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CHAPTER 1

Introduction to this guide

This section contains the following topics:

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About this guide

This guide describes how to monitor and analyze Isilon cluster data by using InsightIQ. Your suggestions help us to improve the accuracy, organization, and overall quality of the documentation. Send your feedback to https://www.research.net/s/isi-docfeedback. If you cannot provide feedback through the URL, send an email message to docfeedback@isilon.com.

Where to go for support

If you have any questions about EMC Isilon products, contact EMC Isilon Technical Support.

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<th>Online Support</th>
<th>Live Chat</th>
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<td></td>
<td>Create a Service Request</td>
</tr>
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| Telephone Support              | United States: 1-800-SVC-4EMC (800-782-4362) |
|                                | Canada: 800-543-4782              |
|                                | Worldwide: +1-508-497-7901       |
|                                | For local phone numbers for a specific country, see EMC Customer Support Centers. |

| Help with online support       | For questions specific to EMC Online Support registration or access, email support@emc.com. |

Support for InsightIQ

If you are running a free version of InsightIQ, community support is available through the EMC Isilon Community Network. If you have purchased one or more licenses of InsightIQ and have a valid support contract for the product, contact EMC Isilon Technical Support for assistance.

Support for IsilonSD Edge

If you are running a free version of IsilonSD Edge, community support through EMC community network is available. However, if you have purchased one or more licenses of IsilonSD Edge, you can contact EMC Isilon Technical Support for assistance, provided you have a valid support contract for the product.
CHAPTER 2

InsightIQ overview

This section contains the following topics:

- Introduction to InsightIQ ................................................................. 8
- Monitoring clusters with InsightIQ Dashboard ............................... 8
- Performance reports and File System reports ................................ 9
- Report configuration ........................................................................ 9
- InsightIQ feature compatibility with OneFS ...................................... 9
Introduction to InsightIQ

InsightIQ provides tools to monitor and analyze historical data from Isilon clusters. With InsightIQ, in the InsightIQ web application, you can view standard or customized Performance reports and File System reports, to monitor and analyze Isilon cluster activity. You can create customized reports to view information about storage cluster hardware, software, and protocol operations. You can publish, schedule, and share reports, and you can export the data to a third-party application.

You can create and view specific InsightIQ reports to identify or confirm the cause of a performance issue. For example, if users report client connectivity issues during certain dates, you can create a report that indicates the cause of the issue. InsightIQ enables you to correlate data across present and historical conditions.

If you modify the Isilon cluster environment, you can measure the effects of those changes by creating an InsightIQ report that compares the past performance with the performance after the changes were made. For example, if you add 20 new clients, you can create a report to compare the performance before the change and after the change. This comparison allows you to determine the impact of the additional clients on system performance.

Create customized reports that help to identify bottlenecks or inefficiencies in Isilon cluster systems and workflows. For example, if you want to verify that all clients can access the cluster quickly and efficiently, you can create a report that measures which client connections are faster or slower. You can then modify the report to add breakouts and filters to identify the cause of the slower connections.

Customized reports provide specific information about cluster operations. For example, if you recently deployed an Isilon cluster, you might want to view a customized report that illustrates how the cluster and its individual components are performing.

A review of past performance trends can help you predict future trends and needs. For example, if you deployed an Isilon cluster for a data-archival project 6 months ago, you might want to estimate when the cluster reaches its maximum capacity. You can customize a report to illustrate capacity usage by day, week, or month to estimate when the cluster reaches capacity.

You can install InsightIQ on a Linux computer or on a virtual machine. Configure settings such as the IP address of InsightIQ and the administrator password in the InsightIQ console interface.

Monitoring clusters with InsightIQ Dashboard

View the status of all the monitored clusters.

InsightIQ Dashboard, available through the InsightIQ web application, provides you with an overview of the status of all the monitored clusters. The Cluster Status summary includes information about cluster capacity, clients, throughput, and CPU usage. Current information about the monitored clusters appears alongside graphs that show the relative changes in the statistics over the past 12 hours.

The Aggregated Cluster Overview section displays the total or average values of the status information for the monitored clusters. This information can help you decide what to include in a Performance report. For example, if the total amount of network traffic for all the monitored clusters is higher than anticipated, a customized Performance report can show you the data about network traffic. The report can
show you the network throughput by direction, by using breakouts, to help you
determine whether one direction of throughput is contributing to the total more than
the other.

Performance reports and File System reports

Monitor EMC Isilon clusters with customizable reports.
Performance reports include information about the cluster activity and capacity. The
information can help you confirm that storage clusters perform as expected, and help
you identify the specific cause of a performance-related issue to investigate. File
System reports include information about the cluster file system, including
deduplication, quotas, and usable capacity. The information can help you identify the
types of data that is stored and where the data is located.

With InsightIQ, you can create live reports and view them through the InsightIQ web
application. You can create live reports for Performance reports and File System
reports. You can modify the attributes of live reports as you view the reports,
including the period, breakouts, and filters.

You can view Performance reports as a PDF file that is generated based on a report
schedule that the administrator sets up. InsightIQ can be configured to send a PDF file
as an email attachment. You can use a PDF file to verify cluster health or to distribute
InsightIQ information to individuals who do not have access to the InsightIQ web
application.

Report configuration

InsightIQ reports are configured by using modules, breakouts, and filter rules.
A module is a section of a report that displays information about a cluster. A breakout
can be applied to a module so that users can view information about separate cluster
components. A filter rule can be applied to a module so that users can view
information about a specific component across the entire report. Filter rules can be
combined into collections that are called filters. Filters can be saved and applied to
multiple reports.

InsightIQ feature compatibility with OneFS

Certain InsightIQ features are supported on specific versions of OneFS.

OneFS compatibility
For general information about InsightIQ compatibility with OneFS, refer to the Isilon
Supportability and Compatibility Guide.

OneFS feature compatibility
Certain InsightIQ features require specific versions of OneFS.

InsightIQ 4.1.x can be used with clusters that run versions of OneFS older than OneFS
8.0.1. However, InsightIQ 4.1.x includes features that OneFS versions older than
OneFS 8.0.1 do not support. OneFS 8.0.1 supports all features of InsightIQ 4.1.x. If you
use a feature in a version of InsightIQ earlier than 4.1.x, that feature is supported in
the latest version of InsightIQ.
### Table 1  InsightIQ features supported by OneFS versions

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<thead>
<tr>
<th>InsightIQ feature</th>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cache performance modules</td>
<td>OneFS 7.1.0 or later</td>
<td>To view data about L3 cache, the cluster must be running OneFS 7.1.1 or later.</td>
</tr>
<tr>
<td>Event summary performance module</td>
<td>OneFS 7.1.0 or later</td>
<td>None</td>
</tr>
<tr>
<td>Quota reports</td>
<td>OneFS 7.1.0 or later</td>
<td>To view more than 1000 quotas at a time, the cluster must be running OneFS 7.2.0 or later.</td>
</tr>
<tr>
<td>Capacity reports</td>
<td>OneFS 7.1.0 or later</td>
<td>If you view capacity reports for a cluster running OneFS 7.1.1 or earlier, the report does not include data that is used by virtual hot spares or snapshots. Without the data from hot spares and snapshots, the remaining capacity appears greater than the actual values.</td>
</tr>
<tr>
<td>Node pool and tier breakouts for performance modules</td>
<td>OneFS 7.1.0 or later</td>
<td>None</td>
</tr>
<tr>
<td>Deduplication reports</td>
<td>OneFS 7.1.1 or later</td>
<td>None</td>
</tr>
<tr>
<td>Node pool and tier breakouts for File System Analytics modules</td>
<td>OneFS 8.0.0 or later</td>
<td>None</td>
</tr>
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- View aggregate cluster status ................................................... 12
- View the status of a cluster ........................................................ 12
- Monitoring errors ...................................................................... 12
Viewing cluster status

The InsightIQ Dashboard view shows information about all monitored clusters.

On the InsightIQ Dashboard, you can view information for all the monitored clusters or for individual monitored clusters. The InsightIQ Dashboard modules can help you identify issues and determine which cluster to investigate further. You can compare information between clusters to help identify whether the issue occurs on all clusters. You can apply a report to all the clusters to narrow down the source of a performance issue, and then create a Performance report to view more detailed information about the affected cluster. For example, if you identify an issue in the Aggregated Cluster Overview, you can review the information for individual clusters to identify which cluster is the source of the issue. You can then create a Performance report to view additional information about the affected cluster.

If Usable Capacity information is available for the cluster, the Aggregated Cluster Overview shows you information about the Usable Capacity available on the cluster rather than the remaining physical space that is available.

View aggregate cluster status

View the status of all monitored clusters.

Procedure

1. In the InsightIQ web application, click the Dashboard tab.
   The InsightIQ Dashboard view appears.
2. In the Aggregated Cluster Overview section, view the status of all monitored clusters.

View the status of a cluster

View the status of an individual cluster.

Procedure

1. In the InsightIQ web application, click the Dashboard tab.
   The InsightIQ Dashboard view appears.
2. Beneath the Aggregated Cluster Overview section is the status of all monitored clusters. To find the status for a specific cluster, scroll down the InsightIQ Dashboard view.
   Expand the section to see more information about a cluster.

Monitoring errors

Identify and resolve problems that are encountered when monitoring a cluster.

To resolve the following errors, you must be logged in to InsightIQ with an administrator account.

Authorization error

InsightIQ is not authorized to communicate with the monitored cluster. To resolve this issue, ensure that InsightIQ is authenticating with the correct username and password.
Connection error
InsightIQ is unable to connect to the monitored cluster. If the Monitoring Status of the cluster is yellow, InsightIQ is trying to resolve this issue. If the Monitoring Status of the cluster is red, InsightIQ is unable to repair the connection to the cluster and resolve this issue manually. To resolve this issue, reestablish network connectivity between InsightIQ and the monitored cluster. After the connection is reestablished, InsightIQ can connect to the monitored cluster automatically.

Database busy
InsightIQ is unable to add cluster data to the InsightIQ data store because the maximum number of data store connections are already in use. Cluster monitoring is temporarily paused until the necessary resources are freed. If this error persists for several minutes or more, open an SSH connection to InsightIQ and restart InsightIQ by running the following command:

```
iiq_restart
```

Data store connection error
InsightIQ is unable to connect to the InsightIQ data store. Cluster monitoring is suspended until this issue is resolved. To resolve this issue, ensure network connectivity between InsightIQ and the data store. InsightIQ tries to connect to the data store until the network connection is reestablished.

Data store full
The InsightIQ data store does not have sufficient space to continue monitoring. To resolve this issue, free space on the InsightIQ data store, and then restart InsightIQ.

Data retrieval delayed
The most recent data that InsightIQ has retrieved from the cluster is more than 15 minutes old. If InsightIQ recently began or resumed monitoring the cluster, this issue commonly resolves itself as InsightIQ retrieves more recent data. If this issue also reports one or more InsightIQ errors, resolve the errors. If the error persists after all other InsightIQ errors are resolved, contact Isilon Technical Support.

FSA connection error
InsightIQ is unable to retrieve File System Analytics reports from the cluster. To resolve this issue, ensure that NFSv3 is enabled on the monitored cluster and that InsightIQ can connect to the cluster. After this issue is resolved, InsightIQ automatically resumes retrieving File System Analytics reports.

GUID error
The globally unique identifier (GUID) associated with the monitored cluster in InsightIQ has changed. The hostname or IP address that is associated with the cluster might be reassigned to another cluster. To resolve this issue, ensure that the hostname or IP address of the monitored cluster matches the hostname or IP address that InsightIQ accesses.

License error
InsightIQ is not licensed on the monitored cluster. To resolve this issue, configure a valid InsightIQ license on the cluster.
Privilege error

The InsightIQ user does not have sufficient privileges to retrieve the specified data from the cluster. For information about adding privileges to InsightIQ, see KB 194112.
CHAPTER 4

Performance reports

This section contains the following topics:

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- Scheduling Performance reports ......................................................... 36
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Performance reports overview

View information about the activity of the nodes, networks, clients, disks, and IFS cache of a monitored cluster.

Performance reports provide you with information about the performance and capacity of a monitored cluster. You can also view information about CPU usage, available capacity, and recent cluster events.

You can use Performance reports to verify whether a cluster is performing as expected, or identify the cause of a performance issue. For example, you can view Performance reports that display information about network throughput for a range of dates. If you find that throughput is not as high as expected, you can search for a cause of the issue by viewing information about any network throughput errors.

Performance reports can also be useful when you want to monitor cluster capacity. For example, you can create a Performance report that shows the changes in available capacity over the past year. You can create a Performance report schedule to send a weekly report that illustrates the cluster capacity over the past week.

InsightIQ downsampling

InsightIQ downsamples the data that it collects for Performance reports.

Downsampling means that InsightIQ converts higher-resolution data to lower-resolution data by adding or averaging several higher-resolution samples. InsightIQ collects data samples at different intervals, depending on the type of data collected. InsightIQ averages or adds samples together to create a single, low-resolution sample that represents a 10-minute period, and preserves the minimum and maximum values for that period. InsightIQ deletes the averaged samples after 24 hours, to limit the size of the data store.

Maximum and minimum data values

You can view the maximum and minimum values for the downsampled data in a report.

In reports, maximum and minimum values are shown as highlighted areas surrounding the line that represents the averaged value. You can use maximum and minimum values to see how monitored cluster activity varies over a date range. For example, if the maximum value exceeds the averaged value, and the minimum time value is close to the averaged value, it is likely that the value fluctuated significantly over a short time.

Maximum and minimum values are not displayed for the following modules:

<table>
<thead>
<tr>
<th>Module</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Protocol Operations Rate</td>
<td>You can view maximum and minimum values when you filter by protocol.</td>
</tr>
<tr>
<td>Protocol Operations Average Latency</td>
<td>You can view maximum and minimum values when you filter by file system event.</td>
</tr>
<tr>
<td>Active Clients</td>
<td></td>
</tr>
<tr>
<td>Connected Clients</td>
<td></td>
</tr>
<tr>
<td>File System Events Rate</td>
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Table 2 Allowable data values by module (continued)

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<th>Notes</th>
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<td>Job Workers</td>
<td></td>
</tr>
<tr>
<td>Storage Capacity</td>
<td></td>
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<tr>
<td>HDD Storage Capacity</td>
<td></td>
</tr>
<tr>
<td>Writable Capacity</td>
<td></td>
</tr>
<tr>
<td>Deduplication Summary (Logical)</td>
<td></td>
</tr>
<tr>
<td>Deduplication Summary (Physical)</td>
<td></td>
</tr>
<tr>
<td>Overall Cache Hit Rate</td>
<td>-</td>
</tr>
<tr>
<td>Overall Cache Throughput Rate</td>
<td></td>
</tr>
<tr>
<td>L1 Cache Throughput Rate</td>
<td></td>
</tr>
<tr>
<td>L2 Cache Throughput Rate</td>
<td></td>
</tr>
<tr>
<td>L3 Cache Throughput Rate</td>
<td></td>
</tr>
<tr>
<td>L1 and L2 Cache Prefetch Throughput Rate</td>
<td></td>
</tr>
<tr>
<td>CPU Usage Rate</td>
<td></td>
</tr>
<tr>
<td>Disk IOPS</td>
<td></td>
</tr>
<tr>
<td>Cache Hits</td>
<td></td>
</tr>
</tbody>
</table>

Data Module overview

Overview of the data modules used to create the performance reports.

