



## **qos statistics commands**

### ONTAP commands

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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
-----
-----
-total-              31      304.00KB/s    10041B    0%
16
_System-Best-Effort   15           0KB/s         0B        0%
0
vol1                 11      44.00KB/s     4096B     0%
40
vol2                  4      256.00KB/s    65536B    0%
14
vs1vol0              1       4.00KB/s     4096B     0%
4
-total-              37      808.00KB/s    22361B    2%
3
_System-Best-Effort   15           0KB/s         0B        0%
0
vol2                 12      768.00KB/s    65536B    0%
9
vs1vol0              8      32.00KB/s     4096B    12%
1
vol1                  2       8.00KB/s     4096B     0%
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.

```

cluster1::> qos statistics characteristics show -iterations 100 -policy
-group pgl
Policy Group          IOPS          Throughput Request size Read
Concurrency
-----
-----
-total-              293           3.02MB/s      10783B  54%
0
pgl                  118           470.67KB/s      4096B 100%
0
-total-              181           478.14KB/s      2700B  65%
0
pgl                  117           469.33KB/s      4096B 100%
0
-total-              226           525.78KB/s      2382B  60%
1
pgl                  110           440.00KB/s      4096B 100%
1
-total-              233           1.67MB/s       7527B  49%
1
pgl                  112           446.67KB/s      4096B 100%
1

```

The example above displays the system characteristics of the QoS policy group *pgl* 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

### **[`-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 latency show -iterations 100 -rows 3
Policy Group          Latency      Network      Cluster      Data
Disk    QoS Max    QoS Min    NVRAM        Cloud  FlexCache  SM Sync
VA
-----
-----
-----
-total-                110.35ms    110.02ms          0ms    327.00us
```

```

0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vs1vol0      167.82ms  167.22ms      0ms  603.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol1      117.76ms  117.56ms      0ms  191.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2      44.24ms   44.05ms      0ms  190.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
-total-      38.89ms   38.63ms      0ms  256.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2      64.47ms   64.20ms      0ms  266.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol1      27.28ms   27.03ms      0ms  253.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vs1vol0      23.72ms   23.47ms      0ms  249.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
-total-      409.81ms  409.65ms      0ms  169.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol1      816.92ms  816.80ms      0ms  120.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2      407.88ms  407.66ms      0ms  219.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vs1vol0      3.68ms    3.49ms      0ms  193.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
-total-      1169.00us 107.00us      0ms  1062.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2      1169.00us 107.00us      0ms  1062.00us
0ms      0ms      0ms      0ms      0ms      0ms      0ms
0ms

```

The example above displays latencies for the 3 QoS policy groups with the highest latencies and refreshes the display 100 times before terminating.

```

cluster1::> qos statistics latency show -iterations 100 -policy-group pg1
Policy Group          Latency      Network      Cluster      Data
Disk    QoS Max    QoS Min    NVRAM        Cloud  FlexCache  SM Sync
VA
-----
-----
-----
-total-
5.14ms      0ms      0ms      308.00us    0ms    434.00us    0ms
0ms
pg1
5.14ms      0ms      0ms      308.00us    0ms    434.00us    0ms
0ms
-total-
3.42ms      0ms      0ms      280.00us    0ms    477.00us    0ms
0ms
pg1
3.42ms      0ms      0ms      280.00us    0ms    477.00us    0ms
0ms
-total-
3.50ms      0ms      0ms      274.00us    0ms    656.00us    0ms
0ms
pg1
3.50ms      0ms      0ms      274.00us    0ms    656.00us    0ms
0ms
-total-
3.92ms      0ms      0ms      276.00us    0ms    699.00us    0ms
0ms
pg1
3.92ms      0ms      0ms      276.00us    0ms    699.00us    0ms
0ms

```

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
```

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

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
```

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

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
```

Policy Group	CPU
-----	-----
-total- (100%)	9%
fast	1%
slow	3%
medium	5%
-total- (100%)	8%
slow	1%
fast	3%
medium	3%

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.

```

cluster1::> qos statistics resource cpu show -node local -iterations 100
-policy-group pg1
  Policy Group          CPU
  -----
-total- (100%)         7%
pg1                    1%
-total- (100%)         7%
pg1                    1%
-total- (100%)         7%
pg1                    1%
-total- (100%)        10%
pg1                    1%

