amount of installed memory on a node is low. | | Critical | | 2 days ago | a day ago | Data Center 1 / DC1-S1 | Total RAM size: 8.37 GB |

2. Review the information in the table.

| Column header | Description |
|---------------|--|
| Name | The name of the alert and its description. |

| Column header | Description |
|------------------|---|
| Severity | <p>The severity of the alert.</p> <ul style="list-style-type: none"> • Critical : An abnormal condition exists that has stopped the normal operations of a StorageGRID node or service. You must address the underlying issue immediately. Service disruption and loss of data might result if the issue is not resolved. • Major : An abnormal condition exists that is either affecting current operations or approaching the threshold for a critical alert. You should investigate major alerts and address any underlying issues to ensure that the abnormal condition does not stop the normal operation of a StorageGRID node or service. • Minor : The system is operating normally, but an abnormal condition exists that could affect the system's ability to operate if it continues. You should monitor and resolve minor alerts that do not clear on their own to ensure they do not result in a more serious problem. |
| Time triggered | How long ago the alert was triggered. |
| Time resolved | How long ago the alert was resolved. |
| Site/Node | The name of the site and node where the alert occurred. |
| Triggered values | The value of the metric that caused the alert to be triggered. For some alerts, additional values are shown to help you understand and investigate the alert. For example, the values shown for a Low object data storage alert include the percentage of disk space used, the total amount of disk space, and the amount of disk space used. |

3. To sort the entire list of resolved alerts, click the up/down arrows  in each column header.

For example, you might want to sort resolved alerts by **Site/Node** to see the alerts that affected a specific node.

4. Optionally, filter the list of resolved alerts by using the drop-down menus at the top of the table.

- Select a time period from the **When triggered** drop-down menu to show resolved alerts based on how long ago they were triggered.

You can search for alerts that were triggered within the following time periods:

- Last hour
- Last day
- Last week (default view)
- Last month
- Any time period
- Custom (allows you to specify the start date and the end date for the time period)

- b. Select one or more severities from the **Severity** drop-down menu to filter on resolved alerts of a specific severity.
- c. Select one or more default or custom alert rules from the **Alert rule** drop-down menu to filter on resolved alerts related to a specific alert rule.
- d. Select one or more nodes from the **Node** drop-down menu to filter on resolved alerts related to a specific node.
- e. Click **Search**.

5. To view details for a specific resolved alert, select the alert from the table.

A dialog box for the alert appears. See [View a specific alert](#).

View a specific alert

You can view detailed information about an alert that is currently affecting your StorageGRID system or an alert that has been resolved. The details include recommended corrective actions, the time the alert was triggered, and the current value of the metrics related to this alert.

Optionally, you can [silence a current alert](#) or [update the alert rule](#).

What you'll need

- You are signed in to the Grid Manager using a [supported web browser](#).

Steps

1. Do one of the following, based on whether you want to view a current or resolved alert:

| Column header | Description |
|---------------|---|
| Current alert | <ul style="list-style-type: none">• From the Health panel on the Dashboard, click the Current alerts link. This link appears only if at least one alert is currently active. This link is hidden if there are no current alerts or if all current alerts have been silenced.• Select ALERTS > Current.• From the NODES page, select the Overview tab for a node that has an alert icon. Then, in the Alerts section, click the alert name. |

| Column header | Description |
|----------------|--|
| Resolved alert | <ul style="list-style-type: none"> From the Health panel on the Dashboard, click the Recently resolved alerts link. (This link appears only if one or more alerts were triggered in the past week and are now resolved. This link is hidden if no alerts were triggered and resolved in the last week.) Select ALERTS > Resolved. |

2. As required, expand a group of alerts and then select the alert you want to view.



Select the alert, not the heading for a group of alerts.

| | | | | | |
|---|---------------------------|--|------------------------------|----------|-------------------------|
| [^] Low installed node memory The amount of installed memory on a node is low. | ✖ 8 Critical | a day ago (newest) a day ago (oldest) | | 8 Active | |
| Low installed node memory The amount of installed memory on a node is low. | ✖ Critical | a day ago | Data Center 2 / DC2-S1-99-56 | Active | Total RAM size: 8.38 GB |

A dialog box appears and provides details for the selected alert.

Low installed node memory

The amount of installed memory on a node is low.

Recommended actions

Increase the amount of RAM available to the virtual machine or Linux host. Check the threshold value for the major alert to determine the default minimum requirement for a StorageGRID node.

See the instructions for your platform:

- VMware installation
- Red Hat Enterprise Linux or CentOS installation
- Ubuntu or Debian installation

Time triggered

2019-07-15 17:07:41 MDT (2019-07-15 23:07:41 UTC)

Status

Active (silence this alert [🔗](#))

Site / Node

Data Center 2 / DC2-S1-99-56

Severity

✖ Critical

Total RAM size

8.38 GB




Condition

[View conditions](#) | [Edit rule](#) [🔗](#)