Data modules collect cluster data and allow users to determine how that data is displayed in a performance report. Each standard performance report included with IIQ is a selection of related data modules. You can also use these same data modules to create your own custom performance reports.

Live Performance Reports overview

Live Performance reports provide information on the performance of the cluster.

Live Performance reports provide you with a quick and easy way to monitor a cluster's performance. You can focus the reports on different data types including cluster capacity, network throughput, clients, jobs and services, events, and cache. Each Live Performance report consists of a collection of modules that monitor a OneFS cluster and display live data on request.

Note

Modules, by default, automatically refresh every 30 seconds. If you expand the date range to greater than 6 hours, the automatic refresh is disabled.
Cluster Performance report overview

The Cluster Performance report displays the general health and status of the cluster. You can focus the modules on individual nodes or clients to view more detailed information about the affects on cluster performance.

Here is a list of modules that are included in this report:

- External Network Throughput Rate
- Protocol Operations Rate
- CPU % Use
- Active Clients
- Connected Clients
- Jobs
- Job Workers

Configure the Cluster Performance report

You can view cluster network activity throughput, protocol operations rate, CPU usage, client activity, and job activity within the Cluster Performance report.

For this example, you are researching into network latency on the cluster to determine the cause.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Cluster Performance.
4. In the Date Range fields, select a range to display, then click View Report.
   The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   The modules in the report are now populated with data for the cluster and date range you selected.
5. In the External Network Throughput Rate module, check the throughput rate during the time in question.

   **Note**
   High throughput values indicate times when the cluster's network was under heavy load.

6. In the External Network Throughput Rate module, click the Client breakout.
   To learn more about breakouts, refer to the Breakouts on page 63 topic.
   To remove focus on a breakout, click the None breakout.
   On the left side of the module, you can now see a list of all clients that were using the cluster's network throughput during the date range you specified. The client at the top of the list was using the highest percentage of network throughput.
7. Click to select the client that was using the most throughput during the date range.

To remove focus on a client, click the client filter button at the top of the module.

All applicable modules in the report are now showing information that is focused on the client you selected, and data from all other clients are removed from the module.

Results
With the information you gathered, you can determine that a specific client might be causing performance issues on the cluster.

Node Performance report overview

The Node Performance report displays the health and status of each node in the cluster.

Users can focus the data modules on specific clients or protocols to view more detailed information about the affects on node performance.

Here is a list of data modules included in this report:

- Node Summary
- External Network Throughput Rate
- Protocol Operations Rate
- CPU % Use
- Disk Throughput Rate
- Disk Operations Rate
- Active Clients
- Connected Clients

Configure the Node Performance report

You can view a list of nodes in the cluster, network activity, disk operations, client activity, and protocols within the Node Performance report.

For this example, you are researching into a node with high I/O to determine the cause.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Node Performance.
4. In the Date Range fields, select a range to display, then click View Report.
   - The date range should include the entire period of time when the node was behaving unexpectedly. The default setting is to view the last hour of data.
   - The modules in the report are now populated with data for the node and date range you selected.
5. In the Node Summary module, check for nodes behaving differently than other nodes.
Note

Unusually high or low I/O on one node might indicate an issue.

6. In the **Node Summary** module, click the node with the highest Total I/O.

   To remove focus on a node, click the node filter button at the top of the module.

   All applicable modules in the report are now focused on the node you filtered.
   Data from all other nodes is removed from the modules.

7. In the **External Network Throughput Rate** module, click the **Client** breakout.

   To learn more about breakouts, refer to the Breakouts on page 63 topic.

   To remove focus on a breakout, click the **None** breakout.

   All applicable modules in the report are now showing information that is focused on
   the node you filtered and the client breakout you selected.

Results

In this example, you can determine which node had high I/O, and focus the modules to determine which client has the most affect on the node performance.

**Network Performance report overview**

The Network Performance report displays the health and status of the cluster's network.

You can focus the data modules on specific protocols, errors, nodes, pools, or tiers to view more detailed information about network performance.

Here is a list of data modules included in this report:

- External Network Throughput Rate
- External Network Packets Rate
- Protocol Operations Average Latency
- External Network Errors

**Configure the Network Performance report**

You can view network throughput, packet rates, protocol latency, and external network errors within the Network Performance report.

For this example, you are researching into network latency to determine the cause.

**Procedure**

1. Click the **Performance Reporting** tab.

2. On the **Live Performance Reporting** page, click the **Cluster** drop down and select the cluster that you want to monitor.

3. Click the **Report Type** drop down and select **Network Performance**.

4. In the **Date Range** fields, select a range to display, then click **View Report**.

   The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
The modules in the report are now populated with data for the cluster and date range you selected.

5. In the **External Network Throughput Rate** module, check the throughput rate during the time in question.

   **Note**

   High throughput values indicate times when the cluster’s network was under heavy load.

6. In the **External Network Throughput Rate** module, click the **Client** breakout.

   To learn more about breakouts, refer to the [Breakouts](#) on page 63 topic.

   To remove focus on a breakout, click the **None** breakout.

   On the left side of the module, you can now see a list of all clients that were using the cluster’s network throughput during the timeframe you specified. The client at the top of the list was using the highest percentage of network throughput.

7. Click to select the client that was using the most throughput during the date range.

   To remove focus on a client, click the client filter button at the top of the module.

   All applicable modules in the report are now showing information that is focused on the client you selected, and data from all other clients are removed from the module.

8. In the **Protocol Operations Average Latency** module, click the **Protocol** breakout.

   On the left side of the module, you can now see a list of all protocols in use during the date range you specified, with the protocol at the top experiencing the most latency.

**Results**

With the information you gathered, you can determine which client and protocol might be causing network latency issues on the cluster.

---

**Client Performance report overview**

The Client Performance report is used to monitor clients connecting to the cluster. You can focus the modules on specific clients, protocols, nodes, and tiers to see how they are affecting performance on the cluster. Here is a list of data modules included in this report:

- Client Summary
- External Network Throughput Rate
- Protocol Operations Rate
- Protocol Operations Average Latency
- External Network Errors
Configure the Client Performance report

You can view a list of connected clients, network throughput, network errors, and protocol operations within the Client Performance report.

For this example, you are researching into clients experiencing performance issues through specific protocols.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Client Performance.
4. In the Date Range fields, select a range to display, then click View Report.
   The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   The modules in the report are now populated with data for the cluster and date range you selected.
5. In the Client Summary module, click the Client with the highest Total I/O.
   The modules below the Client Summary are now populated with data for the client you selected.
6. In the Protocol Operations Average Latency module, click the Protocol breakout.
   To learn more about breakouts, refer to the Breakouts on page 63 topic.
   To remove focus on a breakout, click the None breakout.
   On the left side of the module, you can now see a list of all protocols being used by the client you selected. The protocol at the top of the list experienced the highest average latency during the date range you specified.

Results

With the information you gathered, you can determine the client with the highest Total I/O, and the protocols the client used to access the cluster.

Disk Performance report overview

The Disk Performance report displays the general health of the disks on the cluster.

You can focus the modules on individual disks, nodes, and pools to determine the affect they have on the clusters performance.

Here is a list of the data modules included in this report:

- Protocol Operations Rate
- Disk Activity
- Disk Operations Rate
- Disk Throughput Rate
- Average Disk Operation Size
- Average Disk Hardware Latency
- Average Pending Disk Operations Count
Configure the Disk Performance report

You can view disk activity, disk throughput, and disk operations within the Disk Performance report.

For this example, you are researching into disk latency issues to determine what might have been the cause.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Disk Performance.
4. In the Date Range fields, select a range to display, then click View Report.
   The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   The modules in the report are now populated with data for the cluster and date range you selected.
5. In the Disk Activity module, click the Disk breakout.

   To learn more about breakouts, refer to the Breakouts on page 63 topic.
   To remove focus on a breakout, click the None breakout.

   Note

   High activity on a single disk or a few disks and low activity on the remaining disks might indicate performance issues on the OneFS cluster.

   On the left side of the module, you can now see a list of all disks that were not idle during the date range you specified. The disk at the top of the list had the most activity during the date range you selected.

6. In the Disk Throughput Rate module, click the Disk breakout.
   On the left side of the module, you can now see a list of all disks that were being written to or read from during the date range. The disk at the top of the list had the highest percentage throughput.

Results

With the information you gathered, you can determine which disk has the highest throughput and might be causing performance issues on the cluster.

File System Performance report overview

The File System performance report displays the general health of the file system and recent events.

You can focus the modules on specific nodes, pools, and events to view more detailed information about the affects on cluster performance.

Here is a list of the data modules included in this report:

- File System Events Rate
Configure the File System Performance report

You can view file system events and event service rates within the File System Performance report.

For this example, you are researching into a particular date range when the OneFS cluster behaved unexpectedly and determine what might have been the cause.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select File System Performance.
4. In the Date Range fields, select a range to display, then click View Report.
   The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   The modules in the report are now populated with data for the cluster and date range you selected.
5. In the File System Events Rate module, click the Node breakout.
   To learn more about breakouts, refer to the Breakouts on page 63 topic.
   To remove focus on a breakout, click the None breakout.
   On the left side of the module, you can now see a list of all nodes that were interacting with the file system during the date range you specified. The node at the top of the list had the highest percentage of file system events.
6. Select the Node with the highest percentage of file system events.
7. In the File System Events Rate module, click the FS Event breakout.
   On the left side of the module, you can now see a list of all file system events that the selected node was sending and receiving during the date range you specified. The event at the top of the list was the most active.

Results

With the information you gathered, you can determine which node is servicing the most events and the rate of those events that might be causing performance issues on the cluster.

File System Cache Performance report overview

The File System Cache Performance report displays the general health of the file system cache.

You can focus on cache level, cache hits, and cache throughput to view more detailed information about the affects on cluster performance.

Here are the data modules included in this report:
Configure the File System Cache Performance report

You can view file system cache levels, throughput, and hit rate within the File System Cache Performance report.

For this example, you are researching into file system cache latency on the OneFS cluster to determine the cause.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select File System Cache Performance.
4. In the Date Range fields, select a range to display, then click View Report.
   The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   The modules in the report are now populated with data for the cluster and date range you selected.
5. In the Overall Cache Hit Rate module, check the rate of L1, L2, and L3 cache during the time in question.

Note

If L3 cache is enabled and has a higher hit rate than L2 or L1 cache, cluster performance might be affected.

6. In the Overall Cache Throughput Rate module, select L3 Starts in the breakout dropdown and click the Node breakout.
   To learn more about breakouts, refer to the Breakouts on page 63 topic.
   To remove focus on a breakout, click the None breakout.
   On the left side of the module, you can now see a list of all nodes that were requesting info from L3 during the date range you specified. The node at the top of the list made the most requests to L3.

Results

With the information you gathered, you can determine which node is making the most cache requests, what type of cache requests are being made, and how the cache requests affect performance on the OneFS cluster.
Cluster Capacity Performance report overview

The Cluster Capacity Performance report displays the capacity of the cluster. You can focus the modules on capacity, node, and node pool to view more detailed information about the affect on cluster performance.

Here is a list of data modules included in this report:

- Cluster Capacity

Configure the Cluster Capacity Performance report

You can view total capacity, provisioned capacity, and writable capacity within the Cluster Capacity Performance report.

For this example, you are researching into the cluster's total data usage to determine if it is affecting performance on the cluster.

Procedure

1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Cluster Capacity.
4. In the Date Range fields, select a range to display, then click View Report.
   - The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   - The modules in the report are now populated with data for the cluster and date range you selected.
5. In the Cluster Capacity module, check the total capacity and compare to the total usage during the time in question.

   Note
   - If the total usage is close to the total capacity, you might be close to filling up the cluster. For more detailed information, view the Capacity Reporting page under the File System Reporting tab.

Results

With the information you gathered, you can determine how close you are to reaching the cluster's total capacity and estimate when additional capacity might be needed.

Deduplication Performance report overview

The Deduplication Performance report displays the amount of deduplicated data on the cluster.

You can focus the modules on disk capacity, deduplicated data, or saved storage space to view more detailed information on the affects on cluster performance.

Here is a list of modules that are included in this report:

- Cluster Capacity
- Deduplication Summary (Logical)
Configure the Deduplication Performance report

You can view cluster capacity, deduplicated data, and saved storage space within the Deduplication Performance report.

For this example, you are researching into the amount of storage space deduplication has saved on the cluster.

Procedure
1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Deduplication.
4. In the Date Range fields, select a range to display, then click View Report.
   - The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   - The modules in the report are now populated with data for the cluster and date range you selected.
5. In the Deduplication Summary (Physical) module, view the Space Saved.

Results
With the information you gathered, you can determine how much storage space (physical) you have saved with deduplication.

Cluster Events Performance report overview

The Cluster Events Performance report displays events and jobs on the cluster.

You can focus the modules on specific events, jobs, and nodes to view more detailed information about the affect on cluster performance.

Here is the list of modules that are included in this report:
- Event Summary
- Jobs
- Job Workers

Configure the Cluster Events Performance report

You can view cluster events and jobs within the Cluster Events Performance report.

For this example, you are researching into recent cluster events to determine what might have been the cause.

Procedure
1. Click the Performance Reporting tab.
2. On the Live Performance Reporting page, click the Cluster drop down and select the cluster that you want to monitor.
3. Click the Report Type drop down and select Cluster Events.
4. In the Date Range fields, select a range to display, then click View Report.
   - The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
The modules in the report are now populated with data for the cluster and date range you selected.

5. In the Event Summary module, check the list of events, the severity, and the time noticed.

By default, the event summary list is sorted with the most recent event at the top.

---

**Note**

The bar at the top of the Event Summary module displays the date range that is specified, and highlights the times when events occurred. If you minimize the Event Summary module, you can better compare the highlighted events in the bar with other modules.

---

6. In the Jobs module, click the Job Type breakout.

To learn more about breakouts, refer to the Breakouts on page 63 topic.

To remove focus on a breakout, click the None breakout.

On the left side of the module, you can now see a list of all Job Types that were active during the date range you specified. The Job Type at the top of the list was the most active.

7. In the Jobs module, click the Job ID breakout.

To remove focus on a breakout, click the None breakout.

On the left side of the module, you can now see a list of all Job IDs that were active during the date range you specified. The Job ID at the top of the list was the most active.

---

**Results**

With the information you gathered, you can determine which job type and job id might have caused the event.