```

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.

```

cluster1::> qos statistics resource disk show -node local -iterations 100
-policy-group pg1
  Policy Group          Disk Number of HDD Disks
  -----
-total-                3%                10
pg1                    1%                24

```

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

```

cluster1::> qos statistics volume characteristics show -iterations 100
-rows 3
Workload          ID      IOPS      Throughput Request size Read
Concurrency
-----
-----
-total-          -        68      176.00KB/s      2650B  7%
8
vs1vol0-wid102   102     24      96.00KB/s      4096B 20%
13
vol_1-wid103     103     20      80.00KB/s      4096B  0%
12
vol_2-wid104     104      1           0KB/s           0B  0%
0
-total-          -       157     528.00KB/s     3443B  3%
4
vol_2-wid104     104     48     192.00KB/s     4096B  0%
9
vol_1-wid103     103     43     172.00KB/s     4096B  0%
0
vs1vol0-wid102   102     41     164.00KB/s     4096B 14%
6
-total-          -       274    1016.00KB/s     3797B  2%
2
vs1vol0-wid102   102     85     340.00KB/s     4096B  8%
4
vol_2-wid104     104     85     340.00KB/s     4096B  0%
1
vol_1-wid103     103     84     336.00KB/s     4096B  0%
3

```

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

```

cluster1::> qos statistics volume characteristics show -vserver vs0
-volume vs0_vol0 -iterations 100
Workload          ID      IOPS      Throughput Request Size Read
Concurrency
-----
-----
-total-          -      1567      783.33KB/s      512Kb  90%
2
vs0_vol0-wid1..  15658      785      392.33KB/s      512Kb  89%
1
-total-          -      1521      760.50KB/s      512Kb  90%
1
vs0_vol0-wid1..  15658      982      491.17KB/s      512Kb  90%
0
-total-          -      1482      741.00KB/s      512Kb  89%
0
vs0_vol0-wid1..  15658      945      472.50KB/s      512Kb  90%
0
-total-          -      1482      741.00KB/s      512Kb  89%
0
vs0_vol0-wid1..  15658      945      472.50KB/s      512Kb  90%
0
-total-          -      1702      850.83KB/s      512Kb  90%
0
vs0_vol0-wid1..  15658     1018      509.00KB/s      512Kb  90%
0

```

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

```

cluster1::> qos statistics volume latency show -iterations 100 -rows 3
Workload          ID Latency      Network  Cluster      Data      Disk
Qos Max    Qos Min      NVRAM      Cloud  FlexCache    SM Sync      VA
-----
-----
-----
-total-          110.35ms  110.02ms    0ms    327.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vs1vol0         111 167.82ms  167.22ms    0ms    603.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vol1           1234 117.76ms  117.56ms    0ms    191.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vol2           999  44.24ms   44.05ms    0ms    190.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
-total-          -  38.89ms   38.63ms    0ms    256.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vol2           999  64.47ms   64.20ms    0ms    266.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vol1           1234 27.28ms   27.03ms    0ms    253.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vs1vol0         111  23.72ms   23.47ms    0ms    249.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
-total-          - 409.81ms  409.65ms    0ms    169.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vol1           1234 816.92ms  816.80ms    0ms    120.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vol2           999 407.88ms  407.66ms    0ms    219.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms
vs1vol0         111   3.68ms    3.49ms     0ms    193.00us    0ms
0ms            0ms      0ms      0ms      0ms      0ms

```

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

```

cluster1::> qos statistics volume latency show -vserver vs0 -volume
vs0_vol0 -iterations 100
Workload          ID      Latency      Network      Cluster      Data
Disk      Qos Max    Qos Min      NVRAM        Cloud  FlexCache    SM Sync
VA
-----
-----
-----
-total-          -    455.00us    158.00us          0ms    297.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
vs0_vol0-wid1.. 15658    428.00us    155.00us          0ms    273.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
-total-          -    337.00us    130.00us          0ms    207.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
vs0_vol0-wid1.. 15658    316.00us    128.00us          0ms    188.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
-total-          -    464.00us    132.00us          0ms    332.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
vs0_vol0-wid1.. 15658    471.00us    130.00us          0ms    341.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
-total-          -    321.00us    138.00us          0ms    183.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
vs0_vol0-wid1.. 15658    302.00us    137.00us          0ms    165.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
-total-          -    418.00us    142.00us          0ms    276.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms
vs0_vol0-wid1.. 15658    424.00us    143.00us          0ms    281.00us
0ms              0ms          0ms          0ms          0ms          0ms          0ms
0ms

