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**qos statistics commands**

**qos statistics characteristics show**

Display QoS policy group characterization

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The `qos statistics characteristics show` command displays data that characterizes the behavior of QoS policy groups.

The command displays the following data:

- The QoS policy group name (Policy Group)
- Input/output operations performed per second (IOPS)
- Throughput achieved in kilobytes per second (KB/s) or megabytes per second (MB/s) as appropriate (Throughput)
- Request size in bytes (B) (Request size)
- Read percentage from total I/O (Read)
- Concurrency, which indicates the number of concurrent users generating the I/O traffic (Concurrency)

The results displayed per iteration are sorted by IOPS. Each iteration starts with a row that displays the total IOPS used across all QoS policy groups. Other columns in this row are either totals or averages.

**Parameters**

```
[-node {<nodename>|local}] - Node
   Selects the policy groups that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

[-iterations <integer>] - Number of Iterations
   Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

{ [-rows <integer>] - Number of Rows in the Output
   Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

| [-policy-group <text>] - QoS Policy Group Name
   Selects the QoS policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

| [-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name }
   Selects the QoS adaptive policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.
```
[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration

Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

Examples

```
cluster1::> qos statistics characteristics show -iterations 100 -rows 4

Policy Group | IOPS | Throughput | Request size | Read
--------------|------|------------|--------------|------
Concurrency

-------
-totals-
  16
_System-Best-Effort
  0
vol1
  40
vol2
  14
vs1vol0
  4
-totals-
  3
_System-Best-Effort
  0
vol2
  9
vs1vol0
  1
vol1
  1
```

The example above displays the characteristics of the 4 QoS policy groups with the highest IOPS values and refreshes the display 100 times before terminating.
The example above displays the system characteristics of the QoS policy group `pg1` and refreshes the display 100 times before terminating.

**qos statistics latency show**

Display latency breakdown data per QoS policy group

**Availability:** This command is available to `cluster` administrators at the `admin` privilege level.

**Description**

The `qos statistics latency show` command displays the average latencies for QoS policy groups across the various Data ONTAP subsystems.

The command displays the following data:

- The QoS policy group name (Policy Group)
- Total latency observed per I/O operation (Latency)
- Latency observed per I/O operation in the Network subsystem (Network)
- Latency observed per I/O operation across the internally connected nodes in a Cluster (Cluster)
- Latency observed per I/O operation in the Data management subsystem (Data)
- Latency observed per I/O operation in the Storage subsystem (Disk)
- Latency observed per I/O operation for QoS Policy Group Ceiling (QoS Max)
- Latency observed per I/O operation for QoS Policy Group Floor (QoS Min)
- Latency observed per I/O operation for NVRAM transfer (NVRAM)
- Latency observed per I/O operation for Object Store (Cloud) operations
- Latency observed per I/O operation for FlexCache (FlexCache) operations
- Latency observed per I/O operation for Synchronous Snapmirror (SM Sync) operations
- Latency observed per I/O operation for Volume Activation (VA) operations

The results displayed per iteration are sorted by the Latency field. Each iteration starts with a row that displays the average latency, in microseconds (us) or milliseconds (ms), observed across all QoS policy groups.

**Parameters**

```bash
[-node {<nodename>|local}] - Node
  Selects the policy groups that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.
```

```bash
[-iterations <integer>] - Number of Iterations
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.
```

```bash
{ [-rows <integer>] - Number of Rows in the Output
  Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.
```

```bash
[-policy-group <text>] - QoS Policy Group Name
  Selects the QoS policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.
```

```bash
[-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name
  Selects the QoS adaptive policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.
```

```bash
[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.
```

**Examples**

```
cluster1::> qos statistics latency show -iterations 100 -rows 3
```

```
<table>
<thead>
<tr>
<th>Policy Group</th>
<th>Latency</th>
<th>Network</th>
<th>Cluster</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk QoS Max</td>
<td>QoS Min</td>
<td>NVRAM</td>
<td>Cloud</td>
<td>FlexCache</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-total-</td>
<td>110.35ms</td>
<td>110.02ms</td>
<td>0ms</td>
<td>327.00us</td>
</tr>
</tbody>
</table>
```
The example above displays latencies for the 3 QoS policy groups with the highest latencies and refreshes the display 100 times before terminating.
The example above displays latencies for the QoS policy group `pg1` and refreshes the display 100 times before terminating.

### qos statistics performance show

Display system performance data per QoS policy group

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The `qos statistics performance show` command shows the current system performance levels that QoS policy groups are achieving.
The command displays the following data:

- The QoS policy group name (Policy Group)
- Input/output operations performed per second (IOPS)
- Throughput in kilobytes per second (KB/s) or megabytes per second (MB/s) as appropriate (Throughput)
- Latency observed per request in microseconds (us) or milliseconds (ms) as appropriate (Latency)

The results displayed per iteration are sorted by IOPS. Each iteration starts with a row that displays the total IOPS used across all QoS policy groups. Other columns in this row are either totals or averages.