---

**Jobs and Services Performance report overview.**

The Jobs and Services Performance report displays jobs and services on the cluster.

You can focus the modules on individual jobs, services, and nodes to view more detailed information about the affects on cluster performance.

Here is a list of data modules included in this report:

- Jobs and Services Summary
- CPU Usage Rate
- Disk IOPS
- Cache Hits

**Configure the Jobs and Services Performance report**

You can view jobs, services, disk IOPS, cache hits, or CPU usage within the Jobs and Services Performance report.

For this example, you are researching into recent cluster latency to determine the cause.
Procedure

1. Click the **Performance Reporting** tab.
2. On the **Live Performance Reporting** page, click the **Cluster** drop down and select the cluster that you want to monitor.
3. Click the **Report Type** drop down and select **Jobs and Services**.
4. In the **Date Range** fields, select a range to display, then click **View Report**.
   - The date range should include the entire period of time when the cluster was behaving unexpectedly. The default setting is to view the last hour of data.
   - The modules in the report are now populated with data for the cluster and date range you selected.
5. In the **Jobs and Services Summary** module, check the service, the CPU usage rate, and the cache during the date range specified.
   - **Note**
     - High CPU usage rates indicate times when a job was using high levels of cluster resources.
6. Click to select the Service that was using the most CPU usage during the date range.
   - To remove focus, click the service filter button at the top of the module.
   - All applicable modules in the report are now showing information that is focused on the service you selected, and data from all other services are removed from the module.
7. In the **CPU Usage Rate** module, click the **Node** breakout.
   - To learn more about breakouts, refer to the **Breakouts** on page 63 topic.
   - To remove focus on a breakout, click the **None** breakout.
   - On the left side of the module, you can now see a list of all nodes that were using CPU time during the date specified. The node at the top of the list was using the highest percentage of CPU.

Results

With the information you gathered, you can determine which job and service had high CPU usage and what node originated the request.

**Live Performance reports**

Create, view, modify, delete, and schedule live Performance reports.

Live Performance reports allow you to modify a report as you view it. You can only view a live Performance report while using the InsightIQ web application.

When you view a live Performance report, you can modify the range of data that is displayed, as well as change breakouts and filters. Real-time Performance reports are useful when you want to investigate a performance issue that is affecting a cluster.

You can view a live Performance report to see the individual performance of specific components.

In a live Performance report, you can view the status of the monitored cluster. This information includes the clusters current date and time, the number of nodes that are
deployed, a client-activity overview, a network throughput overview, the capacity usage, and CPU utilization.

Creating a live Performance report

Creates custom live Performance reports.

Procedure

1. In the InsightIQ web application, click the Performance Reporting tab.
2. Click Create a New Performance Report.
   The Create a New Performance Report report template view appears.
3. To create the Live Performance report, specify a template.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a live Performance report from a template that is based on the default settings.</td>
<td>In the Select a Starting Point for Your Performance Report section, click Create from Blank Report.</td>
</tr>
<tr>
<td>Create a live Performance report based on a Saved Performance report.</td>
<td>In the Saved Performance Reports section, click a saved report.</td>
</tr>
<tr>
<td>Create a live Performance report based on one of the standard reports.</td>
<td>In the Standard Reports section, click the name of a Standard report.</td>
</tr>
<tr>
<td></td>
<td>• Node Performance report template</td>
</tr>
<tr>
<td></td>
<td>• Cluster Performance report template</td>
</tr>
<tr>
<td></td>
<td>• Client Performance report template</td>
</tr>
<tr>
<td></td>
<td>• Network Performance report template</td>
</tr>
<tr>
<td></td>
<td>• File System Performance report template</td>
</tr>
<tr>
<td></td>
<td>• Disk Performance report template</td>
</tr>
<tr>
<td></td>
<td>• Cluster Capacity report template</td>
</tr>
<tr>
<td></td>
<td>• File System Cache Performance report template</td>
</tr>
<tr>
<td></td>
<td>• Cluster Events report template</td>
</tr>
<tr>
<td></td>
<td>• Deduplication report template</td>
</tr>
<tr>
<td></td>
<td>• Jobs and Services report template</td>
</tr>
</tbody>
</table>

The Create a New Performance Report view appears.

4. In the Build Your New Performance Report section, in the Performance Report Name field, type a name for the Performance report.
5. Select the Live Performance Reporting checkbox.

Note

If you also want to create a performance report schedule with the same properties as this Live Performance report, select both the Live Performance Reporting and Scheduled Performance Report checkboxes.
6. In the **Select the Data You Want to See** section, specify the Performance modules that you want to include in the report.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add a Performance module</td>
<td>a. In any unassigned Performance module area, from the <strong>Select a Module for this Position</strong> drop-down list, select a performance module.</td>
</tr>
<tr>
<td></td>
<td>b. If all existing Performance module areas are assigned, at the bottom of the section, click <strong>Add another performance module</strong>.</td>
</tr>
<tr>
<td>Modify a Performance module</td>
<td>• In an assigned Performance module area, from the Performance module drop-down list, select a different Performance module.</td>
</tr>
<tr>
<td>Delete a Performance module</td>
<td>• In an assigned Performance module area, click <strong>Delete this performance module</strong>.</td>
</tr>
</tbody>
</table>

Repeat this step for each performance module that you want to include.

7. Complete the Performance report.
   - If you want to save the report but continue editing it, click **Save**.
   - If you want to save the report and then immediately apply the report to a monitored cluster and view the results, click **Finish**.

**View a Live Performance report**

View a Live Performance report.

**Procedure**

1. In the InsightIQ web application, click the **Dashboard** tab.
2. In the **InsightIQ Dashboard** view, locate the monitored cluster that you want to view.
3. Click the **Performance details** link that is located next to the cluster name. The **Live Performance Reporting** view for the cluster appears.
4. (Optional) In the **Date Range** control, specify the beginning date and time and the end date and time for the period that you want to view.
5. Select the **Report Type** that you want to view from the drop-down list.
   You can choose either a **Standard** report or a **Saved** report.
6. Click **View Report**.

**Results**

The **Live Performance** report appears below the **Date Range** control.

**Modify a live Performance report**

Change the name and add or remove modules from a live Performance report.

**Procedure**

1. In the InsightIQ web application, click the **Performance Reporting** tab.
2. Click **Manage Performance Reporting** on the **Performance Reporting** ribbon. The **Manage Performance Reporting** view appears.

3. Click the **Live Performance Reports** tab.

   A list of all saved live performance reports shows in the **Live Performance Reporting** section.

4. Click **Edit** in the row of the live Performance report that you want to modify.

   The **Edit this Performance Report** view appears.

5. Perform the following options as needed options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>To change the name of the Performance report</td>
<td>Update the text in the <strong>Performance Report Name</strong> field.</td>
</tr>
</tbody>
</table>
   | To add a Performance module                 | a. At the bottom of the list of Performance modules in the Select the Data You Want to See list, click Add another performance module. 
   |                                             | b. In the new Performance module area, select a Performance module from the Select a Module for this Position drop-down list. |
   | To modify a Performance module              | a. Locate the Performance module that you want to modify.                   
   |                                             | b. In the Performance module drop-down list, select a new area, select a new Performance module. |
   | To remove a Performance module              | a. Locate the Performance module that you want to remove.                   
   |                                             | b. On the Performance module, click Delete this performance module.         |

6. Click **Finish**.

   To save the changes and continue modifying the live Performance report, click **Save**.

   The **Live Performance Report** is saved and the **Live Performance Reporting** view appears showing the latest changes.

**Delete a saved live Performance report**

Permanently delete a saved live Performance report.

**Procedure**

1. In the InsightIQ web application, click the **Performance Reporting** tab.

2. Click **Manage Performance Reporting** on the **Performance Reporting** ribbon.

   The **Manage Performance Reporting** view appears and includes list of all saved live Performance reports.

3. Click **Performance Reporting** > **Manage Performance Reporting**.

4. Specify the report that you want to delete.
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete one report</td>
<td>In the row of the report that you want to delete, click Delete.</td>
</tr>
<tr>
<td>Delete multiple reports at once</td>
<td>In each row of the reports that you want to delete, select the Report checkbox, and then, in the Select an action drop-down list, select Delete selected reports.</td>
</tr>
<tr>
<td>Delete all live Performance reports</td>
<td>Select the top-level checkbox that is next to the Report column title, and then, in the Select an action drop-down list, select Delete selected reports.</td>
</tr>
</tbody>
</table>

A **Confirm Delete** dialog box appears and prompts you to confirm that you want to delete the Performance reports.

5. Click **Delete**.

**Create a Performance report schedule from a live Performance report**

Create a Performance report schedule based on a Live Performance report.

**Procedure**

1. In the InsightIQ web application, click the **Performance Reporting** tab.
2. Click **Manage Performance Reporting** on the **Performance Reporting** ribbon. The **Manage Performance Reporting** view appears.
3. Click the **Live Performance Reports** tab. A list of all saved live performance reports shows in the **Live Performance Reporting** section.
4. In the row of the live Performance report that you want to schedule, click **Schedule this report**. The **Create a New Performance Report** view appears.
5. To change the name of the live Performance report schedule, update the text in the **Performance Report Name** field.
6. To configure the scheduled Performance report perform the following steps.
   a. Select the name of the cluster in the **Subject of Report** drop-down list.
   b. Select the time interval of data in the **Reporting Period** drop-down list.
   c. Select the report generation interval in the **Report Frequency** drop-down list.
   d. Configure the interval frequency by specifying a number in the **Generate Report Every** edit box.
   e. If the report frequency is **Weekly**, choose the day or days to generate the report each week.
   f. Configure the start time of the generated live Performance reports by choosing a time in the **Generate Report at** drop-down list. Select **AM** or **PM**.
7. To email each generated live Performance report, select the **Email this report as a PDF attachment each time it is generated** checkbox.
Type up to 10 email addresses, which are separated by spaces, commas, or semicolons.

8. Add, remove, or modify Performance modules to the generated live Performance report schedule.

For details about how to add, remove, or modify Performance modules, refer to the Modify a live Performance report task.

9. Click Save.

Publish reports

Publish a report as a PDF.

InsightIQ generates PDFs, sometimes referred to as a generated Performance report, at the times that are specified in a scheduled report. After the published report is complete, you can configure InsightIQ to send the PDF as an email attachment to up to 10 email recipients. You can download the PDFs or view the published reports in the InsightIQ web application.

View a published Performance report

You can view a PDF that is published for a Performance report at any time.

Procedure

1. Click Performance Reporting > Manage Performance Reporting.

   The Manage Performance Reporting page appears with the Live Performance Reporting tab displayed.

2. Click the Generated Reports Archive tab.

   The Generated Reports Archive tab appears, and displays a list of the generated reports.

3. In the Generated Reports area, in the row for the generated report that you want to view, click View.

   The report PDF appears.

Send a published report

You can manually send a PDF that is published for a Performance report to up to 10 email addresses at any time.

Procedure

1. Click Performance Reporting > Manage Performance Reporting.

   The Manage Performance Reporting page appears with the Live Performance Reporting tab displayed.

2. Click the Generated Reports Archive tab.

   The Generated Reports Archive tab appears, and displays a list of the published reports.

3. In the Generated Reports area, specify the published reports that you want to send.
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send one published report</td>
<td>In the row for the published report that you want to send, click Send.</td>
</tr>
<tr>
<td>Send multiple reports in a single email</td>
<td>In the rows for the reports you want to send, select the check boxes, and then, in the Select an action list, select Send Selected reports.</td>
</tr>
<tr>
<td>Send all reports in a single email</td>
<td>Select the top-level check box that is next to the Report column title, and then, in the Select an action drop-down list, select Send Selected reports.</td>
</tr>
</tbody>
</table>

The Send Report dialog box appears.

4. In the Report Recipients field, type up to 10 email addresses that InsightIQ will send this report to.
   - To specify multiple email addresses, separate each address with a comma, a space, or a semicolon.
   - To specify that these email addresses receive the latest version of the report each time it is published in the future, select the Add each of these recipients check box.

5. To specify the subject line for the email that will contain the PDF report, type the subject line in the Message Subject field.
6. To include a message with the email, type the message in the Message field.
7. Click Send.

   InsightIQ immediately sends the email, and the Message Sent dialog box appears.
8. Click Close.

**Delete a published report**

You can permanently delete a published PDF report.

**Procedure**

1. Click Performance Reporting > Manage Performance Reporting.

   The Manage Performance Reporting page appears with the Live Performance Reporting tab displayed.

2. Click the Generated Reports Archive tab.

   The Generated Reports Archive tab appears, and displays a list of all published reports.

3. In the Generated Reports area, specify which published reports you want to delete.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete one published report</td>
<td>In the row of the published report you want to delete, click Delete.</td>
</tr>
</tbody>
</table>
Option | Description
---|---
Delete multiple published reports | In the rows of the reports you want to delete, select the check boxes, and then, in the Select an action list, select Delete Selected reports.
Send all reports in a single email. | Select the highest check box in the Generated Reports area, and then, in the Select an action list, click Delete selected reports.

A confirmation dialog box appears and prompts you to confirm that you want to delete the report.

4. Click OK.

**Publish a report on demand**

Manually publish a scheduled performance report.

**Procedure**

1. In the InsightIQ web application, click the Performance Reporting tab and then click Manage Performance Reporting on the Performance Reporting ribbon. The Manage Performance Reporting view appears.
2. Click the Scheduled Performance Reports tab. The Scheduled Performance Reporting view appears.
3. In the Report Schedules table, in the Actions column, click Generate for the report that you want to publish. The Generate link is disabled while InsightIQ publishes the report.
4. In the Manage Performance Reporting view, click the Generated Reports Archive tab.

**Results**
The published report is listed in the Generated Reports table. You can View, Send, Edit report schedule, or Delete the report.

**Scheduling Performance reports**

Create, disable, enable, modify, and delete Performance report schedules.

You can configure a Performance report schedule to generate PDF reports. Performance report schedules specify what is in the reports, when the reports are generated, and, optionally, one or more email recipients. For each schedule, you specify when InsightIQ generates the report.

You can generate a Performance report that is based on a report schedule at any time. All reports are archived and can be viewed and sent to email recipients. InsightIQ does not automatically delete generated Performance reports. A user must manually delete unwanted Performance reports.

Use Performance report schedules to track cluster performance over a range of dates. For example, if you want to track the remaining unused capacity for a cluster, you can create a Performance report schedule that reports the capacity data for the cluster.
Create a scheduled Performance report

Schedule a Performance report that specifies when InsightIQ publishes PDF reports. You can configure a Performance report schedule to send the published Performance report to one or more email recipients.

Procedure

1. Click **Performance Reporting > Create a New Performance Report.**
   
   The **Create a New Performance Report** page appears.