```

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
Workload          ID      IOPS      Throughput      Latency
-----
-total-          -        97        1.90MB/s       216.87ms
vol_2-wid104     104      28        1.75MB/s       412.78ms
vol_1-wid103     103      25        100.00KB/s     169.16ms
vs1vol0-wid102   102      13        52.00KB/s      403.78ms
-total-          -        98        1276.00KB/s    89.98ms
vs1vol0-wid102   102      28        112.00KB/s     80.70ms
vol_1-wid103     103      19        76.00KB/s     114.72ms
vol_2-wid104     104      17        1088.00KB/s   257.60ms
-total-          -        78        1152.00KB/s   225.22ms
vol_1-wid103     103      17        68.00KB/s     452.27ms
vol_2-wid104     104      16        1024.00KB/s   419.93ms
vs1vol0-wid102   102      15        60.00KB/s     210.63ms
```

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

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

```
cluster1::> qos statistics volume resource cpu show -node nodeA
-iterations 100 -rows 3
  Workload          ID    CPU
  -----
--total- (100%)    -    9%
vs0vol1-wid-102    102   5%
vs0vol2-wid-121    121   2%
vs2_vol0-wid-..    212   2%
-total- (100%)    -    8%
vs0vol1-wid-102    102   5%
vs0vol2-wid-121    121   2%
vs2_vol0-wid-..    212   1%
```

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.

```
cluster1::> qos statistics volume resource cpu show -node local -vserver
vs0 -volume vs0_vol1 -iterations 100
  Workload          ID    CPU
  -----
-total- (100%)    -    2%
vs0_vol1-wid7..    7916  2%
-total- (100%)    -    2%
vs0_vol1-wid7..    7916  2%
-total- (100%)    -    1%
vs0_vol1-wid7..    7916  1%
-total- (100%)    -    2%
vs0_vol1-wid7..    7916  1%
-total- (100%)    -    2%
vs0_vol1-wid7..    7916  2%
```

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

```
cluster1::> qos statistics volume resource disk show -node nodeB
-iterations 100 -rows 3
Workload                ID  Disk Number of HDD Disks
-----
-total- (100%)          -   30%                      4
vs0vol1-wid101          101 12%                      2
vs0vol2-wid121          121 10%                      1
vol0-wid1002            1002 8%                       1
-total- (100%)          -   30%                      4
vs0vol1-wid101          101 12%                      2
vs0vol2-wid121          121 10%                      1
vol0-wid1002            1002 8%                       1
```

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.

```
cluster1::> qos statistics volume resource disk show -node local -vserver
vs0 -volume vs0_vol0 -iterations 100
Workload                ID  Disk Number of HDD Disks
-----
-total-                  -   5%                      10
vs0_vol0-wid1..         15658 1%                      6
-total-                  -   5%                      10
vs0_vol0-wid1..         15658 1%                      6
-total-                  -   6%                      10
vs0_vol0-wid1..         15658 2%                      6
-total-                  -   6%                      10
vs0_vol0-wid1..         15658 2%                      6
-total-                  -   6%                      10
vs0_vol0-wid1..         15658 2%                      6
```

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.

## **[`-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 characteristics show -iterations 100
-rows 4
Workload          ID      IOPS      Throughput Request size Read
Concurrency
-----
-----
-total-          -        68      176.00KB/s      2650B    7%
8
vs1vol0-wid102   102     24       96.00KB/s      4096B   20%
13
_Scan_Besteff..  101     23         0KB/s           0B     0%
0
vol_1-wid103     103     20       80.00KB/s      4096B    0%
12
vol_2-wid104     104      1         0KB/s           0B     0%
0
-total-          -       157     528.00KB/s     3443B    3%
4
vol_2-wid104     104     48      192.00KB/s     4096B    0%
9
vol_1-wid103     103     43      172.00KB/s     4096B    0%
0
vs1vol0-wid102   102     41      164.00KB/s     4096B   14%
6
_Scan_Besteff..  101     25         0KB/s           0B     0%
0
-total-          -       274    1016.00KB/s    3797B    2%
2
vs1vol0-wid102   102     85      340.00KB/s     4096B    8%
4
vol_2-wid104     104     85      340.00KB/s     4096B    0%
1
vol_1-wid103     103     84      336.00KB/s     4096B    0%
3
_Scan_Besteff..  101     20         0KB/s           0B     0%
0
```