**Parameters**

`[-node {<nodename>|local}]` - Node

Selects the policy groups that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

`[-iterations <integer>]` - Number of Iterations

Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

`{[-rows <integer>]` - Number of Rows in the Output

Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

`[-policy-group <text>]` - QoS Policy Group Name

Selects the QoS policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

`[-adaptive-policy-group <text>]` - Adaptive QoS Policy Group Name

Selects the QoS adaptive policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

`[-refresh-display {true|false}]` - Toggle Screen Refresh Between Each Iteration

Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

**Examples**
cluster1::> qos statistics performance show -iterations 100 -rows 4

<table>
<thead>
<tr>
<th>Policy Group</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>79</td>
<td>1296.00KB/s</td>
<td>337.41ms</td>
</tr>
<tr>
<td>_System-Best-Effort</td>
<td>25</td>
<td>0KB/s</td>
<td>0ms</td>
</tr>
<tr>
<td>vol1</td>
<td>24</td>
<td>96.00KB/s</td>
<td>193.72ms</td>
</tr>
<tr>
<td>vol2</td>
<td>18</td>
<td>1152.00KB/s</td>
<td>750.98ms</td>
</tr>
<tr>
<td>vs1vol0</td>
<td>12</td>
<td>48.00KB/s</td>
<td>707.38ms</td>
</tr>
<tr>
<td>-total-</td>
<td>109</td>
<td>1.99MB/s</td>
<td>133.27ms</td>
</tr>
<tr>
<td>_System-Best-Effort</td>
<td>35</td>
<td>0KB/s</td>
<td>0ms</td>
</tr>
<tr>
<td>vol2</td>
<td>29</td>
<td>1.81MB/s</td>
<td>249.27ms</td>
</tr>
<tr>
<td>vs1vol0</td>
<td>24</td>
<td>96.00KB/s</td>
<td>48.32ms</td>
</tr>
<tr>
<td>vol1</td>
<td>21</td>
<td>84.00KB/s</td>
<td>292.30ms</td>
</tr>
</tbody>
</table>

The example above displays the system performance for the 4 QoS policy groups with the highest IOPS and it refreshes the display 100 times before terminating.

cluster1::> qos statistics performance show -iterations 100 -policy-group pg1

<table>
<thead>
<tr>
<th>Policy Group</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>2833</td>
<td>10.66MB/s</td>
<td>924.00us</td>
</tr>
<tr>
<td>pg1</td>
<td>2655</td>
<td>10.37MB/s</td>
<td>917.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>2837</td>
<td>10.65MB/s</td>
<td>923.00us</td>
</tr>
<tr>
<td>pg1</td>
<td>2655</td>
<td>10.37MB/s</td>
<td>917.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>2799</td>
<td>10.73MB/s</td>
<td>802.00us</td>
</tr>
<tr>
<td>pg1</td>
<td>2737</td>
<td>10.69MB/s</td>
<td>815.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>2930</td>
<td>13.33MB/s</td>
<td>905.00us</td>
</tr>
<tr>
<td>pg1</td>
<td>2720</td>
<td>10.62MB/s</td>
<td>858.00us</td>
</tr>
</tbody>
</table>

The example above displays the system performance for the QoS policy group pg1 and refreshes the display 100 times before terminating.

**qos statistics resource cpu show**

Display CPU resource utilization data per QoS policy group

**Availability:** This command is available to *cluster* administrators at the *admin* privilege level.

**Description**

The qos statistics resource cpu show command displays the CPU utilization for QoS policy groups per node.

The command displays the following data:
• The QoS policy group name (Policy Group)
• CPU utilization observed in percentage (CPU)

The results displayed per iteration are sorted by total CPU utilization. Each iteration starts with a row that displays the total CPU utilization across all QoS policy groups.

Parameters

-node {<nodename>|local} - Node
  Selects the policy groups that match this parameter value.

[-iterations <integer>] - Number of Iterations
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

{ [-rows <integer>] - Number of Rows in the Output
  Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

[-policy-group <text>] - QoS Policy Group Name
  Selects the QoS policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

[-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name
  Selects the QoS adaptive policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

Examples

cluster1::> qos statistics resource cpu show -node nodeA -iterations 100 -rows 3

<table>
<thead>
<tr>
<th>Policy Group</th>
<th>CPU</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total- (100%)</td>
<td>9%</td>
</tr>
<tr>
<td>fast</td>
<td>1%</td>
</tr>
<tr>
<td>slow</td>
<td>3%</td>
</tr>
<tr>
<td>medium</td>
<td>5%</td>
</tr>
<tr>
<td>-total- (100%)</td>
<td>8%</td>
</tr>
<tr>
<td>slow</td>
<td>1%</td>
</tr>
<tr>
<td>fast</td>
<td>3%</td>
</tr>
<tr>
<td>medium</td>
<td>3%</td>
</tr>
</tbody>
</table>

The example above displays the total CPU utilization for the 3 QoS policy groups with the highest CPU utilization and it refreshes the display 100 times before terminating.
The example above displays the total CPU utilization for the QoS policy group `pg1` and refreshes the display 100 times before terminating.

**qos statistics resource disk show**

Display disk resource utilization data per QoS policy group

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The `qos statistics resource disk show` command displays the disk utilization for QoS policy groups per node. The disk utilization shows the percentage of time spent on the disk during read and write operations. The command displays disk utilization for system-defined policy groups; however, their disk utilization is not included in the total utilization. The command only supports hard disks.

The command displays the following data:

- The QoS policy group name (Policy Group)
- Disk utilization (Disk)
- The number of HDD data disks utilized (Number of HDD Disks)

The results displayed are sorted by total disk utilization. Each iteration starts with a row that displays the total disk utilization across all QoS policy groups.

**Parameters**

- `-node {<nodename>|local}` - Node  
  Selects the policy groups that match this parameter value.

- `[-iterations <integer>]` - Number of Iterations  
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.
[-rows <integer>] - Number of Rows in the Output
   Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

[-policy-group <text>] - QoS Policy Group Name
   Selects the QoS policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

[-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name
   Selects the QoS adaptive policy group whose name matches the specified value. If you do not specify this parameter, the command displays data for all QoS policy groups.