2. Specify a template for the report schedule.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a report schedule from a template based on the default settings/</td>
<td>Click <strong>Create from Blank Report</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Create a report schedule from a template based on a user-created Performance report.</td>
<td>In the <strong>Saved Reports</strong> area, click the name of a report.</td>
</tr>
<tr>
<td>Create a report schedule from a template based on one of the standard reports included with InsightIQ.</td>
<td>In the <strong>Standard Reports</strong> area, click the name of a report.</td>
</tr>
</tbody>
</table>

   The **Create a New Performance Report** page reloads and displays report configuration options.

3. In the **Build Your New Performance Report** area, in the **Performance Report Name** field, type a name for the report schedule.

4. Select the **Scheduled Performance Report** checkbox.
   
   If you want to also create a live Performance report that has the same properties as this static Performance report schedule, select both the **Scheduled Performance Report** and **Live Performance Reporting** checkboxes.

   Additional scheduling options appear.

5. Under **Configure Your Scheduled Report**, from the **Subject of Report** list, select the cluster that you want to apply this report to.

6. From the **Reporting Period** list, select the length of time that you want each report to cover.
   
   For example, if you select **24 Hours**, and a report is generated at 10:00 AM on 08/02/2011, the report includes data that is collected from 10:00 AM on 08/01/2011 to 10:00 AM on 08/02/2011.

7. Under **Schedule and Delivery**, from the **Report Frequency** list, specify how often you want this report to be generated.
## Performance reports

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate one or more reports every day</td>
<td>Select Hourly, specify the number of hours to elapse before the next report is generated, and specify the time when each report is generated for the first time each day. For example, if you configure InsightIQ to generate a report every seven hours starting at 1:30 PM, the report is generated daily at 1:30 PM and 8:30 PM.</td>
</tr>
<tr>
<td>Generate no more than one report per day. Optionally, suspend report generation for a number of days.</td>
<td>Select Daily, specify the number of days that elapse before the next report is generated, and specify the time of day when the report is generated.</td>
</tr>
<tr>
<td>Generate no more than one report per day. Optionally, suspend report generation for a number of weeks.</td>
<td>Select Weekly, specify the number of weeks that elapse before the next report is generated, and specify one or more days of the week and the time of day when the report is generated.</td>
</tr>
<tr>
<td>Generate no more than one report per month</td>
<td>Select Monthly, specify the number of months that elapse before the next report is generated, and specify the day of the month on which the report is generated. Reports are always generated at 11:59 PM on the specified day.</td>
</tr>
</tbody>
</table>

8. If you want to send reports that are generated from this schedule to one or more email addresses, specify the addresses.
   a. Select the **Email this report as a PDF attachment each time it is generated** checkbox.
   b. Type one or more email addresses in the **Report Recipients** box.
      Separate each address with a comma, a space, or a semi-colon. You can specify up to 10 email addresses.

9. In the **Insert the Data You Want to See** area, specify the modules that you want to view in the report.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add module</td>
<td>a. If all existing module areas are assigned, click <strong>Add another performance module.</strong></td>
</tr>
<tr>
<td></td>
<td>Note</td>
</tr>
<tr>
<td></td>
<td>Unassigned modules contain a <strong>Select a Module for this Position</strong> list.</td>
</tr>
<tr>
<td></td>
<td>b. In an unassigned module area, from the <strong>Select a Module for this Position</strong> list, select a module.</td>
</tr>
<tr>
<td>Modify a module</td>
<td>• In an assigned module area, from the module list, select a different module.</td>
</tr>
</tbody>
</table>

Repeat this step for each module that you want to include.
10. If you want to apply a breakout to a module, in a module area, in the Display Options area, click the name of the breakout that you want to apply.

Repeat this step for each module that you want to apply a breakout to.

11. Save the report schedule.

- To save the report but want to continue modifying it, click Save.
- To save the report and complete the configuration process, click Finish.

Disable a scheduled Performance report

Disable a scheduled Performance report to temporarily prevent InsightIQ from publishing Performance reports.

You can disable a scheduled Performance report if you want to temporarily prevent InsightIQ from publishing Performance reports, but do not want to permanently delete the report. A disabled report can be enabled so that InsightIQ publishes Performance reports again.

Procedure

1. Click Performance Reporting > Manage Performance Reporting.

The Manage Performance Reporting page appears with the Live Performance Reporting tab displayed.

2. Click the Scheduled Performance Reports tab.

The Scheduled Performance Reports view appears. A list of all saved report schedules is displayed in the Report Schedules table.

3. In the Report Schedules table, specify which report schedule you want to disable.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disable a single report schedule.</td>
<td>In the row of the report schedule you want to disable, click the black double-bar icon in the Next Run (UTC) column.</td>
</tr>
<tr>
<td>Disable multiple report schedules.</td>
<td>In the rows of the report schedules you want to disable, select the check boxes, and then, in the Select an action list, select Pause selected report schedules.</td>
</tr>
<tr>
<td>Disable all report schedules.</td>
<td>In the header row, select the check box next to Report, and then, in the Select an action list, select Pause selected report schedules.</td>
</tr>
</tbody>
</table>

In the Next Run (UTC) column of the report schedules, the status changes to Paused. The icon changes to a right pointing triangle and InsightIQ does not generate reports for the specified schedules.

Enable a scheduled Performance report

Enable a scheduled Performance report.

Once a Performance report has been enabled, InsightIQ resumes Performance report publishing.
Procedure

1. Click **Performance Reporting > Manage Performance Reporting**.

   The **Manage Performance Reporting** view appears with the **Live Performance Reporting** tab displayed.

2. Click the **Scheduled Performance Reports** tab.

   The **Scheduled Performance Reports** tab appears. A list of all saved report schedules is displayed in the **Scheduled Reports** table.

3. In the **Report Schedules** table, specify which report schedule you want to enable.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable a single report schedule.</td>
<td>In the row of the report schedule you want to enable, click the black right-pointing triangle icon in the <strong>Next Run (UTC)</strong> column.</td>
</tr>
<tr>
<td>Enable multiple report schedules.</td>
<td>In the rows of the report schedules you want to enable, select the checkboxes. In the <strong>Select an action</strong> list, select <strong>Resume selected report schedules</strong>.</td>
</tr>
<tr>
<td>Enable all report schedules.</td>
<td>In the header row, select the checkbox next to <strong>Report</strong>. In the <strong>Select an action</strong> list, select <strong>Resume selected report schedules</strong>.</td>
</tr>
</tbody>
</table>

   The next date that InsightIQ will publishes a report appears in the **Next Run (UTC)** column of the schedules.

Modify a scheduled Performance report

Add or remove data elements from a Performance report schedule.

You can modify the scheduled Performance report to add or remove modules and change the list of email message recipients.

Procedure

1. Click **Performance Reporting > Manage Performance Reporting**.

   The **Manage Performance Reporting** view appears with the **Live Performance Reporting** tab shown.

2. Click the **Scheduled Performance Reports** tab.

   The **Scheduled Performance Reports** tab appears, and displays a list of all saved report schedules.

3. In the **Scheduled Reports** area, in the row for the scheduled report that you want to modify, click **Edit**.

   The **Edit this Performance Report** view appears.

4. Modify the schedule settings as necessary, and then click save.

Delete a scheduled Performance report

Permanently delete a scheduled Performance report.

If you no longer want InsightIQ to publish PDF reports on a configured report schedule, you can permanently delete the scheduled Performance report. Deleted
scheduled reports cannot be recovered. Any reports that InsightIQ publishes are not be deleted as a result of deleting the scheduled report.

**Procedure**

1. Click **Performance Reporting > Manage Performance Reporting**.
   The **Manage Performance Reporting** page appears with the **Live Performance Reporting** tab displayed.

2. Click the **Scheduled Performance Reports** tab.
   The **Scheduled Performance Reports** tab appears, and displays a list of all saved report schedules.

3. In the **Scheduled Reports** area, specify which report schedule or schedules you want to delete.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete one report schedule</td>
<td>In the row for the report schedule that you want to delete, click <strong>Delete</strong>.</td>
</tr>
<tr>
<td>Delete multiple report schedules</td>
<td>In the rows for the report schedules that you want to delete, select the checkboxes, and then, in the <strong>Select an action</strong> list, select <strong>Delete selected report schedules</strong>.</td>
</tr>
<tr>
<td>Delete all report schedules</td>
<td>Select the highest checkbox in the <strong>Scheduled Reports</strong> area, and then, in the <strong>Select an action</strong> list, click <strong>Delete selected report schedules</strong>.</td>
</tr>
</tbody>
</table>

   A dialog box appears and prompts you to confirm that you want to delete the report schedule or schedules.

4. Click **Delete**.

**Troubleshooting scheduled Performance report issues**

Tips on troubleshooting scheduled InsightIQ performance reports.

**Problems generating a scheduled Performance report**
Review the **Report Schedules** table, found on the **Scheduled Performance Reports** tab on the **Manage Performance Reports** view. This table includes current information about saved report schedules, including a **Status** column that describes the current state of the report schedule.

If InsightIQ is not publishing reports from a report schedule or the published reports are not reaching the specified email recipients, verify the schedule settings.

If InsightIQ is not publishing reports at the times that are specified in a report schedule, InsightIQ might be publishing reports that are based on an incorrect time zone. To correct this problem, update the InsightIQ time zone to the correct time zone.

**Problems delivering reports by email**
If the specified email recipients do not receive a published report, perform the following actions.

- Verify the email address.
- Configure InsightIQ email settings. InsightIQ might not be authorized to send outbound email through the organization’s email server.
• Reduce the size of the published reports by removing breakouts from the report schedule. Many email servers reject email messages that are larger than a certain limit. The email server might be rejecting the reports because they are too large.
• Configure the email program to allow InsightIQ to send email messages. The email program might be filtering email messages that InsightIQ sends.

Interpreting Performance reports

The following sections include recommendations for interpreting modules in Performance reports.

Active Clients report

The Active Clients report shows the number of unique client addresses that generate protocol traffic on the monitored cluster. Clients that are connected, but not generating any traffic, are not counted in this report. You can optionally break out this data by node or protocol. The recommended number of active clients that are supported for NFS is approximately 1,000 per node (OneFS 7.1.1 and earlier).

For SMB 2.0 and later, the number of active clients that are supported depends on the version of OneFS.

Table 3 Active clients by OneFS version

<table>
<thead>
<tr>
<th>OneFS version</th>
<th>Number of active clients per node (SMB 2.0 or later)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0 Through 7.1</td>
<td>1,000</td>
</tr>
<tr>
<td>7.1.1 and later</td>
<td>1,500</td>
</tr>
</tbody>
</table>

Depending on usage details, exceeding the recommendations in OneFS 7.1.0 and earlier can lead to dropped connections or other performance problems. Generally speaking, if the number of active connections exceeds 90 percent of the limits, add nodes to the cluster when possible.

In OneFS 7.1.1 and later, over allocation is handled differently. Connection requests are denied when the total number of clients equals 90 percent of the total recommended limit for the cluster. If there are many active clients, and if that quantity is near the supported limit, check each node to ensure that the load is evenly distributed. Verify that any one node is not oversubscribed.

Keep these limits in mind when you perform maintenance on a node so that you do not exceed the pool or cluster limit when you take nodes offline.

Average Pending Disk Operations Count report

The Average Pending Disk Operations Count report shows the average number of operations or transfers that are in the processing queue for each disk in the cluster.

You can break out this data by node or disk.

The graph focuses on the queue depth of disk operations. The graph is most meaningful when viewing the disk detail breakout. Disk pending operation counts of 10 or less usually mean that the drives are operating as intended. Counts higher than 10 could indicate backlogs in disk operations, sometimes resulting in performance issues with the cluster. Viewing the disk breakout could identify a drive or node with
excessively high counts that are compared to the others, which may indicate a hardware or configuration issue. If all the nodes/drives have high counts, the workflow is most likely spindle-bound.

**External Network Throughput Rate report**

The External Network Throughput Rate report shows the total amount of data that passed through the external network interfaces in the monitored cluster.

The information is straightforward to interpret, though it is more helpful to break out specifics by interface, direction, client, operation class, protocol, or node. For example, if you have an application that uses a particular SmartConnect zone, you can view the throughput on those nodes to observe that application’s performance. This information can be useful, but it is not a good indicator of potential performance problems. There are many factors that affect the actual throughput rates over the network, many of which are unrelated to the cluster itself.

**Overall Cache Hit Rate report**

The Overall Cache Hit Rate report shows the percentage of data requests that returned hits.

A hit means that the requested data was available in cache. Higher hit rates indicate that more of the requested data is being retrieved from cache.

In the graph, you can plot data for the L1, L2, and L3 caches, or any combination of the three.

**Table 4 Cache descriptions**

<table>
<thead>
<tr>
<th>Cache</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Private to the node servicing input-output requests</td>
</tr>
<tr>
<td>L2</td>
<td>Global across all nodes</td>
</tr>
<tr>
<td>L3</td>
<td>Read only, data is stored on a solid state drive (SSD) instead of RAM</td>
</tr>
</tbody>
</table>

Break out the data for a selected cache by cache data type and node. If you want to determine if input-output is balanced across nodes or node pools, examining node details can be helpful.

Also, InsightIQ provides specific charts for throughput rates of the individual L1, L2, and L3 caches.

**Overall Cache Throughput Rate report**

The Overall Cache Throughput Rate report shows the amount of data that was requested from cache and how much of the requested data was available in cache.

In this chart, you can plot data for starts and hits on the L1, L2, and L3 caches (or any combination of the three). A start refers to the amount of data requested from a given cache, while a hit refers to the amount of data available in a given cache. You can also break out the data starts or hits for a particular cache, and, in addition, by cache data type or node for that cache.
Table 5 Cache by Type

<table>
<thead>
<tr>
<th>Cache</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Private to the node servicing input-output requests</td>
</tr>
<tr>
<td>L2</td>
<td>Global across all nodes</td>
</tr>
<tr>
<td>L3</td>
<td>Read only; stored on SSD instead of RAM</td>
</tr>
</tbody>
</table>

By comparing this graph to the disk, protocol, and network throughput rates, you can determine the actual impact of cache throughput on system performance.

InsightIQ also provides specific graphs for throughput rates of the individual L1, L2, and L3 caches.

**Pending Disk Operations Latency report**

The Pending Disk Operations Latency report shows the average amount of time that disk operations spend in the input-output scheduler.

You can also break out this information by node or disk, which yields more useful information than the aggregate values. The graph represents the amount of time that a disk operation remains in the input-output scheduler, not the actual latency of a disk operation (which is part of the total latency in every input-output request). Long times in the scheduler certainly indicate a busy system, and this may indicate the need to look more closely at cluster statistics to identify potential performance bottlenecks. In general, total latencies in the input-output system should be under 10 milliseconds.

**Protocol Operations Average Latency report**

The Protocol Operations Average Latency report displays the average amount of time that is required for protocols to process incoming operations.

You can also break out this information by node, protocol, client, or operation class. The Protocol Operations Average Latency report can be a helpful report, especially when you break out the details. For example, view the latency by protocol, then at the operation class for each protocol, to check for specific operations that might be causing excessive latency.