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

```

cluster1::> qos statistics workload characteristics show -iterations 100
-rows 2 -policy-group pg1
  Workload          ID      IOPS      Throughput Request size Read
Concurrency
-----
-----
- total-           -      243      546.86KB/s      2307B  61%
1
file-test1_a-...  6437      34      136.00KB/s      4096B 100%
0
file-test1_c-...  5078      33      133.33KB/s      4096B 100%
0
- total-           -      310      3.09MB/s      10428B  55%
1
file-test1_a-...  6437      36      142.67KB/s      4096B 100%
0
file-test1_b-...  9492      35      138.67KB/s      4096B 100%
0
- total-           -      192      575.71KB/s      3075B  71%
1
file-test1-wi...  7872      39      157.33KB/s      4096B 100%
0
file-test1_c-...  5078      38      153.33KB/s      4096B 100%
0

```

The example above displays the characteristics 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 characteristics show -iterations 100
-workload-id 9492
  Workload          ID      IOPS      Throughput Request size Read
Concurrency
-----
- - - - -
- - - - -
-total-            -      737      2.14MB/s      3045B  79%
1
file-test1_b-...  9492      265      1058.67KB/s    4096B 100%
0
-total-            -      717      4.26MB/s      6235B  80%
1
file-test1_b-...  9492      272      1086.67KB/s    4096B 100%
1
-total-            -      623      2.50MB/s      4202B  86%
0
file-test1_b-...  9492      263      1050.67KB/s    4096B 100%
0
-total-            -      595      2.11MB/s      3712B  89%
0
file-test1_b-...  9492      266      1064.00KB/s    4096B 100%
0

```

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 (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 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
Workload          ID  Latency      Network Cluster      Data      Disk
Qos Max      Qos Min      NVRAM      Cloud  FlexCache      SM Sync      VA
-----
-----
-total-          110.35ms    110.02ms      0ms    327.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vs1vol0         111 167.82ms    167.22ms      0ms    603.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vol1            1234 117.76ms    117.56ms      0ms    191.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vol2            999  44.24ms     44.05ms       0ms    190.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
-total-          -   38.89ms     38.63ms       0ms    256.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vol2            999  64.47ms     64.20ms       0ms    266.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vol1            1234 27.28ms     27.03ms       0ms    253.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vs1vol0         111  23.72ms     23.47ms       0ms    249.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
-total-          -  409.81ms    409.65ms      0ms    169.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vol1            1234 816.92ms    816.80ms      0ms    120.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vol2            999 407.88ms    407.66ms      0ms    219.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
vs1vol0         111   3.68ms     3.49ms        0ms    193.00us      0ms
0ms            0ms          0ms          0ms      0ms          0ms
```

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

```

cluster1::> qos statistics workload latency show -iterations 100 -rows 2
-policy-group pgl
Workload          ID      Latency      Network      Cluster      Data
Disk      Qos Max    Qos Min      NVRAM        Cloud  FlexCache    SM Sync
VA
-----
-----
-----
-total-          -      4.80ms      287.00us      0ms      427.00us
4.08ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
file-test1-wi..  7872      9.60ms      265.00us      0ms      479.00us
8.85ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
file-test1_a-..  6437      8.22ms      262.00us      0ms      424.00us
7.53ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
-total-          -      4.20ms      296.00us      0ms      421.00us
3.48ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
file-test1-wi..  7872      8.70ms      211.00us      0ms      489.00us
8.00ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
file-test1_a-..  6437      6.70ms      297.00us      0ms      464.00us
5.94ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
-total-          -      5.90ms      303.00us      0ms      1.71ms
3.88ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
file-test1-wi..  7872     11.36ms      263.00us      0ms      2.06ms
9.04ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
file-test1_a-..  6437      9.48ms      250.00us      0ms      2.30ms
6.93ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms

```

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
      Workload          ID      Latency      Network      Cluster      Data
Disk   Qos Max      Qos Min      NVRAM      Cloud      FlexCache      SM Sync
VA
-----
-----
- total-          -      443.00us      273.00us          0ms      170.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
  file-test1_b-..  9492      440.00us      272.00us          0ms      168.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
- total-          -      577.00us      313.00us          0ms      264.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
  file-test1_b-..  9492      607.00us      316.00us          0ms      291.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
- total-          -      475.00us      291.00us          0ms      184.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
  file-test1_b-..  9492      476.00us      293.00us          0ms      183.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
- total-          -      628.00us      284.00us          0ms      344.00us
0ms          0ms          0ms          0ms          0ms          0ms          0ms
0ms
  file-test1_b-..  9492      591.00us      281.00us          0ms      310.00us
0ms          0ms          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
Workload          ID      IOPS      Throughput      Latency
-----
-total-          -        97        1.90MB/s        216.87ms
_Scan_Besteff..  101      31         0KB/s           0ms
vol_2-wid104     104      28        1.75MB/s        412.78ms
vol_1-wid103     103      25       100.00KB/s      169.16ms
vs1vol0-wid102   102      13        52.00KB/s      403.78ms
-total-          -        98       1276.00KB/s     89.98ms
_Scan_Besteff..  101      34         0KB/s           0ms
vs1vol0-wid102   102      28       112.00KB/s     80.70ms
vol_1-wid103     103      19        76.00KB/s     114.72ms
vol_2-wid104     104      17       1088.00KB/s    257.60ms
-total-          -        78       1152.00KB/s    225.22ms
_Scan_Besteff..  101      30         0KB/s           0ms
vol_1-wid103     103      17        68.00KB/s     452.27ms
vol_2-wid104     104      16       1024.00KB/s    419.93ms
vs1vol0-wid102   102      15        60.00KB/s     210.63ms
```

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

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.

```

cluster1::> qos statistics workload performance show -iterations 100
-workload-id 11201
Workload          ID      IOPS      Throughput      Latency
-----
-total-          -      2866      10.92MB/s      905.00us
file-testfile..  11201      674      2.63MB/s      889.00us
-total-          -      2761      10.55MB/s     1054.00us
file-testfile..  11201      638      2.49MB/s     1055.00us
-total-          -      2810      10.58MB/s      832.00us
file-testfile..  11201      685      2.68MB/s      909.00us
-total-          -      2593      9.86MB/s     1092.00us
file-testfile..  11201      632      2.47MB/s      964.00us

```

The example above displays the system performance for the QoS workload with QoS workload ID *11201* and it refreshes 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

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.

```
cluster1::> qos statistics workload resource cpu show -node local
-iterations 100 -rows 2 -policy-group pgl
  Workload          ID    CPU
  -----
-total- (100%)      -    41%
file-test1_b-..    9492   16%
file-test1_c-..    5078   16%
-total- (100%)      -    43%
file-test1_c-..    5078   17%
file-test1_b-..    9492   16%
-total- (100%)      -    40%
file-test1_c-..    5078   16%
file-test1_b-..    9492   15%
```

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.

```
cluster1::> qos statistics workload resource cpu show -node local
-iterations 100 -workload-id 9492
  Workload          ID    CPU
  -----
-total- (100%)      -    15%
file-test1_b-..    9492    3%
-total- (100%)      -    14%
file-test1_b-..    9492    3%
-total- (100%)      -    14%
file-test1_b-..    9492    2%
-total- (100%)      -    13%
file-test1_b-..    9492    3%
```

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

```

cluster1::> qos statistics workload resource disk show -node nodeB
-iterations 100 -rows 3
Workload          ID  Disk Number of HDD Disks
-----
-total- (100%)    -   30%                    4
  _RAID           -   20%                    4
vs0-wid101        101  12%                    2
file-1-wid121     121  10%                    1
vol0-wid1002      1002  8%                     1
  _WAFL           -    7%                    3
-total- (100%)    -   30%                    4
vs0-wid101        101  12%                    2
file-1-wid121     121  10%                    1
  _RAID           -   10%                    4
vol0-wid1002      1002  8%                     1
  _WAFL           -    7%                    3

```

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.

```

cluster1::> qos statistics workload resource disk show -node local
-iterations 100 -rows 2 -policy-group pg1
Workload          ID  Disk Number of HDD Disks
-----
-total-           -    3%                    10
file-test1_a-..   6437  6%                     6
file-test1-wi..   7872  6%                     6
-total-           -    3%                    10
file-test1_a-..   6437  5%                     6
file-test1-wi..   7872  5%                     6
-total-           -    3%                    10
file-test1_a-..   6437  6%                     6
file-test1-wi..   7872  6%                     6

```

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
Workload          ID  Disk Number of HDD Disks
-----
-total-          -   3%                10
file-test1_a-..  6437  6%                 6
-total-          -   3%                10
file-test1_a-..  6437  5%                 6
-total-          -   3%                10
file-test1_a-..  6437  6%                 6

```

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.

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