[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
   Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

Examples

cluster1::> qos statistics resource disk show -node nodeA -iterations 100 -rows 3
   Policy Group          Disk Number of HDD Disks
   -------------------- ----- -------------------
   -total-                40%                  27
   pg1                    22%                   5
   slow                   10%                  10
   fast                   8%                   12
   _System_Default         7%                  20
   -total-                42%                  27
   pg1                    22%                   5
   slow                   12%                  10
   fast                   8%                   12
   _System_Default         7%                  20

The example above displays the total disk utilization for the 3 QoS policy groups with the highest disk utilization and it refreshes the display 100 times before terminating.
The example above displays the total disk utilization for the QoS policy group *pg1* and refreshes the display 100 times before terminating.

### qos statistics volume characteristics show

**Display volume characteristics**

**Availability:** This command is available to *cluster* administrators at the *admin* privilege level.

**Description**

The `qos statistics volume characteristics show` command displays data that characterizes the behavior of volumes.

The command displays the following data:

- QoS volume name (Workload)
- QoS workload ID (ID)
- Input/output operations per second (IOPS)
- Throughput achieved in kilobytes per second (KB/s) or megabytes per second (MB/s) as appropriate (Throughput)
- Request size in bytes (B) (Request size)
- Read percentage from total IOPS (Read)
- Concurrency, which indicates the number of concurrent users generating the I/O traffic (Concurrency)

The results displayed per iteration are sorted by IOPS. Each iteration starts with a row that displays the total IOPS used across all volumes. Other columns in this row are either totals or averages.

**Parameters**

```
[-node {<nodename>|local}] - Node
  Selects the volumes that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.
```
{-rows <integer>} - Number of Rows in the Output
   Specifies the number of busiest QoS policy groups to display. The default setting is 10. The allowed range of values is 1 to 20.

-vserver <vserver name> - Vserver Name
   Specifies the Vserver to which the volume belongs.

-volume <volume name> - Volume Name
   Selects the characteristic data that match this parameter value. Enter a complete volume name or press the <Tab> key to complete the name. Wildcard query characters are not supported.

{-iterations <integer>} - Number of Iterations
   Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

{-refresh-display {true|false}} - Toggle Screen Refresh Between Each Iteration
   Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

{-show-flexgroup-as-constituents {true|false}} - Display Flexgroups as Constituents
   If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

Examples
```bash
cluster1::> qos statistics volume characteristics show -iterations 100 -rows 3
```

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Request size</th>
<th>Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrency</td>
<td></td>
<td></td>
<td>--------------</td>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>------</td>
<td>--------------</td>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>68</td>
<td>176.00KB/s</td>
<td>2650B</td>
<td>7%</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>24</td>
<td>96.00KB/s</td>
<td>4096B</td>
<td>20%</td>
</tr>
<tr>
<td>vol_1-wid103</td>
<td>103</td>
<td>20</td>
<td>80.00KB/s</td>
<td>4096B</td>
<td>0%</td>
</tr>
<tr>
<td>vol_2-wid104</td>
<td>104</td>
<td>1</td>
<td>0KB/s</td>
<td>0B</td>
<td>0%</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>157</td>
<td>528.00KB/s</td>
<td>3443B</td>
<td>3%</td>
</tr>
<tr>
<td>vol_2-wid104</td>
<td>104</td>
<td>48</td>
<td>192.00KB/s</td>
<td>4096B</td>
<td>0%</td>
</tr>
<tr>
<td>vol_1-wid103</td>
<td>103</td>
<td>43</td>
<td>172.00KB/s</td>
<td>4096B</td>
<td>0%</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>41</td>
<td>164.00KB/s</td>
<td>4096B</td>
<td>14%</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>274</td>
<td>1016.00KB/s</td>
<td>3797B</td>
<td>2%</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>85</td>
<td>340.00KB/s</td>
<td>4096B</td>
<td>8%</td>
</tr>
<tr>
<td>vol_2-wid104</td>
<td>104</td>
<td>85</td>
<td>340.00KB/s</td>
<td>4096B</td>
<td>0%</td>
</tr>
<tr>
<td>vol_1-wid103</td>
<td>103</td>
<td>84</td>
<td>336.00KB/s</td>
<td>4096B</td>
<td>0%</td>
</tr>
</tbody>
</table>

The example above displays characteristics for the 3 volumes with the highest IOPS and it refreshes the display 100 times before terminating.
The example above displays characteristics for volume `vs0_vol0` in Vserver `vs0` and it refreshes the display 100 times before terminating.

### qos statistics volume latency show

Display latency breakdown data per volume

**Availability:** This command is available to *cluster* administrators at the *admin* privilege level.

**Description**

The `qos statistics volume latency show` command displays the average latencies for volumes on Data ONTAP subsystems.

The command displays the following data:

- The QoS volume name (Workload)
- The QoS workload ID (ID)
- Total latency observed per I/O operation (Latency)
• Latency observed per I/O operation in the Network subsystem (Network)
• Latency observed per I/O operation across the internally connected nodes in a Cluster (Cluster)
• Latency observed per I/O operation in the Data management subsystem (Data)
• Latency observed per I/O operation in the Storage subsystem (Disk)
• Latency observed per I/O operation for QoS Policy Group Ceiling (QoS Max)
• Latency observed per I/O operation for QoS Policy Group Floor (QoS Min)
• Latency observed per I/O operation for NVRAM transfer (NVRAM)
• Latency observed per I/O operation for Object Store (Cloud) operations
• Latency observed per I/O operation for FlexCache (FlexCache) operations
• Latency observed per I/O operation for Synchronous Snapmirror (SM Sync) operations
• Latency observed per I/O operation for Volume Activation (VA) operations

The results displayed per iteration are sorted by the total latency field. Each iteration starts with a row that displays the average latency, in microseconds (us) or milliseconds (ms) observed across all volumes.