For the SMB protocol, the Change Notify operation can be the source of high latency. You might also see that namespace operations introduce significant latency, which can be alleviated with SSDs. HTTP transactions also exhibit high latency and skew the results. Filter out HTTP traffic, unless you are specifically interested in that data.
CHAPTER 5

File System reports

This section contains the following topics:

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- Capacity reports overview ....................................... 51
- Deduplication reports .............................................. 52
- File System reports overview ................................. 53
- Quota reports ...................................................... 55
- View File System reports ........................................ 55
File System reports

View information about the cluster file system using File System reports. There are four types of File System reports. These reports include Capacity reports, File System Analytics reports, Deduplication reports, and Quota reports.

File System Analytic result set snapshots

You can configure whether InsightIQ generates File System Analytics result sets from snapshots or the live file system. If you generate result sets from snapshots, the monitored cluster creates snapshots specifically for InsightIQ.

Generating result sets from snapshots enables you to view data that represents an exact point in time. However, it requires the monitored cluster to create snapshots, which consume cluster resources. Generating result sets from the live file system consumes less cluster resources; however, because the live file system is constantly changing, results sets generated from the live file system do not represent an exact point in time.

Note
Generating result sets from snapshots does not require you to activate a SnapshotIQ license on the monitored cluster.

File System report modules

Modules that are used in File System reports display information about the file system of a monitored cluster.

Note
Depending on which version of the OneFS operating system the monitored cluster is running, certain InsightIQ features may not be available.

Current Estimated Usable Capacity
Displays the amount data that can be added to the cluster before the cluster reaches capacity. The module displays the following values:

Total Capacity
The total amount of storage capacity on the cluster.

Unallocated Capacity
The storage capacity of nodes that belong to node pools that include fewer than three nodes. These nodes are referred to as Unprovisioned Nodes in the OneFS web administration interface.

Allocated Capacity
The storage capacity of nodes that belong to node pools that include three or more nodes. In the OneFS command-line interface, Allocated Capacity is referred to as size in the output of the isi_status command. If all node pools include at least three nodes, the Allocated Capacity is the same as the Total Capacity.

Reserved for Virtual Hot Spares
The amount of storage capacity that is reserved for virtual hot spares.
**Writable Capacity**
The amount of storage capacity that user data can be written to on the cluster.

**User Data Including Protection**
The amount of storage capacity that is occupied by user data and protection for that user data.

**Snapshots Usage**
The amount of data occupied by snapshots on the cluster.

**Remaining Capacity**
The total amount of storage capacity that is unused on the cluster.

**Estimated Additional Protection Overhead**
The estimated amount of additional data protection overhead that is required to protect data if the cluster is filled to capacity.

**Overhead estimated based on FSA report**
Specifies which FSA report to base the Estimated Additional Protection Overhead on. The estimated overhead is calculated based on the ratio of data protection that is required to protect user data at the time that the FSA report was created.

**Estimated Usable Capacity**
The amount of data that can be added to the cluster before the cluster reaches capacity.

**Capacity Forecast**
Displays the amount data that can be added to the cluster before the cluster reaches capacity. This report module displays the following values.

**Total Capacity**
The total amount of storage capacity on the cluster.

**Provisioned Capacity**
The storage capacity of nodes that belong to node pools.

**Writable Capacity**
The amount of storage capacity that user data can be written to on the cluster.

**Total Usage**
The total amount of user data and the associated Protection Overhead that is stored on the cluster.

**Forecast data**
The breakout of information that is are shown in the Forecast chart. The Forecast data includes the following information.

**Calculation Range**
The highlighted range of data that is used to calculate the forecast.

**Forecast Usage**
The projected Total Usage over time.

**Standard Deviation**
The standard deviation of the Forecast Usage calculation.
Outliers
Data points that are significantly outside of the range of the bulk of the Calculation Range data. Depending on the frequency and amount of variation, these points can have a major impact on the accuracy of the Forecast Usage data.

Y-axis
The scale used on the Y-axis for the Forecast chart.

Percent
Forecast data as a percentage of total disk capacity.

Bytes
Forecast data expressed as actual bytes in use.

Allocated Capacity
The storage capacity of nodes that belong to node pools that include three or more nodes. In the OneFS command-line interface, Allocated Capacity is referred to as size in the output of the isi_status command. If all node pools include at least three nodes, the Allocated Capacity is the same as the Total Capacity.

Reserved for Virtual Hot Spares
The amount of storage capacity that is reserved for virtual hot spares.

User Data Including Protection
The amount of storage capacity that is occupied by user data and protection for that user data.

Snapshots Usage
The amount of data occupied by snapshots on the cluster.

Remaining Capacity
The total amount of storage capacity that is unused on the cluster.

Estimated Additional Protection Overhead
The estimated amount of additional data protection overhead that is required to protect data if the cluster is filled to capacity.

Overhead estimated based on FSA report
Specifies which FSA report to base the Estimated Additional Protection Overhead on. The estimated overhead is calculated based on the ratio of data protection that is required to protect user data at the time that the FSA report was created.

Estimated Usable Capacity
The amount of data that can be added to the cluster before the cluster reaches capacity.

Directories
Displays disk-usage data and file counts per directory, recursively. You can sort the information by clicking a column heading in the table view. Resorting causes the chart on the left to reload and display a visual representation of the specified information. You can click pathnames to view more specific information about any subdirectories contained in the directory. You can also create a filter for a specific directory that you can use to filter data in other InsightIQ views.
Deduplication Current Summary (Physical)
Displays information about the current state of deduplication on the cluster. This module refers to the estimated physical space and data, meaning that file metadata and protection overhead are considered. The module displays the following values:

**Deduplicated Data**
The amount of data that has been deduplicated.

**Space Used**
The amount of space that deduplicated data currently occupies on the cluster.

**Space Saved**
The amount of space that deduplication has saved on the cluster.

**Total Capacity**
The total amount of storage capacity on the cluster.

**Total Usage**
The total amount of data that is stored on the cluster.

---

**Note**
The information that is displayed in this module always refers to the current state of the cluster and is not influenced by the selected date range.

**Deduplicated Blocks per Job**
Displays the number of blocks that were deduplicated compared to the number of blocks that were scanned by a given deduplication job.

**Files Scanned for Deduplication per Job**
Displays the number of files that were scanned by a deduplication job.

**Input/Output Operations per Job**
Displays the number of Input/Output operations that were performed while a SmartDedupe job was running.

**Input/Output Bytes per Job**
Displays the Input/Output byte throughput for a SmartDedupe job.

**File Count by Physical Size**
Displays the total number of files in a specified physical-size range. For example, the monitored cluster might contain 23,724 files that are between 100 GB and 1 TB in physical size. You can optionally break out this data by modified time, node pool, extension, or directory.

**File Count by Logical Size**
Displays the total number of files in a specified logical-size range. For example, the monitored cluster might contain 3,329,210 files that are between 1 GB and 10 GB in logical size. You can optionally break out this data by modified time, node pool extension, or directory.

**File Count by Last Modified**
Displays the total number of files that were last modified within a specified time range. For example, the monitored cluster might contain 38,734 files that were last modified between 14 days and 21 days ago. You can optionally break out this data by node pool, logical size, extension, directory, or physical size.
Quota Browser

Deduplicated Data
The amount of data that has been deduplicated.

Paths
Displays whether a quota has been applied on or under a directory. The selected directory determines which quotas are displayed in the Quotas Applied On and Under directory module. This module reflects the current cluster configuration.

Quotas Applied On and Under Directory
Displays the quotas that have been applied on or under the selected directory. The Select a report list determines the point in time that this module represents, regardless of the Date Range selected.

Quota Limit Usage
Displays the usage limits for the selected quota along with the level of data usage for the directory that the quota is applied to. The %Used column shows the usage divided by the highest-level limit. If no hard limit is applied, the soft limit is used. If no soft limit is applied, the advisory limit is used. For example, assume that a quota has no hard limit, a soft limit of 2 TB, and an advisory limit of 1 TB. If the usage for the quota equaled 1 TB, the %Used would be 50%.

Top <number> Files by <element>
Displays the top files sorted by the specified element. You can configure the maximum number of top-contributing files to display.

Top <number> Directories by <element>
Displays the top directories sorted by the specified element. You can configure the maximum number of top-contributing directories to display.

File System report breakouts
Each breakout displays the contributions of individual component.

Accessed Time
Breaks out data by when a file was last accessed.

Direction
Breaks out data by inbound traffic.

Directory
Breaks out data by the specified directory.

Node Pool
Breaks out data by the size of files in each Node pool.

File Extension
Breaks out data by file extension.

Logical Size
Breaks out data by logical file size. Logical file size calculations include only data, and do not include data-protection overhead.

Modified Time
Breaks out data by when a file was last modified.
Physical Size
Breaks out data by physical size. Physical size calculations include data-protection overhead.

User Attribute
Breaks out data by a user-defined attribute, if an attribute is defined. You can define attributes through the OneFS command-line interface.

Capacity reports overview
Capacity reports show an estimate of available storage on a cluster.

Capacity reports show the estimated amount of data that can be added to a cluster before the cluster reaches capacity. This estimate is different than the physical free space that OneFS reports. The amount of physical free space does consider the amount of protection overhead that is required to protect the stored data. Because clusters have varied protection settings that can change over time, InsightIQ estimates the size of protection overhead that is required to protect data.

If the data protection changes on the cluster, the estimate of usable capacity changes, even if the data stored on the cluster remains constant. For example, assume that a cluster contains 3 TB of data. 1 TB is protected at +3, and the other 2 TB is protected at +2. If 2 TB of data is later protected at +3, and 1 TB is protected at +2, the estimated amount of protection overhead increases. This increase is because the ratio of user data to protection overhead changes.

You can choose the File System Analytics report that you want to create protection overhead estimates. Protection overhead is calculated based on the cluster configuration at the time that the job is run. This information can be useful if you expect the cluster configuration to resemble a previous configuration. If you do not create a File System Analytics report, protection overhead is not in Capacity reports.

If you view a Capacity report for clusters running OneFS 7.1.1 or earlier, the report does not include storage that is used by virtual hot spares or snapshots. Any remaining capacity appears greater than it actually is.

Capacity reports include the Cluster Capacity Performance module that can be viewed in a Live Performance report.

Note
Protection overhead estimates do not account for the /ifs/.ifsvar directory because the /ifs/.ifsvar directory is protected at a higher level than other directories. /ifs/.ifsvar does not reflect the level of the protection that is applied to the majority of the file system. Also, because the /ifs/.ifsvar directory stores only internal OneFS files, the directory is expected to scale at a much slower rate than other directories on the file system.

Viewing a Capacity report
View Capacity reports to see the estimate of when the cluster reaches capacity.

Procedure
1. Click File System Reporting > Capacity Reporting.
2. In the Cluster list, select the cluster that you want to view capacity information for.
3. Click **View Report**.

4. (Optional) From the **Overhead estimation based on FSA report** list, select the date of the File System Analytics report that you want to use as a basis for the Overhead Protection Estimation.

   The framed control above the **Capacity Forecast** report module is the **Date Range** control.

5. (Optional) To configure the dates in the **Capacity Forecast** report module, in the **Date Range** control, specify a period and then click **View Report**.

   The **Zoom Slider** is below the **Capacity Forecast** drop down control. The **Zoom Slider** shows a graph in light gray that represents the percentage of the total disk capacity in use over time for the date range that you typed in the **Date Range** control.

6. To calculate a **Capacity Forecast**, define a subset of data in the **Zoom Slider** by clicking and dragging the **Zoom Slider** handles.

   The chart that is displayed in the **Capacity Forecast** report module is the **Capacity Forecast** chart. The **Capacity Forecast** chart shows a line graph of the data selected with the **Zoom Slider** handles.

7. To analyze a **Calculation Range**, drag on a region of the **Capacity Forecast** chart.

   A light yellow highlight in the **Capacity Forecast** chart indicates the **Calculation Range**.

**Results**

Text below the **Capacity Forecast** chart provides a projected date when the cluster reaches critical capacity as well as details about the regression calculation.

---

**Deduplication reports**

Deduplication reports allow you to view historical and current information about data that has been deduplicated with the SmartDedupe software module.

You can view information about specific deduplication jobs or the current state of deduplication on the cluster. Deduplication job information is not cumulative. For example, if you run a deduplication job that deduplicates 10 GB of data, and then later run a deduplication job that deduplicates another 10 GB of data, both data points on the graph will report that only 10 GB of data was deduplicated.

To view deduplication reports, you must activate a SmartDedupe license on the monitored cluster. For more information about SmartDedupe, see the *OneFS Web Administration Guide* and *OneFS CLI Administration Guide*.

---

**Note**

Deduplication information is also included in Performance reports. In Performance reports, deduplication information is cumulative.

---

**Viewing a Deduplication report**

View information about the current state of deduplication on a monitored cluster.

**Procedure**

1. Click **File System Reporting > Deduplication Reporting**.
2. From the **Apply to cluster** list, select the name of the cluster that you want to view the report for.

3. In the **Date Range** section, select the days that you want to view deduplication information about.

**Note**

The Deduplication Summary module reflects the current state of the cluster. The specified date range does not affect the report.

4. Click **View Report**.

---

**File System reports overview**

File System reports include information about the files that are stored on a cluster. The File System reports information includes the number of files that are stored on the cluster, the types of files that are stored on the cluster, and where files are located.

InsightIQ supports two kinds of File System Analytics reports: Data Usage reports and Data Property reports. Data Usage reports include data about the individual files on a cluster, such as which files have remained unmodified for the longest amount of time. Data Properties reports include data about the overall cluster file system, such as how many files were last modified during a specific period. Data Properties reports can also be compared between two different points in time. For example, you can view the relative changes in file count by physical size.

File System reports can be used to manage storage space among multiple clusters. For example, if you have two clusters, you can view the Data Properties report to compare file utilization. You can compare that the files are modified regularly on one cluster and that the files on the second cluster are modified occasionally. If the Data Properties report reveals that a significant number of files on the cluster have not been accessed in a long time, you can view the Data Usage report to identify the inactive files. To archive storage, consider transferring the inactive files.

You can use a File System report to verify that the file system of a cluster is behaving as expected. For example, if you have a cluster that is designated for archiving data, you can use the data properties report to view the file count by last modified file system module. This report shows you the last change date of the files on the cluster. If the count of files that have been modified is particularly high, you can consider moving those files to a cluster intended for development.

You can also use File System reports to investigate files. For instance, if you discovered from a Performance report or the InsightIQ Dashboard that you had less capacity remaining than you expected, you can view the data usage File Systems report for that cluster. The Data Usage report includes a report module that can be customized to show the top 1000 largest files on the cluster. You could use this report to verify which files were taking up the most space on the cluster.
**Note**

Do not apply a quota to the `/ifs/.ifsvar/modules/fsa` directory through the SmartQuotas module. If you limit the size of the `/ifs/.ifsvar/modules/fsa` directory through a quota, and the directory reaches its limit, the File System Analytics report process fails. A quota does not cause older File System reports to be deleted from the `/ifs/.ifsvar/modules/fsa` directory to make room for newer reports.

