



qos statistics commands

ONTAP commands

NetApp

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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 pg1
Policy Group          IOPS          Throughput Request size Read
Concurrency
-----
-----
-total-              293          3.02MB/s          10783B  54%
0
pg1                  118          470.67KB/s           4096B 100%
0
-total-              181          478.14KB/s           2700B  65%
0
pg1                  117          469.33KB/s           4096B 100%
0
-total-              226          525.78KB/s           2382B  60%
1
pg1                  110          440.00KB/s           4096B 100%
1
-total-              233          1.67MB/s           7527B  49%
1
pg1                  112          446.67KB/s           4096B 100%
1
```

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 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 SnapMirror Synchronous (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-		5.88ms	308.00us	0ms	434.00us		
5.14ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
pg1		5.88ms	308.00us	0ms	434.00us		
5.14ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
-total-		4.17ms	280.00us	0ms	477.00us		
3.42ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
pg1		4.17ms	280.00us	0ms	477.00us		
3.42ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
-total-		4.43ms	274.00us	0ms	656.00us		
3.50ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
pg1		4.43ms	274.00us	0ms	656.00us		
3.50ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
-total-		4.89ms	276.00us	0ms	699.00us		
3.92ms	0ms	0ms	0ms	0ms	0ms		0ms
0ms							
pg1		4.89ms	276.00us	0ms	699.00us		
3.92ms	0ms	0ms	0ms	0ms	0ms		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
-total-	3%	10
pg1	1%	24
-total-	3%	10
pg1	1%	24
-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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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-widl1..	15658	785	392.33KB/s	512Kb	89%
1					
-total-	-	1521	760.50KB/s	512Kb	90%
1					
vs0_vol0-widl1..	15658	982	491.17KB/s	512Kb	90%
0					
-total-	-	1482	741.00KB/s	512Kb	89%
0					
vs0_vol0-widl1..	15658	945	472.50KB/s	512Kb	90%
0					
-total-	-	1482	741.00KB/s	512Kb	89%
0					
vs0_vol0-widl1..	15658	945	472.50KB/s	512Kb	90%
0					
-total-	-	1702	850.83KB/s	512Kb	90%
0					
vs0_vol0-widl1..	15658	1018	509.00KB/s	512Kb	90%
0					

The example above displays characteristics for volume `vs0_vo10` 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 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 SnapMirror Synchronous (SM Sync) operations
- Latency observed per I/O operation for Volume Activation (VA) operations
- Latency observed per I/O operation for Anti Virus Scan (AVSCAN) 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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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
AVSCAN
-----
-----
-----
-total-          110.35ms  110.02ms      0ms  327.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vs1vol10          111 167.82ms  167.22ms      0ms  603.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol1          1234 117.76ms  117.56ms      0ms  191.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2          999  44.24ms   44.05ms      0ms  190.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
-total-          -   38.89ms   38.63ms      0ms  256.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2          999  64.47ms   64.20ms      0ms  266.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol1          1234  27.28ms   27.03ms      0ms  253.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vs1vol10          111  23.72ms   23.47ms      0ms  249.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
-total-          - 409.81ms  409.65ms      0ms  169.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol1          1234 816.92ms  816.80ms      0ms  120.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vol2          999 407.88ms  407.66ms      0ms  219.00us      0ms
0ms          0ms      0ms      0ms      0ms      0ms      0ms
0ms
vs1vol10          111   3.68ms    3.49ms      0ms  193.00us      0ms
0ms          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          AVSCAN
-----
-----
-----
-total-          -    455.00us    158.00us          0ms    297.00us
0ms            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            0ms
-total-          -    337.00us    130.00us          0ms    207.00us
0ms            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            0ms
-total-          -    464.00us    132.00us          0ms    332.00us
0ms            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            0ms
-total-          -    321.00us    138.00us          0ms    183.00us
0ms            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            0ms
-total-          -    418.00us    142.00us          0ms    276.00us
0ms            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            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 FlexVol volumes and FlexGroup

constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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					
vs1vol10-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					
vs1vol10-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					
vs1vol10-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 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 SnapMirror Synchronous (SM Sync) operations
- Latency observed per I/O operation for Volume Activation (VA) operations
- Latency observed per I/O operation for Anti Virus Scan (AVSCAN) 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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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
AVSCAN
-----
-----
-----
-total-          110.35ms    110.02ms      0ms    327.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vs1vol10          111 167.82ms    167.22ms      0ms    603.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vol11            1234 117.76ms    117.56ms      0ms    191.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vol12            999  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
vol12            999  64.47ms     64.20ms      0ms    266.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vol11            1234  27.28ms     27.03ms      0ms    253.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vs1vol10          111  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
vol11            1234 816.92ms     816.80ms      0ms    120.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vol12            999 407.88ms     407.66ms      0ms    219.00us      0ms
0ms            0ms            0ms      0ms      0ms      0ms
0ms
vs1vol10          111   3.68ms      3.49ms      0ms    193.00us      0ms
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 pg1
```

Workload	ID	Latency	Network	Cluster	Data
Disk Qos Max	Qos Min	NVRAM	Cloud	FlexCache	SM Sync
VA AVSCAN					

-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	AVSCAN					

-total-		-	443.00us	273.00us	0ms	170.00us
0ms	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	0ms					
-total-		-	577.00us	313.00us	0ms	264.00us
0ms	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	0ms					
-total-		-	475.00us	291.00us	0ms	184.00us
0ms	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	0ms					
-total-		-	628.00us	284.00us	0ms	344.00us
0ms	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	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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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 pg1
```

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 FlexVol volumes and FlexGroup constituents. Otherwise it will display data for FlexVol volumes and FlexGroup volumes.

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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