Parameters

[-node {<nodename>|local}] - Node
   Selects the volumes that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

{ [-rows <integer>] - Number of Rows in the Output
   Specifies the number of busiest QoS policy groups to display. The default setting is 10. The allowed range of values is 1 to 20.

| -vserver <vserver name> - Vserver Name
   Specifies the Vserver to which the volume belongs.

- volume <volume name> - Volume Name }
   Selects the latency data that match this parameter value. Enter a complete volume name or press the <Tab> key to complete the name. Wildcard query characters are not supported.

[ -iterations <integer>] - Number of Iterations
   Specifies the number of times that the command refreshes the display with updated data before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

[ -refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
   Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

[ -show-flexgroup-as-constituents {true|false}] - Display Flexgroups as Constituents
   If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

Examples
The example above displays latencies for the 3 volumes with the highest latencies and it refreshes the display 100 times before terminating.
The example above displays latencies for volume `vs0_vol0` in Vserver `vs0` and it refreshes the display 100 times before terminating.

**qos statistics volume performance show**

Display system performance data per volume
Availability: This command is available to cluster administrators at the admin privilege level.

Description

The qos statistics volume performance show command shows the current system performance that each volume is achieving.

The command displays the following data:

- The QoS volume name (Workload)
- The QoS workload ID (ID)
- Input/output operations performed per second (IOPS)
- Throughput in kilobytes per second (KB/s) or megabytes per second (MB/s) as appropriate (Throughput)
- Latency observed per request in microseconds (us) or milliseconds (ms) as appropriate (Latency)

The results displayed per iteration are sorted by IOPS. Each iteration starts with a row that displays the total IOPS used across all volumes. Other columns in this row are either totals or averages.

Parameters

[-node {<nodename>|local}] - Node
   Selects the volumes that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

{-rows <integer>} - Number of Rows in the Output
   Specifies the number of busiest QoS policy groups to display. The default setting is 10. The allowed range of values is 1 to 20.

| -vserver <vserver name> - Vserver Name
   Specifies the Vserver to which the volume belongs.

-volume <volume name> - Volume Name
   Selects the performance data that match this parameter value. Enter a complete volume name or press the <Tab> key to complete the name. Wildcard query characters are not supported.

[-iterations <integer>] - Number of Iterations
   Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
   Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

[-show-flexgroup-as-constituents {true|false}] - Display Flexgroups as Constituents
   If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.
### Examples

#### cluster1::> qos statistics volume performance show -iterations 100 -rows 3

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>-</td>
<td>97</td>
<td>1.90MB/s</td>
<td>216.87ms</td>
</tr>
<tr>
<td>vol_2-wid104</td>
<td>104</td>
<td>28</td>
<td>1.75MB/s</td>
<td>412.78ms</td>
</tr>
<tr>
<td>vol_1-wid103</td>
<td>103</td>
<td>25</td>
<td>100.00KB/s</td>
<td>169.16ms</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>13</td>
<td>52.00KB/s</td>
<td>403.78ms</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>98</td>
<td>1276.00KB/s</td>
<td>89.98ms</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>28</td>
<td>112.00KB/s</td>
<td>80.70ms</td>
</tr>
<tr>
<td>vol_1-wid103</td>
<td>103</td>
<td>19</td>
<td>76.00KB/s</td>
<td>114.72ms</td>
</tr>
<tr>
<td>vol_2-wid104</td>
<td>104</td>
<td>17</td>
<td>1088.00KB/s</td>
<td>257.60ms</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>78</td>
<td>1152.00KB/s</td>
<td>225.22ms</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>15</td>
<td>60.00KB/s</td>
<td>210.63ms</td>
</tr>
</tbody>
</table>

The example above displays the system performance for the 3 volumes with the highest IOPS and it refreshes the display 100 times before terminating.

#### cluster1::> qos statistics volume performance show -vserver vs0 -volume vs0_vol0 -iterations 100

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>-</td>
<td>1278</td>
<td>639.17KB/s</td>
<td>404.00us</td>
</tr>
<tr>
<td>vs0_vol0-wid1..</td>
<td>15658</td>
<td>526</td>
<td>263.17KB/s</td>
<td>436.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>1315</td>
<td>657.33KB/s</td>
<td>86.00us</td>
</tr>
<tr>
<td>vs0_vol0-wid1..</td>
<td>15658</td>
<td>528</td>
<td>264.17KB/s</td>
<td>88.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>1220</td>
<td>609.83KB/s</td>
<td>418.00us</td>
</tr>
<tr>
<td>vs0_vol0-wid1..</td>
<td>15658</td>
<td>515</td>
<td>257.33KB/s</td>
<td>531.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>1202</td>
<td>600.83KB/s</td>
<td>815.00us</td>
</tr>
<tr>
<td>vs0_vol0-wid1..</td>
<td>15658</td>
<td>519</td>
<td>259.67KB/s</td>
<td>924.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>1240</td>
<td>620.17KB/s</td>
<td>311.00us</td>
</tr>
<tr>
<td>vs0_vol0-wid1..</td>
<td>15658</td>
<td>525</td>
<td>262.50KB/s</td>
<td>297.00us</td>
</tr>
</tbody>
</table>

The example above displays the system performance for volume vs0_vol0 in Vserver vs0 and it refreshes the display 100 times before terminating.

### qos statistics volume resource cpu show

Display CPU resource utilization data per volume

**Availability:** This command is available to cluster administrators at the admin privilege level.
Description

The `qos statistics volume resource cpu show` command displays the CPU utilization for volumes per node.

The command displays the following data:

- The QoS volume name (Workload)
- The QoS workload ID (ID)
- CPU utilization observed in percentage (CPU)

The results displayed per iteration are sorted by total CPU utilization. Each iteration starts with a row that displays the total CPU utilization across all volumes.