### Viewing a File System Analytics report

View and configure a File System Analytics report.

**Before you begin**

The File System Analytics (FSA) job must be enabled.

**Procedure**

1. Click **File System Reports > File System Analytics**.
   
The **File System Analytics** page appears.
2. From the **Apply to cluster** list, select the name of the cluster that you want to view the report for.
3. From the **Apply this report** list, select the name of the report that you want to view.
   
   If you selected **Data Properties Report**, the **Compare to** field appears.
4. In the **Select a reporting date** list, select the time and day that you want to view the report for.
   
   The time and day references a File System Analytics result set.
5. If you are viewing a data properties report, and want to compare the data for the selected reporting date with data for another reporting date, from the **Compare to** list, select the other reporting date.
6. Click **View Report**.
   
The file system modules that are associated with the specified report appear.
7. If you want to apply a breakout, in a file system module area, in the **Breakout by** area, click the name of a breakout.
   
   The breakouts appear below the chart in the file system module section.
8. If you want to apply a filter, in a file system module area, click the green button of the filter you want to apply.
   
   For example, if you want to filter by write events, click **write**.
   
   To remove a filter rule from a report, click the red button of the filter you want to remove in either the **Data Filters** section or a file system module section where the filter is applied.
   
   For example, if you want to stop filtering by write events, click **Event:write**.
Quota reports

Quota reports display information about quotas created through the SmartQuotas software module.

Quota reports can be useful if you want to compare the data usage of a directory to the quota limits for that directory over time. This information can help you predict when a directory is likely to reach its quota limit.

Historical quota data is generated according to the quota reports that are generated by OneFS. The granularity of historical quota data depends on how often quota reports are created. For information about configuring how frequent quota reports are generated, see the OneFS Web Administration Guide and OneFS CLI Administration Guide.

To view quota reports, activate a SmartQuotas license on the monitored cluster.

View a Quota report

View information about quotas on a monitored cluster.

Procedure

1. Click File System Reporting > Quota Reporting.
2. In the Select Your Quota Report area, from the Apply to Cluster list, select the cluster that you want to view quota information for.
   - The Path module displays directories on the cluster and indicates whether quotas have been applied on or under those directories. The Path module reflects the current cluster configuration.
   - The Quotas Applied On and Under Path module displays the quotas that have been applied on or under the path specified by the Path module. The Quotas Applied On and Under Path module reflects the time specified by the Select a report list.
   - The Quota Limit Usage module displays time-series data about the quota selected in the Quotas Applied On and Under Path module. The Quota Limit Usage module reflects the time specified by the Date Range section.
3. (Optional) To view quota limits and data usage for a specific directory over time, select a quota from the Quotas Applied On and Under Path module and then view the Quota Limit Usage module.
4. (Optional) To modify the time period shown in the Quota Limit Usage module, in the Date Range section, select the days that you want to view information for and then click View Report.

View File System reports

File System report views.
CHAPTER 6

Creating custom reports

This section contains the following topics:

- Building reports overview ................................................................. 58
- Modules .............................................................................................. 58
- Breakouts ......................................................................................... 63
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- Applying a breakout ......................................................................... 65
- Filters ............................................................................................... 66
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Building reports overview

Customize how information is shown in a report.

You can modify all reports based on a range of dates. You can create customized Performance reports by adding and removing Performance modules, breakouts, and filters.

Date ranges allow you to limit the data based on a start and end date. The date interval, also called a **Zoom Level**, can be automatically set to intervals of 30 minutes, 1 hour, 6 hours, 12 hours, 1 day, 3 days, 1 week, and 1 month. Custom date intervals can be created by specifying the beginning and ending day and time.

Performance modules are preconfigured collections of information about the monitored cluster. You can add and remove Performance modules to all Performance reports.

Breakouts divide a dataset into component parts but do not limit the information presented.

Filters limit the information in a dataset. With a filter, the dataset is refined to simplify what is in a report. Filters can exclude data that can be repetitive or irrelevant. Different types of filters can be used to amend information results. A generated report often produces a large and complex dataset. Filtering can make the report results more understandable. A filter can contain one or more filter rules. Filters can be saved and applied to more than one report.

Modules

Modules show collections of information about the cluster.

Modules are preconfigured collections of information about the monitored cluster. You can add and remove modules to all Performance reports.

**Note**

Depending on which version of the OneFS operating system the monitored cluster is running, certain InsightIQ features may not be available.

**Table 6 Module descriptions**

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Clients</td>
<td>Shows the number of unique client addresses that generate protocol traffic on the monitored cluster. Clients that are connected, but not generating any traffic, are not counted. You can optionally break out this data by protocol or node.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>Some protocols might issue a type of ping message, which can cause clients to appear active even if they are only sending these ping messages.</td>
</tr>
<tr>
<td>Average Disk Hardware Latency</td>
<td>Shows the average amount of time it takes for the physical disk hardware to service an operation or transfer. You can optionally break out this data by node or disk.</td>
</tr>
</tbody>
</table>
Table 6 Module descriptions (continued)

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Disk Operation Size</td>
<td>Shows the average size of the operations or transfers that the disks in the cluster are servicing. You can optionally break out this data by direction, node, or disk.</td>
</tr>
<tr>
<td>Average Pending Disk Operations Count</td>
<td>Shows the average number of operations or transfers that are in the processing queue for each disk in the cluster. You can optionally break out this data by node or disk.</td>
</tr>
<tr>
<td>Blocking File System Events Rate</td>
<td>Shows the number of file blocking events occurring in the file system per second. You can optionally break out this data by path or node.</td>
</tr>
<tr>
<td>CPU % Use</td>
<td>Shows the average CPU usage for all nodes in the monitored cluster. As some nodes may consume significantly more or less CPU resources than others, the average reflects the sum of the individual CPU-usage averages for each node.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>You can optionally break out this data by node. This breakout indicates the average CPU usage of each node. For example, at 10:52:22 AM on 2010-06-15, the specified node was using 14.35% of the total available node CPU capacity.</td>
</tr>
<tr>
<td>Average Cached Data Age</td>
<td>Indicates the average amount of time that data has been in the L1 and L2 caches. Shorter times indicate that data is moving faster through cache and that older data is being replaced quickly.</td>
</tr>
<tr>
<td>Clients Summary</td>
<td>Shows clients that are currently consuming the most bandwidth. The list shows up to 64 clients, ordered from most to least active, as determined by their combined input and output throughput rates during the specified time range.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>If the monitored cluster is running the Isilon SyncIQ module, the InsightIQ client list might include a client with an IP address of 0.0.0.0. This behavior is expected.</td>
</tr>
<tr>
<td>Cluster Capacity</td>
<td>Shows the amount of storage on the cluster.</td>
</tr>
<tr>
<td></td>
<td>• Total Capacity - The total amount of storage capacity on the cluster.</td>
</tr>
<tr>
<td></td>
<td>• Allocated Capacity - The storage capacity of nodes that belong to node pools that include three or more nodes. In the OneFS command-line interface, Allocated Capacity is referred to as &quot;size&quot; in the output of the isi status command. If all node pools include at least three nodes, the Allocated Capacity is the same as the Total Capacity.</td>
</tr>
<tr>
<td></td>
<td>• Writable Capacity - The amount of storage capacity that user data can be written to on the cluster.</td>
</tr>
<tr>
<td></td>
<td>• User Data Including Protection - The amount of storage capacity that is in use by user data and protection.</td>
</tr>
<tr>
<td>Module</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Connected Client</td>
<td>Shows the number of unique client addresses with established TCP connections to the cluster on known ports. You can optionally break out this data by protocol or node.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>UDP connections do not appear as connected. Also, some short-lived TCP connections might not appear as connected, although they are active.</td>
</tr>
<tr>
<td>Contended File System Events Rate</td>
<td>Shows the number of file contention events, such as lock contention or read/write contention, occurring in the file system per second. You can optionally break out this data by path or node.</td>
</tr>
<tr>
<td>Deadlocked File System Events Rate</td>
<td>Shows the number of file system deadlock events that the file system is processing per second. This information can be useful if you want to identify a specific file state that might be contributing to performance issues. Deadlocked events occur regularly during normal cluster operation, and the file system is designed to detect and break them. You can optionally break out this data by path or node.</td>
</tr>
<tr>
<td>Deduplication Summary (Physical)</td>
<td>Shows the amount of space that deduplication has saved on the cluster and the amount of data that has been deduplicated. This module refers to the estimated physical space and data. The file metadata and protection overhead are considered. This module is available only for clusters running OneFS 7.1.1 or later.</td>
</tr>
<tr>
<td>Deduplication Summary (Logical)</td>
<td>Shows the amount of space that deduplication has saved on the cluster and the amount of data that has been deduplicated. This module refers to the logical space and data. The file metadata and protection overhead are not considered. This module is available only for clusters running OneFS 7.1.1 or later.</td>
</tr>
<tr>
<td>Disk Activity</td>
<td>Shows the average percentage of time that disks in the cluster spend performing operations instead of sitting idle. You can optionally break out this data by node or disk.</td>
</tr>
<tr>
<td>Disk Operations Rate</td>
<td>Shows the average rate at which the disks in the cluster are servicing data read/write/change requests, also referred to as operations or disk transfers. You can optionally break out this data by disk, direction, or node.</td>
</tr>
<tr>
<td>Disk Throughput Rate</td>
<td>Shows the total amount of data being read from and written to the disks in the cluster. You can optionally break out this data by disk, direction, or node.</td>
</tr>
<tr>
<td>Event Summary</td>
<td>Shows events generated by the monitored cluster during the specified time range. Also includes events that were started before but ended during the specified time range. This module is available only for clusters running OneFS 7.0 or later. The following list describes the specific columns of the <strong>Events</strong> table.</td>
</tr>
<tr>
<td><strong>Event Timeline</strong></td>
<td>The horizontal red event timeline represents the same period that is represented in the performance charts. A vertical red line on the event timeline indicates the start of an event.</td>
</tr>
</tbody>
</table>
### Table 6 Module descriptions (continued)

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>event. You can rest the pointer over specific sections of the horizontal timeline to view detailed information about any time-specific events or alerts.</td>
</tr>
<tr>
<td></td>
<td>• Severity - Indicates the severity level of the event.</td>
</tr>
<tr>
<td></td>
<td>• Start - Indicates when the event started.</td>
</tr>
<tr>
<td></td>
<td>• End - If applicable, indicates when the event ended.</td>
</tr>
<tr>
<td></td>
<td>• Instance - Shows the unique identifier of the event.</td>
</tr>
<tr>
<td></td>
<td>• Message - Shows a description of the event.</td>
</tr>
<tr>
<td>External Network Errors</td>
<td>Shows the number of errors generated for the external network interfaces. You can optionally break out this data by direction, interface, or node.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td>During normal operations, this chart indicates an error count of 0. Errors reported in this chart are often the result of network infrastructure issues (for example, malformed frames or headers, handoff errors, or queuing errors) rather than OneFS issues. When investigating the cause of these errors, first review the logs and reports for the network switch and other network infrastructure components.</td>
</tr>
<tr>
<td>External Network Packets Rate</td>
<td>Shows the total number of packets that passed through the external network interfaces in the monitored cluster. You can optionally break out this data by direction, interface, or node.</td>
</tr>
<tr>
<td>External Network Throughput Rate</td>
<td>Shows the total amount of data that passed through the external network interfaces in the monitored cluster. You can optionally break out this data by interface, direction, client, operation class, protocol, or node.</td>
</tr>
<tr>
<td>File System Events Rate</td>
<td>Shows the number of file system events, or operations, such as read, write, lookup, or rename, that the file system is servicing per second. You can optionally break out this data by direction, operation class, path, node, or event.</td>
</tr>
<tr>
<td>File System Output Rate</td>
<td>Shows the rate at which data is being read from the file system. You can optionally break out this data by node.</td>
</tr>
<tr>
<td>File System Throughput Rate</td>
<td>Shows the rate at which data is being read from and written to the file system.</td>
</tr>
<tr>
<td>Jobs</td>
<td>Shows the number of active and inactive jobs on the cluster. An active job is a system job that workers perform. An inactive job is a system job that has been assigned workers, but the workers are not currently performing the job. You can optionally break out this data by job name or job ID.</td>
</tr>
<tr>
<td>Job Workers</td>
<td>Shows the number of active and assigned workers on the cluster. An active worker is a worker that is performing a system job. An assigned worker is a worker that has been assigned to a system job but is not</td>
</tr>
</tbody>
</table>
Table 6 Module descriptions (continued)

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>currently performing the job. You can optionally break out this data by job name or job ID.</td>
<td></td>
</tr>
</tbody>
</table>
| L1 Cache Throughput Rate | Shows the amount of data that was requested from the L1 cache and how much of the requested data was available in the L1 cache.  
  - Starts - Indicates the amount of data that was requested.  
  - Hits - Indicates the amount of requested data that was available.  
  - Waits - Indicates the amount of requested data that existed in cache but was not available because the data was in use.  
  - Misses - Indicates the amount of requested data that did not exist in cache.  
  - Prefetch Hits - Indicates the amount of data that was requested from prefetch. |
| L2 Cache Throughput Rate | Shows the amount of data that was requested from the L2 cache and how much of the requested data was available in the L2 cache.  
  - Starts - Indicates the amount of data that was requested.  
  - Hits - Indicates the amount of requested data that was available.  
  - Waits - Indicates the amount of requested data that existed in cache, but was not available because the data was in use.  
  - Misses - Indicates the amount of requested data that did not exist in cache.  
  - Prefetch Hits - Indicates the amount of data that was requested from prefetch. |
| L3 Cache Throughput Rate | Shows the amount of data that was requested from the L3 cache and how much of the requested data was available in the L3 cache.  
  - Starts - Indicates the amount of data that was requested.  
  - Hits - Indicates the amount of requested data that was available.  
  - Misses - Indicates the amount of requested data that did not exist in cache. |
| L1 and L2 Cache Prefetch Throughput Rate | Shows the amount of data that was prefetched for L1 and L2 and how much of the prefetched data was requested.  
  - Starts - Indicates the amount of data that was requested.  
  - Hits - Indicates the amount of requested data that was available. |
| Locked File System Events Rate | Shows the number of file lock operations occurring in the file system per second. You can optionally break out this data by path or node. |
| Node Summary | Shows status and performance metrics for all nodes in the monitored cluster. |
| Overall Cache Hit Rate | Shows the percentage of data requests that returned hits. A hit means that the requested data was available in cache. Higher hit rates indicate that more of the requested data is being retrieved from cache. |
Table 6 Module descriptions (continued)