Close

3. Review the alert details.

| Information | Description |
|------------------------|---|
| <i>title</i> | The name of the alert. |
| <i>first paragraph</i> | The description of the alert. |
| Recommended actions | The recommended actions for this alert. |

| Information | Description |
|--------------------|--|
| Time triggered | The date and time the alert was triggered in your local time and in UTC. |
| Time resolved | For resolved alerts only, the date and time the alert was resolved in your local time and in UTC. |
| Status | The status of the alert: Active, Silenced, or Resolved. |
| Site/Node | The name of the site and node affected by the alert. |
| Severity | <p>The severity of the alert.</p> <ul style="list-style-type: none"> • Critical : An abnormal condition exists that has stopped the normal operations of a StorageGRID node or service. You must address the underlying issue immediately. Service disruption and loss of data might result if the issue is not resolved. • Major : An abnormal condition exists that is either affecting current operations or approaching the threshold for a critical alert. You should investigate major alerts and address any underlying issues to ensure that the abnormal condition does not stop the normal operation of a StorageGRID node or service. • Minor : The system is operating normally, but an abnormal condition exists that could affect the system's ability to operate if it continues. You should monitor and resolve minor alerts that do not clear on their own to ensure they do not result in a more serious problem. |
| <i>data values</i> | The current value of the metric for this alert. For some alerts, additional values are shown to help you understand and investigate the alert. For example, the values shown for a Low metadata storage alert include the percent of disk space used, the total amount of disk space, and the amount of disk space used. |

4. Optionally, click **silence this alert** to silence the alert rule that caused this alert to be triggered.

You must have the Manage Alerts or Root access permission to silence an alert rule.



Be careful when deciding to silence an alert rule. If an alert rule is silenced, you might not detect an underlying problem until it prevents a critical operation from completing.

5. To view the current conditions for the alert rule:
 - a. From the alert details, click **View conditions**.

A pop-up appears, listing the Prometheus expression for each defined severity.

Low installed node memory

Major node_memory_MemTotal_bytes < 24000000000
Critical node_memory_MemTotal_bytes < 12000000000

Total RAM size
8.38 GB
Condition
[View conditions](#) | [Edit rule](#)

b. To close the pop-up, click anywhere outside of the pop-up.

6. Optionally, click **Edit rule** to edit the alert rule that caused this alert to be triggered:

You must have the Manage Alerts or Root access permission to edit an alert rule.



Be careful when deciding to edit an alert rule. If you change trigger values, you might not detect an underlying problem until it prevents a critical operation from completing.

7. To close the alert details, click **Close**.

View legacy alarms

Alarms (legacy system) are triggered when system attributes reach alarm threshold values. You can view the currently active alarms from the Current Alarms page.



While the legacy alarm system continues to be supported, the alert system offers significant benefits and is easier to use.

What you'll need

- You must be signed in to the Grid Manager using a [supported web browser](#).

Steps

1. Select **SUPPORT > Alarms (legacy) > Current alarms**.

The alarm system is the legacy system. The alert system offers significant benefits and is easier to use. See [Managing alerts and alarms](#) in the instructions for monitoring and troubleshooting StorageGRID.

Current Alarms





Last Refreshed: 2020-05-27 09:41:39 MDT

☐ Show Acknowledged Alarms
 (1 - 1 of 1)

| Severity | Attribute | Service | Description | Alarm Time | Trigger Value | Current Value |
|----------|------------------------------------|----------------------------|---------------------|-------------------------|---------------------|---------------------|
| Major | ORSU (Outbound Replication Status) | Data Center 1/DC1-ARC1/ARC | Storage Unavailable | 2020-05-26 21:47:18 MDT | Storage Unavailable | Storage Unavailable |

Show 50 Records Per Page
 Refresh
 Previous 1 Next

The alarm icon indicates the severity of each alarm, as follows:

| Icon | Color | Alarm severity | Meaning |
|---|--------------|----------------|--|
|  | Yellow | Notice | The node is connected to the grid, but an unusual condition exists that does not affect normal operations. |
|  | Light Orange | Minor | The node is connected to the grid, but an abnormal condition exists that could affect operation in the future. You should investigate to prevent escalation. |
|  | Dark Orange | Major | The node is connected to the grid, but an abnormal condition exists that currently affects operation. This requires prompt attention to prevent escalation. |
|  | Red | Critical | The node is connected to the grid, but an abnormal condition exists that has stopped normal operations. You should address the issue immediately. |

2. To learn about the attribute that caused the alarm to be triggered, right click the attribute name in the table.
3. To view additional details about an alarm, click the service name in the table.

The Alarms tab for the selected service appears (**SUPPORT > Tools > Grid topology > Grid Node > Service > Alarms**).

Overview


Alarms


Reports


Configuration

Main

History


Alarms: ARC (DC1-ARC1) - Replication
Updated: 2019-05-24 10:46:48 MDT

| Severity | Attribute | Description | Alarm Time | Trigger Value | Current Value | Acknowledge Time | Acknowledge |
|---|------------------------------------|---------------------|-------------------------|---------------------|---------------------|------------------|--------------------------|
|  Major | ORSU (Outbound Replication Status) | Storage Unavailable | 2019-05-23 21:40:08 MDT | Storage Unavailable | Storage Unavailable | | <input type="checkbox"/> |

Apply Changes 

4. If you want to clear the count of current alarms, you can optionally do the following:
 - Acknowledge the alarm. An acknowledged alarm is no longer included in the count of legacy alarms unless it is triggered at the next severity level or it is resolved and occurs again.
 - Disable a particular Default alarm or Global Custom alarm for the entire system to prevent it from being triggered again.

Related information

[Alarms reference \(legacy system\)](#)

[Acknowledge current alarms \(legacy system\)](#)

[Disable alarms \(legacy system\)](#)

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.