Parameters

- `-node {<nodename>|local}` - Node
  Selects the volumes that match this parameter value.

- `{[-rows <integer>] - Number of Rows in the Output}
  Specifies the number of busiest QoS policy groups to display. The default setting is 10. The allowed range of values is 1 to 20.

- `vserver <vserver name>` - Vserver Name
  Specifies the Vserver to which the volume belongs.

- `volume <volume name>` - Volume Name
  Selects the CPU utilization data that match this parameter value. Enter a complete volume name or press the <Tab> key to complete the name. Wildcard query characters are not supported.

- `{[-iterations <integer>] - Number of Iterations}
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

- `{[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration}
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

- `{[-show-flexgroup-as-constituents {true|false}] - Display Flexgroups as Constituents}
  If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

Examples
The example above displays total CPU utilization for the 3 volumes with the highest CPU utilization and it refreshes the display 100 times before terminating.

The example above displays total CPU utilization for volume vs0_vol1 in Vserver vs0 and it refreshes the display 100 times before terminating.

**qos statistics volume resource disk show**

Display disk resource utilization data per volume

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The qos statistics volume resource disk show command displays the disk utilization for volumes per node. The disk utilization shows the percentage of time spent on the disk during read and write operations. The command only supports hard disks.
The command displays the following data:

- The QoS volume name (Workload)
- The QoS workload ID (ID)
- Disk utilization (Disk)
- The number of HDD data disks utilized (Number of HDD Disks)

The results displayed are sorted by total disk utilization. Each iteration starts with a row that displays the total disk utilization across all volumes.

**Parameters**

- **-node \{<nodename>|local\} - Node**
  Selects the volumes that match this parameter value.

- **\{-rows <integer>\} - Number of Rows in the Output**
  Specifies the number of busiest QoS policy groups to display. The default setting is 10. The allowed range of values is 1 to 20.

- **-vserver <vserver name> - Vserver Name**
  Specifies the Vserver to which the volume belongs.

- **-volume <volume name> - Volume Name**
  Selects the disk utilization data that match this parameter value. Enter a complete volume name or press the <Tab> key to complete the name. Wildcard query characters are not supported.

- **\{-iterations <integer>\} - Number of Iterations**
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

- **\{-refresh-display \{true|false\}\} - Toggle Screen Refresh Between Each Iteration**
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

- **\{-show-flexgroup-as-constituents \{true|false\}\} - Display Flexgroups as Constituents**
  If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

**Examples**
The example above displays total disk utilization for the 3 volumes with the highest disk utilization and it refreshes the display 100 times before terminating.

The example above displays total disk utilization for volume vs0_vol0 in Vserver vs0 and it refreshes the display 100 times before terminating.

**qos statistics workload characteristics show**

Display QoS workload characterization

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The qos statistics workload characteristics show command displays data that characterizes the behavior of QoS workloads.
The command displays the following data:

- The QoS workload name (Workload)
- The QoS workload ID (ID)
- Input/output operations performed per second (IOPS)
- Throughput achieved in kilobytes per second (KB/s) or megabytes per second (MB/s) as appropriate (Throughput)
- Request size in bytes (B) (Request size)
- Read percentage from total IOPS (Read)
- Concurrency, which indicates the number of concurrent users generating the I/O traffic (Concurrency)

The results displayed per iteration are sorted by IOPS. Each iteration starts with a row that displays the total IOPS used across all QoS workloads. Other columns in this row are either totals or averages.

**Parameters**

```
[-node {<nodename>|local}] - Node
  Selects the QOS workloads that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

[-iterations <integer>] - Number of Iterations
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

{-rows <integer>} - Number of Rows in the Output
  Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

[-policy-group <text>] - QoS Policy Group Name
  Selects the QoS workloads that belong to the QoS policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

[-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name
  Selects the QoS workloads that belong to the QoS adaptive policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

[-workload <text>] - QoS Workload Name
  Selects the QoS workload that match this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

[-workload-id <integer>] - QoS Workload ID
  Selects the QoS workload that match the QoS workload ID specified by this parameter value.
```
If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

### Examples

```bash
cluster1::> qos statistics workload characteristics show -iterations 100
-rrows 4

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Request size</th>
<th>Read</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-total-</td>
<td></td>
<td>68</td>
<td>176.00KB/s</td>
<td>2650B</td>
</tr>
<tr>
<td></td>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>24</td>
<td>96.00KB/s</td>
<td>4096B</td>
</tr>
<tr>
<td></td>
<td>_Scan_Besteff..</td>
<td>101</td>
<td>23</td>
<td>0KB/s</td>
<td>0B</td>
</tr>
<tr>
<td></td>
<td>vol_1-wid103</td>
<td>103</td>
<td>20</td>
<td>80.00KB/s</td>
<td>4096B</td>
</tr>
<tr>
<td></td>
<td>vol_2-wid104</td>
<td>104</td>
<td>1</td>
<td>0KB/s</td>
<td>0B</td>
</tr>
<tr>
<td></td>
<td>-total-</td>
<td>-total-</td>
<td>157</td>
<td>528.00KB/s</td>
<td>3443B</td>
</tr>
<tr>
<td></td>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>85</td>
<td>340.00KB/s</td>
<td>4096B</td>
</tr>
<tr>
<td></td>
<td>vol_2-wid104</td>
<td>104</td>
<td>85</td>
<td>340.00KB/s</td>
<td>4096B</td>
</tr>
<tr>
<td></td>
<td>vol_1-wid103</td>
<td>103</td>
<td>84</td>
<td>336.00KB/s</td>
<td>4096B</td>
</tr>
<tr>
<td></td>
<td>_Scan_Besteff..</td>
<td>101</td>
<td>20</td>
<td>0KB/s</td>
<td>0B</td>
</tr>
</tbody>
</table>
```

The example above displays characteristics for the 4 QoS workloads with the highest IOPS and it refreshes the display 100 times before terminating.
The example above displays the characteristics for the 2 QoS workloads belonging to QoS policy group \textit{pg1} with the highest IOPS and it refreshes the display 100 times before terminating.
The example above displays the characteristics for the QoS workload with QoS workload ID 9492 and it refreshes the display 100 times before terminating.