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 Hit Rate</td>
<td>Indicates the hit rate for L1 cache.</td>
</tr>
<tr>
<td>L2 Hit Rate</td>
<td>Indicates the hit rate for L2 cache.</td>
</tr>
<tr>
<td>L3 Hit Rate</td>
<td>Indicates the hit rate for L3 cache.</td>
</tr>
<tr>
<td>Overall Cache Throughput Rate</td>
<td>Shows the amount of data that was requested from cache and how much of the requested data was available in cache.</td>
</tr>
<tr>
<td>L1 Starts</td>
<td>Indicates the amount of data that was requested from the L1 cache.</td>
</tr>
<tr>
<td>L1 Hits</td>
<td>Indicates the amount of requested data that was available in the L1 cache.</td>
</tr>
<tr>
<td>L2 Starts</td>
<td>Indicates the amount of data that was requested from the L2 cache.</td>
</tr>
<tr>
<td>L2 Hits</td>
<td>Indicates the amount of requested data that was available in the L2 cache.</td>
</tr>
<tr>
<td>L3 Starts</td>
<td>Indicates the amount of data that was requested from the L3 cache.</td>
</tr>
<tr>
<td>L3 Hits</td>
<td>Indicates the amount of requested data that was available in the L3 cache.</td>
</tr>
<tr>
<td>Pending Disk Operations Latency</td>
<td>Shows the average amount of time that disk operations spend in the input/output scheduler. You can optionally break out this data by node or disk.</td>
</tr>
<tr>
<td>Protocol Operation Average Latency</td>
<td>Shows the average amount of time that is required for protocols to process incoming operations. These values are typically represented in fractions of seconds. You can optionally break out this data by client, operation class, protocol, or node.</td>
</tr>
<tr>
<td>Protocol Operations Rate</td>
<td>Shows the total number of requests per client for all file data access protocols. Combined with data from the disk throughput and disk operations rate data elements, this information can help you identify specific clients that might be significantly contributing to cluster load. You can optionally break out this data by client, operation class, protocol, or node.</td>
</tr>
<tr>
<td>Slow Disk Access Rate</td>
<td>Shows the rate at which slow, or long-latency, disk operations occur. You can optionally break out this data by node or disk.</td>
</tr>
<tr>
<td>Total Used Physical Space</td>
<td>Shows the total amount of physical space that is being used on the monitored cluster.</td>
</tr>
</tbody>
</table>

Breakouts

Refine information in reports with a breakout.

Modules in reports can provide a breakout of data by category to refine the scope of information.
You can apply breakouts to modules to view the individual contributions of various performance characteristics. You apply only one breakout to a module at a time.

Breakouts provide heat maps that display variations of color to represent each component’s contribution to overall performance. The darker the color on a heat map, the greater the activity for that component. Heat maps help you to visualize performance trends and to identify periods of constrained performance. If you hover the mouse pointer over any location on a heat map, InsightIQ shows data for the specified component at that moment in time. Breakouts are sorted by component based on level of activity, with the most active elements at the top of the list.

Breakouts can be useful when trying to determine the source of a performance issue. For example, if you break out the CPU usage module by node, you can then view the individual CPU usage of each node.

**Note**

The sum of individual breakouts might not add up to the aggregated values of a specified category. For example, not all network traffic is associated with a protocol. Therefore, the sum of the various protocols might not match the total count of reported traffic.

### Breakout types

Breakouts provide information on the individual components within modules.

**Table 7 Breakout descriptions**

<table>
<thead>
<tr>
<th>Breakout</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cached Data Type</td>
<td>Reports data by user data and metadata.</td>
</tr>
<tr>
<td>Client</td>
<td>Reports data by individual client. Only clients with the most activity are represented in the data that is displayed.</td>
</tr>
<tr>
<td>Direction</td>
<td>Reports data by the direction of cluster throughput.</td>
</tr>
<tr>
<td>Disk</td>
<td>Reports data by individual disk.</td>
</tr>
<tr>
<td>Event</td>
<td>Reports data by individual network interface.</td>
</tr>
<tr>
<td>Interface</td>
<td>Reports data by individual network interface.</td>
</tr>
<tr>
<td>Job ID</td>
<td>The numeric ID of a job.</td>
</tr>
<tr>
<td>Job Name</td>
<td>The name of a job type.</td>
</tr>
<tr>
<td>Node</td>
<td>Reports data by individual node. Nodes are identified by their logical node number (LNN).</td>
</tr>
<tr>
<td>Node (devid)</td>
<td>Reports data by individual node. Nodes are identified by their device ID.</td>
</tr>
<tr>
<td>Node Pool</td>
<td>Breaks out data by node pool.</td>
</tr>
</tbody>
</table>
Table 7 Breakout descriptions (continued)

<table>
<thead>
<tr>
<th>Breakout</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note</strong></td>
<td></td>
</tr>
<tr>
<td>• This breakout is available only for clusters running OneFS 7.1 or later. If you upgraded to InsightIQ 3.2, data that are collected by earlier versions of InsightIQ are not in this breakout.</td>
<td></td>
</tr>
<tr>
<td>• For clusters running OneFS 7.1.1 or earlier, accelerator nodes and unprovisioned nodes are grouped under the Unclassified node pool.</td>
<td></td>
</tr>
<tr>
<td>Op Class (Operation Class)</td>
<td>Reports data by the type of operation performed. The following operation types are supported:</td>
</tr>
<tr>
<td>• Read - file and stream reading</td>
<td></td>
</tr>
<tr>
<td>• Write - file and stream writing</td>
<td></td>
</tr>
<tr>
<td>• Create - file, link, node, stream, and directory creation</td>
<td></td>
</tr>
<tr>
<td>• Delete - file, link, node, stream, and directory deletion</td>
<td></td>
</tr>
<tr>
<td>• Namespace Read - attribute, statistic, ACL read, lookup, and directory read</td>
<td></td>
</tr>
<tr>
<td>• Namespace Write - rename, set attribute, set permission, time, and write ACL</td>
<td></td>
</tr>
<tr>
<td>• File State - open, close, lock, acquire, release, break, check, and notify.</td>
<td></td>
</tr>
<tr>
<td>• Session State - negotiate, inquire, and change protocol connections and sessions</td>
<td></td>
</tr>
<tr>
<td>• Other - file system information and other operations that are not categorized.</td>
<td></td>
</tr>
</tbody>
</table>

| Path                   | Reports data by individual file name or directory name. |
| Protocol               | Reports data by protocol (for example, NFS). |
| Tier                   | Reports data by tier. |

| User Attribute         | Reports data by a user-defined attribute, if an attribute is defined. You can define attributes through the OneFS command-line interface. |

### Applying a breakout

**Apply a breakout to a report.**

**Procedure**

1. In the InsightIQ web application, open any Performance report or a File System Analytics report.

2. To apply a breakout to a module, in the Breakout by list, click the name of a breakout.

   The module shows the information broken out by component.
Filters

Refine a large dataset with a filter.

You can create and manage filters. Apply filters to any Performance report and File System Analytics reports to provide information that is limited to specified parameters. You can create and apply filters, which contain one or more filter rules.

If you apply a filter rule to a report, all the Performance modules in the report display information that is constrained by the filter rule.

For example, you can apply a filter rule to show information about a specific node in a cluster. All the Performance modules in the report display data about that node.

While breakouts show all components in a category, filters can limit the number of contributors in a category. For example, you can breakout a Performance module by protocol. Breakouts appear beneath Performance modules but do not modify the Performance module. Filter rules limit what data is displayed in Performance modules. Filters are customized collections of filter rules that you can create, save, and apply to various reports.

A filter can contain both a filter rule for a specific node in a cluster and a filter rule for a specific client accessing that cluster. Applying this filter causes all Performance modules in a report to display information about the interactions for only that node and client. You can save filter rules and then apply them to specific reports.

Filter rules

Rules for InsightIQ filters.

To define a filter rule, specify the match parameter. For some rules, InsightIQ automatically generates a list of valid parameters. For other filters, type a valid parameter.

Input values for the following Data Filter rules.

Table 8 Data Filter rules that require an input parameter

<table>
<thead>
<tr>
<th>Filter</th>
<th>Match value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client</td>
<td>The IP address of a client. To filter by all clients exceeding the top 1000 for a particular Performance module, specify other clients.</td>
</tr>
<tr>
<td>Node Pool</td>
<td>The name of a node pool on the cluster.</td>
</tr>
<tr>
<td>Directory</td>
<td>The path of a directory within /ifs. For example, /ifs/data/media. The backslash character () is not valid.</td>
</tr>
<tr>
<td>File Extension</td>
<td>The file name extension. For example .xml To filter files without file name extensions, specify the following: (none) The backslash character () is not valid.</td>
</tr>
</tbody>
</table>
### Table 8  Data Filter rules that require an input parameter (continued)

<table>
<thead>
<tr>
<th>Filter</th>
<th>Match value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job ID</td>
<td>The numeric ID of a job. For example, 5</td>
</tr>
<tr>
<td>Path</td>
<td>The path of a directory within /ifs. For example, /ifs/data/media. The backslash character () is not valid.</td>
</tr>
<tr>
<td>User Attribute</td>
<td>The name of a user attribute that is defined on the cluster. All characters are valid.</td>
</tr>
</tbody>
</table>

You can select conditional values for the following Filter rules.

### Table 9  Filter rules that allow conditional values

<table>
<thead>
<tr>
<th>Filter</th>
<th>Condition values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessed Time</td>
<td>0 sec - 1 min</td>
<td>Includes only files that were accessed 0 seconds to 1 minute ago.</td>
</tr>
<tr>
<td></td>
<td>1 min - 1 hour</td>
<td>Includes only files that were accessed 1 minute to 1 hour ago.</td>
</tr>
<tr>
<td></td>
<td>1 hour - 1 day</td>
<td>Includes only files that were accessed 1 hour to 1 day ago.</td>
</tr>
<tr>
<td></td>
<td>1 day - 7 days</td>
<td>Includes only files that were accessed 1 day to 7 day ago.</td>
</tr>
<tr>
<td></td>
<td>7 days - 30 days</td>
<td>Includes only files that were accessed 7 days to 30 days ago.</td>
</tr>
<tr>
<td></td>
<td>30 days - 60 days</td>
<td>Includes only files that were accessed 30 days to 60 days ago.</td>
</tr>
<tr>
<td></td>
<td>60 days - 90 days</td>
<td>Includes only files that were accessed 60 days to 90 days ago.</td>
</tr>
<tr>
<td></td>
<td>90 days - 180 days</td>
<td>Includes only files that were accessed 90 days to 180 days ago.</td>
</tr>
<tr>
<td></td>
<td>180 days - 1 year</td>
<td>Includes only files that were accessed 180 days to 1 year ago.</td>
</tr>
<tr>
<td></td>
<td>1 year - 2 years</td>
<td>Includes only files that were accessed 1 year to 2 years ago.</td>
</tr>
<tr>
<td>Direction</td>
<td>In</td>
<td>Includes only information that is related to inbound cluster traffic.</td>
</tr>
<tr>
<td></td>
<td>Out</td>
<td>Includes only information that is related to outbound cluster traffic.</td>
</tr>
<tr>
<td>Disk</td>
<td>&lt;devid&gt;/Bay &lt;number&gt;</td>
<td>Includes only information that is related to the specified disk.</td>
</tr>
<tr>
<td>FS Event</td>
<td>blocked</td>
<td>Includes only information that is related to blocked file system events.</td>
</tr>
<tr>
<td>Filter</td>
<td>Condition values</td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>contended</td>
<td>Includes only information that is related to contended file system events.</td>
<td></td>
</tr>
<tr>
<td>deadlocked</td>
<td>Includes only information that is related to deadlocked file system events.</td>
<td></td>
</tr>
<tr>
<td>getattr</td>
<td>Includes only information that is related to get attribute events.</td>
<td></td>
</tr>
<tr>
<td>link</td>
<td>Includes only information that is related to linking events.</td>
<td></td>
</tr>
<tr>
<td>lock</td>
<td>Includes only information that is related to locking events.</td>
<td></td>
</tr>
<tr>
<td>lookup</td>
<td>Includes only information that is related to lookup events.</td>
<td></td>
</tr>
<tr>
<td>read</td>
<td>Includes only information that is related to read events.</td>
<td></td>
</tr>
<tr>
<td>rename</td>
<td>Includes only information that is related to rename events.</td>
<td></td>
</tr>
<tr>
<td>setattr</td>
<td>Includes only information that is related to set attribute events.</td>
<td></td>
</tr>
<tr>
<td>unlink</td>
<td>Includes only information that is related to unlinking events.</td>
<td></td>
</tr>
<tr>
<td>write</td>
<td>Includes only information that is related to write events.</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>&lt;devid&gt;/&lt;type&gt;</td>
<td>Includes only information that is related to the specified interface.</td>
</tr>
<tr>
<td>Job Name</td>
<td>AVScan</td>
<td>Includes only information that is related to the AVScan job engine job.</td>
</tr>
<tr>
<td>AutoBalance</td>
<td>Includes only information that is related to the AutoBalance job engine job.</td>
<td></td>
</tr>
<tr>
<td>AutoBalanceLin</td>
<td>Includes only information that is related to the AutoBalanceLin job engine job.</td>
<td></td>
</tr>
<tr>
<td>ChangelistCreate</td>
<td>Includes only information that is related to the ChangelistCreate job engine job.</td>
<td></td>
</tr>
<tr>
<td>Collect</td>
<td>Includes only information that is related to the Collect job engine job.</td>
<td></td>
</tr>
<tr>
<td>Dedupe</td>
<td>Includes only information that is related to the Dedupe job engine job.</td>
<td></td>
</tr>
<tr>
<td>DedupeAssessment</td>
<td>Includes only information that is related to the DedupeAssessment job engine job.</td>
<td></td>
</tr>
<tr>
<td>DomainMark</td>
<td>Includes only information that is related to the DomainMark job engine job.</td>
<td></td>
</tr>
</tbody>
</table>
Table 9  Filter rules that allow conditional values (continued)