### qos statistics workload latency show

Display latency breakdown data per QoS workload

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The `qos statistics workload latency show` command displays the average latencies for QoS workloads on Data ONTAP subsystems.

The command displays the following data:

- The QoS workload name (Workload)
- The QoS workload ID (ID)
- Total latency observed per I/O operation (Latency)
- Latency observed per I/O operation in the Network subsystem (Network)
- Latency observed per I/O operation across the internally connected nodes in a Cluster (Cluster)
- Latency observed per I/O operation in the Data management subsystem (Data)
• Latency observed per I/O operation in the Storage subsystem (Disk)
• Latency observed per I/O operation for QoS Policy Group Ceiling (QoS Max)
• Latency observed per I/O operation for QoS Policy Group Floor (QoS Min)
• Latency observed per I/O operation for NVRAM transfer (NVRA M)
• Latency observed per I/O operation for Object Store(Cloud) operations
• Latency observed per I/O operation for FlexCache (FlexCache) operations
• Latency observed per I/O operation for Synchronous Snapmirror (SM Sync) operations
• Latency observed per I/O operation for Volume Activation (VA) operations

The results displayed per iteration are sorted by the total latency field. Each iteration starts with a row that displays the average latency, in microseconds (us) or milliseconds (ms) observed across all QoS workloads.

Parameters

[-node {<nodename>|local}] - Node
Selects the QoS workloads that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

[-iterations <integer>] - Number of Iterations
Specifies the number of times that the command refreshes the display with updated data before terminating. If you do not specify this parameter, the command continues to run until you interrupt it by pressing Ctrl-C.

[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration
Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

{ [-rows <integer>] - Number of Rows in the Output
Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

[-policy-group <text>] - QoS Policy Group Name
Selects the QoS workloads that belong to the QoS policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

| [-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name
Selects the QoS workloads that belong to the QoS adaptive policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

| [-workload <text>] - QoS Workload Name
Selects the QoS workload that match this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

| [-workload-id <integer>] - QoS Workload ID
Selects the QoS workload that match the QoS workload ID specified by this parameter value.
[[-show-flexgroup-as-constituents {true|false}] - Display Flexgroups as Constituents]

If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

Examples

```
cluster1::> qos statistics workload latency show -iterations 100 -rows 3
```

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>Latency</th>
<th>Network</th>
<th>Cluster</th>
<th>Data</th>
<th>Disk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qos Max</td>
<td>Qos Min</td>
<td>NVRAM</td>
<td>Cloud</td>
<td>FlexCache</td>
<td>SM Sync</td>
<td>VA</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>------</td>
<td>------</td>
<td>---------</td>
<td>--------</td>
<td>----</td>
</tr>
<tr>
<td>-total-</td>
<td>110.35ms</td>
<td>110.02ms</td>
<td>0ms</td>
<td>327.00us</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms 111</td>
<td>167.82ms</td>
<td>167.22ms</td>
<td>0ms</td>
<td>603.00us</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms</td>
<td>1234</td>
<td>117.76ms</td>
<td>117.56ms</td>
<td>0ms</td>
<td>191.00us</td>
<td>0ms</td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms</td>
<td>999</td>
<td>44.24ms</td>
<td>44.05ms</td>
<td>0ms</td>
<td>190.00us</td>
<td>0ms</td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0ms 111</td>
<td>27.28ms</td>
<td>27.03ms</td>
<td>0ms</td>
<td>253.00us</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>1234 111</td>
<td>27.28ms</td>
<td>27.03ms</td>
<td>0ms</td>
<td>253.00us</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>-total-</td>
<td>409.81ms</td>
<td>409.65ms</td>
<td>0ms</td>
<td>169.00us</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>1234 816.92ms</td>
<td>816.80ms</td>
<td>0ms</td>
<td>120.00us</td>
<td>0ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>999 407.88ms</td>
<td>407.66ms</td>
<td>0ms</td>
<td>219.00us</td>
<td>0ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
<tr>
<td>111 3.68ms</td>
<td>3.49ms</td>
<td>0ms</td>
<td>193.00us</td>
<td>0ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0ms 0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td>0ms</td>
<td></td>
</tr>
</tbody>
</table>

The example above displays latencies for the 3 QoS workloads with the highest latencies and it refreshes the display 100 times before terminating.
The example above displays latencies for the 2 QoS workloads belonging to QoS policy group `pg1` with the highest IOPS and it refreshes the display 100 times before terminating.
cluster1::> qos statistics workload latency show -iterations 100 -workload -id 9492

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>Latency</th>
<th>Network</th>
<th>Cluster</th>
<th>Data</th>
<th>VA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk</td>
<td>Qos Max</td>
<td>Qos Min</td>
<td>NVRAM</td>
<td>Cloud</td>
<td>FlexCache</td>
<td>SM Sync</td>
</tr>
<tr>
<td>Disk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

```
- ----------------- ------- ---------- ---------- ---------- ----------
- total-            -   443.00us   273.00us        0ms   170.00us
0ms 0ms 0ms 0ms 0ms 0ms
file-test1_b-..    9492   440.00us   272.00us        0ms   168.00us
0ms 0ms 0ms 0ms 0ms 0ms
- total-            -   577.00us   313.00us        0ms   264.00us
0ms 0ms 0ms 0ms 0ms 0ms
file-test1_b-..    9492   607.00us   316.00us        0ms   291.00us
0ms 0ms 0ms 0ms 0ms 0ms
- total-            -   475.00us   291.00us        0ms   184.00us
0ms 0ms 0ms 0ms 0ms 0ms
file-test1_b-..    9492   476.00us   293.00us        0ms   183.00us
0ms 0ms 0ms 0ms 0ms 0ms
- total-            -   628.00us   284.00us        0ms   344.00us
0ms 0ms 0ms 0ms 0ms 0ms
file-test1_b-..    9492   591.00us   281.00us        0ms   310.00us
0ms 0ms 0ms 0ms 0ms 0ms
```

The example above displays the latencies for the QoS workload with QoS workload ID 9492 and it refreshes the display 100 times before terminating.

**qos statistics workload performance show**

Display system performance data per QoS workload

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The `qos statistics workload performance show` command shows the current system performance that each QoS workload is achieving.
The command displays the following data:

- The QoS workload name (Workload)
- The QoS workload ID (ID)
- Input/output operations performed per second (IOPS)
- Throughput in kilobytes per second (KB/s) or megabytes per second (MB/s) as appropriate (Throughput)
- Latency observed per request in microseconds (us) or milliseconds (ms) as appropriate (Latency)

The results displayed per iteration are sorted by IOPS. Each iteration starts with a row that displays the total IOPS used across all QoS workloads. Other columns in this row are either totals or averages.

Parameters

`[-node {<nodename>|local}]` - Node
Selects the QoS workloads that match this parameter value. If you do not specify this parameter, the command displays data for the entire cluster.

`[-iterations <integer>]` - Number of Iterations
Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

`[-refresh-display {true|false}]` - Toggle Screen Refresh Between Each Iteration
Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

`{-rows <integer>}` - Number of Rows in the Output
Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

`[-policy-group <text>]` - QoS Policy Group Name
Selects the QoS workloads that belong to the QoS policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

`{-adaptive-policy-group <text>}` - Adaptive QoS Policy Group Name
Selects the QoS workloads that belong to the QoS adaptive policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

`{-workload <text>}` - QoS Workload Name
Selects the QoS workload that match this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

`{-workload-id <integer>}` - QoS Workload ID
Selects the QoS workload that match the QoS workload ID specified by this parameter value.

`{-show-flexgroup-as-constituents {true|false}}` - Display Flexgroups as Constituents
If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.
### Examples

```
cluster1::> qos statistics workload performance show -iterations 100 -rows 4

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>-</td>
<td>97</td>
<td>1.90MB/s</td>
<td>216.87ms</td>
</tr>
<tr>
<td>_Scan_Besteff..</td>
<td>101</td>
<td>31</td>
<td>0KB/s</td>
<td>0ms</td>
</tr>
<tr>
<td>vol_2-wid104</td>
<td>104</td>
<td>28</td>
<td>1.75MB/s</td>
<td>412.78ms</td>
</tr>
<tr>
<td>vol_1-wid103</td>
<td>103</td>
<td>25</td>
<td>100.00KB/s</td>
<td>169.16ms</td>
</tr>
<tr>
<td>vs1vol0-wid102</td>
<td>102</td>
<td>13</td>
<td>52.00KB/s</td>
<td>403.78ms</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>98</td>
<td>1276.00KB/s</td>
<td>89.98ms</td>
</tr>
</tbody>
</table>
```

The example above displays the system performance for the 4 QoS workloads with the highest IOPS and it refreshes the display 100 times before terminating.

```
cluster1::> qos statistics workload performance show -iterations 100 -rows 2 -policy-group pg1

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>IOPS</th>
<th>Throughput</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>-</td>
<td>2598</td>
<td>9.96MB/s</td>
<td>1223.00us</td>
</tr>
<tr>
<td>file-testfile..</td>
<td>4228</td>
<td>650</td>
<td>2.54MB/s</td>
<td>1322.00us</td>
</tr>
<tr>
<td>file-testfile..</td>
<td>11201</td>
<td>635</td>
<td>2.48MB/s</td>
<td>1128.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>2825</td>
<td>10.89MB/s</td>
<td>714.00us</td>
</tr>
<tr>
<td>file-testfile..</td>
<td>4228</td>
<td>707</td>
<td>2.76MB/s</td>
<td>759.00us</td>
</tr>
<tr>
<td>file-testfile..</td>
<td>11201</td>
<td>697</td>
<td>2.72MB/s</td>
<td>693.00us</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>2696</td>
<td>10.13MB/s</td>
<td>1149.00us</td>
</tr>
<tr>
<td>file-testfile..</td>
<td>4228</td>
<td>645</td>
<td>2.52MB/s</td>
<td>945.00us</td>
</tr>
<tr>
<td>file-testfile..</td>
<td>6827</td>
<td>634</td>
<td>2.48MB/s</td>
<td>1115.00us</td>
</tr>
</tbody>
</table>
```

The example above displays the system performance for the 2 QoS workloads belonging to QoS policy group pg1 with the highest IOPS and it refreshes the display 100 times before terminating.
The example above displays the system performance for the QoS workload with QoS workload ID 11201 and it刷新es the display 100 times before terminating.

**qos statistics workload resource cpu show**

Display CPU resource utilization data per QoS workload

**Availability:** This command is available to cluster administrators at the admin privilege level.

**Description**

The `qos statistics workload resource cpu show` command displays the CPU utilization for QoS workloads per node.