<table>
<thead>
<tr>
<th>Filter</th>
<th>Condition values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSAnalyze</td>
<td></td>
<td>Includes only information that is related to the FSAnalyze job engine job.</td>
</tr>
<tr>
<td>FlexProtect</td>
<td></td>
<td>Includes only information that is related to the FlexProtect job engine job.</td>
</tr>
<tr>
<td>FlexProtectLin</td>
<td></td>
<td>Includes only information that is related to the FlexProtectLin job engine</td>
</tr>
<tr>
<td>IntegrityScan</td>
<td></td>
<td>Includes only information that is related to the IntegrityScan job engine job.</td>
</tr>
<tr>
<td>MediaScan</td>
<td></td>
<td>Includes only information that is related to the MediaScan job engine job.</td>
</tr>
<tr>
<td>MultiScan</td>
<td></td>
<td>Includes only information that is related to the MultiScan job engine job.</td>
</tr>
<tr>
<td>PermissionRepair</td>
<td></td>
<td>Includes only information that is related to the PermissionRepair job engine</td>
</tr>
<tr>
<td>QuotaScan</td>
<td></td>
<td>Includes only information that is related to the QuotaScan job engine job.</td>
</tr>
<tr>
<td>SetProtectPlus</td>
<td></td>
<td>Includes only information that is related to the SetProtectPlus job engine</td>
</tr>
<tr>
<td>ShadowStoreDelete</td>
<td></td>
<td>Includes only information that is related to the ShadowStoreDelete job engine</td>
</tr>
<tr>
<td>ShadowStoreProtect</td>
<td></td>
<td>Includes only information that is related to the ShadowStoreProtect job engine</td>
</tr>
<tr>
<td>SmartPools</td>
<td></td>
<td>Includes only information that is related to the SmartPools job engine job.</td>
</tr>
<tr>
<td>SnapRevert</td>
<td></td>
<td>Includes only information that is related to the SnapRevert job engine job.</td>
</tr>
<tr>
<td>SnapshotDelete</td>
<td></td>
<td>Includes only information that is related to the SnapshotDelete job engine</td>
</tr>
<tr>
<td>TreeDelete</td>
<td></td>
<td>Includes only information that is related to the TreeDelete job engine job.</td>
</tr>
<tr>
<td>WormQueue</td>
<td></td>
<td>Includes only information that is related to the WormQueue job engine job.</td>
</tr>
<tr>
<td>Logical Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 B - 8 KB</td>
<td></td>
<td>Includes only files that have a logical size of 0 B to 8 KB.</td>
</tr>
<tr>
<td>8 KB - 128 KB</td>
<td></td>
<td>Includes only files that have a logical size of 8 KB to 128 KB.</td>
</tr>
<tr>
<td>128 LB - 1 MB</td>
<td></td>
<td>Includes only files that have a logical size of 128 KB to 1 MB.</td>
</tr>
</tbody>
</table>
## Table 9  Filter rules that allow conditional values (continued)

<table>
<thead>
<tr>
<th>Filter</th>
<th>Condition values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 MB - 10 MB</td>
<td>Includes only files that have a logical size of 1 MB to 10 MB.</td>
</tr>
<tr>
<td></td>
<td>10 MB - 100 MB</td>
<td>Includes only files that have a logical size of 10 MB to 100 MB.</td>
</tr>
<tr>
<td></td>
<td>100 MB - 1 GB</td>
<td>Includes only files that have a logical size of 100 MB to 1 GB.</td>
</tr>
<tr>
<td></td>
<td>1 GB - 10 GB</td>
<td>Includes only files that have a logical size of 1 GB to 10 GB.</td>
</tr>
<tr>
<td></td>
<td>10 GB - 100 GB</td>
<td>Includes only files that have a logical size of 10 GB to 100 GB.</td>
</tr>
<tr>
<td></td>
<td>100 GB - 1 TB</td>
<td>Includes only files that have a logical size of 100 GB to 1 TB.</td>
</tr>
<tr>
<td></td>
<td>1 TB - ∞</td>
<td>Includes only files that have a logical size of 1 TB to ∞.</td>
</tr>
<tr>
<td>Modified Time</td>
<td>0 sec - 1 min</td>
<td>Includes only files that have been modified 0 seconds to 1 minute ago.</td>
</tr>
<tr>
<td></td>
<td>1 min - 1 hour</td>
<td>Includes only files that have been modified 1 minute to 1 hour ago.</td>
</tr>
<tr>
<td></td>
<td>1 hour - 1 day</td>
<td>Includes only files that have been modified 1 hour to 1 day ago.</td>
</tr>
<tr>
<td></td>
<td>1 day - 7 day</td>
<td>Includes only files that have been modified 1 day to 7 day ago.</td>
</tr>
<tr>
<td></td>
<td>7 days - 30 days</td>
<td>Includes only files that have been modified 7 days to 30 days ago.</td>
</tr>
<tr>
<td></td>
<td>30 days - 60 days</td>
<td>Includes only files that have been modified 30 days to 60 days ago.</td>
</tr>
<tr>
<td></td>
<td>60 days - 90 days</td>
<td>Includes only files that have been modified 60 days to 90 days ago.</td>
</tr>
<tr>
<td></td>
<td>90 days - 180 days</td>
<td>Includes only files that have been modified 90 days to 180 days ago.</td>
</tr>
<tr>
<td></td>
<td>180 days - 1 year</td>
<td>Includes only files that have been modified 180 days to 1 year ago.</td>
</tr>
<tr>
<td></td>
<td>1 year - 2 years</td>
<td>Includes only files that have been modified 1 year to 2 years ago.</td>
</tr>
<tr>
<td>Node</td>
<td>&lt;integer&gt;</td>
<td>Includes only information that is related to the node with the specified LNN.</td>
</tr>
<tr>
<td>Node (Device ID)</td>
<td>&lt;integer&gt;</td>
<td>Includes only information that is related to the node with the specified device ID.</td>
</tr>
<tr>
<td>Op Class</td>
<td>create</td>
<td>Includes only information that is related to file create operations.</td>
</tr>
<tr>
<td>Filter</td>
<td>Condition values</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>delete</td>
<td></td>
<td>Includes only information that is related to file delete operations.</td>
</tr>
<tr>
<td>file_state</td>
<td></td>
<td>Includes only information that is related to file access operations, such as open, close, lock, and unlock.</td>
</tr>
<tr>
<td>namespace_read</td>
<td></td>
<td>Includes only information that is related to namespace read operations</td>
</tr>
<tr>
<td>namespace_write</td>
<td></td>
<td>Includes only information that is related to write operations.</td>
</tr>
<tr>
<td>other</td>
<td></td>
<td>Includes only information that is related to operations that do not fit in to any other operation class category.</td>
</tr>
<tr>
<td>read</td>
<td></td>
<td>Includes only information that is related to file read operations.</td>
</tr>
<tr>
<td>session_state</td>
<td></td>
<td>Includes only information that is related to operations that control session access, such as connect, disconnect, login, and logout.</td>
</tr>
<tr>
<td>write</td>
<td></td>
<td>Includes only information that is related to file write operations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Size</th>
<th>Condition values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 B - 8 KB</td>
<td></td>
<td>Includes only files that have a logical size of 0 B to 8 KB.</td>
</tr>
<tr>
<td>8 KB - 128 KB</td>
<td></td>
<td>Includes only files that have a logical size of 8 KB - 128 KB.</td>
</tr>
<tr>
<td>128 KB - 1 MB</td>
<td></td>
<td>Includes only files that have a logical size of 128 KB - 1 MB.</td>
</tr>
<tr>
<td>1 MB - 10 MB</td>
<td></td>
<td>Includes only files that have a logical size of 1 MB - 10 MB.</td>
</tr>
<tr>
<td>10 MB - 100 MB</td>
<td></td>
<td>Includes only files that have a logical size of 10 MB - 100 MB.</td>
</tr>
<tr>
<td>100 MB - 1 GB</td>
<td></td>
<td>Includes only files that have a logical size of 100 MB - 1 GB.</td>
</tr>
<tr>
<td>1 GB - 10 GB</td>
<td></td>
<td>Includes only files that have a logical size of 1 GB - 10 GB.</td>
</tr>
<tr>
<td>10 GB - 100 GB</td>
<td></td>
<td>Includes only files that have a logical size of 10 GB - 100 GB.</td>
</tr>
<tr>
<td>100 GB - 1 TB</td>
<td></td>
<td>Includes only files that have a logical size of 100 GB - 1 TB.</td>
</tr>
<tr>
<td>1 TB - ∞</td>
<td></td>
<td>Includes only files that have a logical size of 1 TB - ∞.</td>
</tr>
</tbody>
</table>
Table 9  Filter rules that allow conditional values (continued)

<table>
<thead>
<tr>
<th>Filter</th>
<th>Condition values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>ftp</td>
<td>Includes only information that is related to FTP.</td>
</tr>
<tr>
<td></td>
<td>hdfs</td>
<td>Includes only information that is related to HDFS.</td>
</tr>
<tr>
<td></td>
<td>http</td>
<td>Includes only information that is related to HTTP.</td>
</tr>
<tr>
<td></td>
<td>nfs</td>
<td>Includes only information that is related to NFS.</td>
</tr>
<tr>
<td></td>
<td>nfs3</td>
<td>Includes only information that is related to NFS3.</td>
</tr>
<tr>
<td></td>
<td>nfs4</td>
<td>Includes only information that is related to NFS4.</td>
</tr>
<tr>
<td></td>
<td>nlm</td>
<td>Includes only information that is related to NLM.</td>
</tr>
<tr>
<td></td>
<td>papi</td>
<td>Includes only information that is related to PAPI.</td>
</tr>
<tr>
<td></td>
<td>siq</td>
<td>Includes only information that is related to SyncIQ.</td>
</tr>
<tr>
<td></td>
<td>smb</td>
<td>Includes only information that is related to SMB.</td>
</tr>
<tr>
<td></td>
<td>smb1</td>
<td>Includes only information that is related to SMBv1.</td>
</tr>
<tr>
<td></td>
<td>smb2</td>
<td>Includes only information that is related to SMBv2.</td>
</tr>
</tbody>
</table>

Create a filter

Create a filter that consists of one or more rules.

Specify the rules to include in a filter, then save the filter and apply it to reports.

Procedure

1. On the Live Performance Reporting view, below the Date Range control, click Create/manage data filters.
   The Data Filters control appears.
2. On the Data Filters control toolbar, click Add Rule.
3. From the Type drop-down list, select an attribute type that you want to filter on.
4. In the Match field, select or type a value for the attribute you selected.
   Repeat steps 2 through 4 as needed until you have built and applied all the rules that you want to include in the filter.
5. Click Apply.
The filter is applied to all Performance modules in the report. Each rule is indicated.

6. From the Manage menu, click Save.
   The Save Filter As dialog box appears.
7. In the Please enter a filter name field, type a name for the filter, and then click OK.
   The filter is saved, and the name of the filter appears in the Current filter field, indicating that the filter is applied globally across all Performance modules in the report.

Modify a filter

Modify and remove the filter rules that are contained in a filter.

Procedure
1. On the Live Performance Reporting view, click Create/manage data filters.
   The Data Filters view appears.
2. On the Manage menu, point to Load filter, and then click the name of the filter that you want to modify.
   The individual filter rules appear in the Filter section, and InsightIQ applies the filter globally across all Performance modules in the report.
3. Modify filter settings as needed.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add a filter rule.</td>
<td>a. Click Add Rule.</td>
</tr>
<tr>
<td></td>
<td>b. From the Type list, select the breakout that you want to filter by.</td>
</tr>
<tr>
<td></td>
<td>c. In the Match field for the filter rule, select or type a filter value.</td>
</tr>
<tr>
<td>Modify a filter rule.</td>
<td>a. In the Match field for the filter rule that you want to modify, select or type a filter value.</td>
</tr>
<tr>
<td>Remove a filter rule.</td>
<td>a. Click either the Type list or Match field for the filter rule you want to remove.</td>
</tr>
<tr>
<td></td>
<td>b. Click Delete Rule.</td>
</tr>
</tbody>
</table>

4. Save the filter.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save the filter under its existing name.</td>
<td>a. Click Apply.</td>
</tr>
<tr>
<td></td>
<td>b. On the Manage menu, click Save.</td>
</tr>
<tr>
<td></td>
<td>The Save Filter dialog box appears.</td>
</tr>
<tr>
<td></td>
<td>c. Click Yes.</td>
</tr>
</tbody>
</table>
### Delete a filter

Permanently delete a filter.

**Procedure**

1. On the **Live Performance Reporting** view, click **Create/manage data filters**.
   
The **Data Filters** view appears.

2. On the **Manage** menu, point to **Load Filter**, and then click the name of the filter that you want to delete.

   The individual filter rules appear in the **Filter** section, and InsightIQ applies the filter globally across all Performance modules in the report.

3. On the **Manage** menu, click **Delete**.

   The **Delete Filter** dialog box appears and prompts you to confirm that you want to delete the filter.

4. Click **Yes**.

----

### Create a Permalink to share a report

Create a Permalink.

**Procedure**

1. In the InsightIQ web application, view any report that you want to share.

2. In the upper-right corner of the report, click **Permalink**.

   The InsightIQ **Permalink** dialog box displays and contains a URL for the currently configured report.

3. Put the cursor focus in the **Copy the URL below and use it for sharing this view** field.

4. Type **Ctrl + A** to select all the text.

5. Type **Ctrl + C** to copy the text.

6. Paste the text to a location that is convenient, such as a text file

7. Click **OK** to close the dialog box.
To view the report that is associated with the Permalink, you must be logged in to the InsightIQ web application.
Creating custom reports
CHAPTER 7

InsightIQ export data

This section contains the following topics:

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- Export InsightIQ data ................................................................. 78
- CSV export format .................................................................. 78
Export data overview

Use InsightIQ data with a third-party application.

You can export InsightIQ data if you want to access the data with a third-party application, such as Microsoft Excel. After you import the data to a third-party application, you can analyze and display the data. InsightIQ outputs data to a comma-separated value (CSV) file.

For Performance reports, InsightIQ averages data before displaying it in the InsightIQ web application. However, when you export InsightIQ data, InsightIQ does not average the data before creating the CSV file. Because of this, exported datapoints for Performance reports might not exactly match the data as it appears in the InsightIQ web interface.

You can export data from Performance reports and File System Analytics reports. Exporting data from other reports is not supported.

CSV export format

The first two columns describe the data points displayed in the Performance module chart. The first column is the timestamp of when the sample period for that data point began. The second value describes the value for the sample period.

If you included minimum and maximum values, the next two columns describe the minimum and maximum values. The first column is the timestamp of when the ten-minute sampling period began. The second value describes the minimum value during the sample period. The third value describes the maximum value during the sample period.

If you included breakouts, the remaining columns describe the breakouts. Each breakout contains two columns. The first column describes the timestamp of when the sampling period of the data beginning point. The second value describes the value of the breakout during the sample period.

Export InsightIQ data

Export InsightIQ data to a CSV file.

Procedure

1. View a report that displays the data that you want to export.

2. In the area of a module you want to export data for, click **Download as CSV**. InsightIQ exports the data that appears in the module. Any applied filters and breakouts are reflected in the CSV file.

3. Save the CSV file.

CSV export format

InsightIQ export data is saved in CSV format.

The first two columns describe the data points displayed in the Performance module chart. The first column is the timestamp of when the sample period for that data point began. The second value describes the value for the sample period.

If you included minimum and maximum values, the next two columns describe the minimum and maximum values. The first column is the timestamp of when the ten-minute sampling period began. The second value describes the minimum value during
the sample period. The third value describes the maximum value during the sample period.

If you included breakouts, the remaining columns describe the breakouts. Each breakout contains two columns. The first column describes the timestamp of when the sampling period for when the data point began. The second value describes the value of the breakout during the sample period.
InsightIQ export data