The command displays the following data:

- The QoS workload name (Workload)
- The QoS workload ID (ID)
- CPU utilization observed in percentage (CPU)

The results displayed per iteration are sorted by total CPU utilization. Each iteration starts with a row that displays the total CPU utilization across all QoS workloads.

**Parameters**

- `-node {<nodename>|local}` - Node
  Selects the QoS workloads that match this parameter value.

- `[-iterations <integer>]` - Number of Iterations
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

- `[-refresh-display {true|false}]` - Toggle Screen Refresh Between Each Iteration
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the
The command displays each data iteration below the previous one. The default is false.

{-rows <integer>} - Number of Rows in the Output

Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

{-policy-group <text>} - QoS Policy Group Name

Selects the QoS workloads that belong to the QoS policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

{-adaptive-policy-group <text>} - Adaptive QoS Policy Group Name

Selects the QoS workloads that belong to the QoS adaptive policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

{-workload <text>} - QoS Workload Name

Selects the QoS workload that match this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

{-workload-id <integer>} - QoS Workload ID

Selects the QoS workload that match the QoS workload ID specified by this parameter value.

{-show-flexgroup-as-constituents {true|false}} - Display Flexgroups as Constituents

If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

Examples

```
cluster1::> qos statistics workload resource cpu show -node nodeA -iterations 100 -rows 3

Workload          ID   CPU
----------------- ----- ----- 
- total- (100%)    -    9%
vs0-wid-102       102    5%
file-bigvmdk-...  121    2%
vs2_vol0-wid-...  212    2%
- total- (100%)    -    8%
vs0-wid-101       102    5%
file-bigvmdk-...  121    2%
vs2_vol0-wid-...  212    1%
```

The example above displays total CPU utilization for the 3 QoS workloads with the highest CPU utilization and it refreshes the display 100 times before terminating.
The example above displays total CPU utilization for the 2 QoS workloads belonging to QoS policy group pg1 with the highest IOPS and it refreshes the display 100 times before terminating.

The example above displays total CPU utilization for the QoS workload with QoS workload ID 9492 and it refreshes the display 100 times before terminating.

qos statistics workload resource disk show

Display disk resource utilization data per QoS workload

Availability: This command is available to cluster administrators at the admin privilege level.

Description

The qos statistics workload resource disk show command displays the disk utilization for QoS workloads per node. The disk utilization shows the percentage of time spent on the disk during read and write operations. The command displays disk utilization for system-defined workloads; however, their disk utilization is not included in the total utilization. The command only supports hard disks.
The command displays the following data:

- The QoS workload name (Workload)
- The QoS workload ID (ID)
- Disk utilization (Disk)
- The number of HDD data disks utilized (Number of HDD Disks)

The results displayed are sorted by total disk utilization. Each iteration starts with a row that displays the total disk utilization across all QoS workloads.

Parameters

- **-node {<nodename>|local} - Node**
  Selects the QOS workloads that match this parameter value.

- **[-iterations <integer>] - Number of Iterations**
  Specifies the number of times the display is refreshed before terminating. If you do not specify this parameter, the command iterates until interrupted by Ctrl-C.

- **[-refresh-display {true|false}] - Toggle Screen Refresh Between Each Iteration**
  Specifies the display style. If true, the command clears the display after each data iteration. If false, the command displays each data iteration below the previous one. The default is false.

- **{ [-rows <integer>] - Number of Rows in the Output**
  Specifies the number of busiest QoS policy groups to display. Valid values are from 1 to 20. The default value is 10.

- **[-policy-group <text>] - QoS Policy Group Name**
  Selects the QoS workloads that belong to the QoS policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

  | **[-adaptive-policy-group <text>] - Adaptive QoS Policy Group Name**
  | Selects the QoS workloads that belong to the QoS adaptive policy group specified by this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

  | **[-workload <text>] - QoS Workload Name**
  | Selects the QoS workload that match this parameter value. If you do not specify this parameter, the command displays data for all QoS workloads.

  | **[-workload-id <integer>] - QoS Workload ID**
  | Selects the QoS workload that match the QoS workload ID specified by this parameter value.

- **[-show-flexgroup-as-constituents {true|false}] - Display Flexgroups as Constituents**
  If the parameter is specified and if the value is true, it will display data for FlexVols and Flexgroup Constituents. Otherwise it will display data for FlexVols and Flexgroups.

Examples
The example above displays total disk utilization for the 3 QoS workloads with the highest disk utilization and it refreshes the display 100 times before terminating.

The example above displays total disk utilization for the 2 QoS workloads belonging to QoS policy group pg1 with the highest IOPS and it refreshes the display 100 times before terminating.
cluster1::> qos statistics workload resource disk show -node local -iterations 100 -workload-id 6437

<table>
<thead>
<tr>
<th>Workload</th>
<th>ID</th>
<th>Disk</th>
<th>Number of HDD Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>-total-</td>
<td>-</td>
<td>3%</td>
<td>10</td>
</tr>
<tr>
<td>file-test1_a-..</td>
<td>6437</td>
<td>6%</td>
<td>6</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>3%</td>
<td>10</td>
</tr>
<tr>
<td>file-test1_a-..</td>
<td>6437</td>
<td>5%</td>
<td>6</td>
</tr>
<tr>
<td>-total-</td>
<td>-</td>
<td>3%</td>
<td>10</td>
</tr>
<tr>
<td>file-test1_a-..</td>
<td>6437</td>
<td>6%</td>
<td>6</td>
</tr>
</tbody>
</table>

The example above displays total disk utilization for the QoS workload with QoS workload ID 6437 and it refreshes the display 100 times before terminating.