

PERFORMANCE MONITORING MADE EASY WITH STORAGE RESOURCE MONITOR

By: James Honey





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Managing storage is a constant dance of making sure resources are available for the applications that need them, and making sure resources are constantly in use, because having wasted resources in addition to no resources can be problem. <u>SolarWinds® Storage Resource Monitor</u> helps make this dance a little less complicated. This paper will not only show the different parts of Storage Resource Monitor in relation to storage performance, but how each of these parts can give you the information you need to monitor your environment and maximize one of your largest IT investments.

To start, we will address some basic information regarding storage performance and how Storage Resource Monitor (SRM) presents the data. Based on <u>customer feedback</u>, one of the best things about SRM is that users are able to quickly view and understand their storage performance problems. To start you will see what initial performance information SRM provides, and ways to interpret the data. Depending on your environment, there will always be different ways to interpret performance data, so your mileage will vary.

The image below is the SRM Summary dashboard. In one simple view you get a list of storage devices being monitored, alerts, events, and performance and capacity summaries.

torage Home										
All Storage Obje GROUPED BY VENDOR	ects				EDIT HELP	All Active Alerts (39 ALL UNACKNOWLEDGED ALERTS)			EDIT HELP
⊢ ⊡⊗ HP						ALERT NAME	MESSAGE	TRIGGERING	ACTIVE TIME	RELATED NODE
						▲ LUN Total Latency is greater than or equal to 20ms	LUN Total Latency is greater than or equal to 20ms was triggered.	00257 Volume 00257	7h 20m	
Constant NetApp Constant Pure Storage Constant Pure Storage	, Inc.					LUN Total Latency is greater than or equal to 20ms	LUN Total Latency is greater than or equal to 20ms was triggered.	00256 Volume 00256	7h 20m	
Storage Objects	by Performan	ce Risk			Q EDIT HELP	LUN Total Latency is greater than or equal to 20ms	LUN Total Latency is greater than or equal to 20ms was triggered.	swi-esx	1d 6h 31m	
RESOURCE	TYPE	ARRAY	LATENCY	IOPS	THROUGHPUT	Pool Oversubscribed Capacity is between	Pool Oversubscribed Capacity is between	aggr1	1d 6h 40m	
200257 Volume 00257	LUN	000194900393	777 ms	0	0.00 MB/s	A Pool Oversubscribed	Pool Oversubscribed	aggr1	1d 6h	
. ₽© 00256 Volume 00256	LUN	000194900393	263 ms	0	0.00 MB/s	10%	was triggered.	988 ^{, 1}	40m	
👰 swi-esx	LUN	Storage Center 60964	50 ms	0	0.00 MB/s		nems on page Show an	Display	/ing objec	ts 1 - 5 of 39
⊡ <mark>⊗</mark> A	STORAGE POOL	€ 208000c0ffda2b f9	9.96 ms	1	0.00 MB/s	Array Raw Disk Cap	acity Summary			C EDIT HELP
⊡⊗ dg01- thick	STORAGE POOL	© 208000c0ffda2b f9	9.70 ms	0	0.00 MB/s	Spare 📕 Used 📃 Re	maining			
	of 513 🕥 🛞 Ite	ms on page 5 Show	vall Displa	aying ob	jects 1 - 5 of 2562	Dell_MD3200i	0.00 KE	3 / 3.00 TB / 0.	.00 KB / 3	.00 TB Total
Storage Objects	by Capacity R	isk			Q EDIT HELP	NFXCDCXTREMIO	0.00 KB /	18.19 TB / 0.0	IO KB / 18	.19 TB Total
RESOURCE TYPE	E ARRAY L	AST 7 DAYS	WARNII	NG CRI	FICAL AT	AMS2100@10.1.134.253	0.00 KE	8 / 3.57 TB / 0.	.00 KB / 3	.57 TB Total
22 LUN	AMS2100 @10.1.134.253	Used: 1009	6 > 90%	> 9 No	5% 100% w Now	NetApp-ESeries-2650	0.00 KE	3 / 3.27 TB / 0	.00 KB / 3	.27 TB Total
	@1011134233	Used: 100			EN 400%	pstorv	0.00 KE	3 / 5.12 TB / 0	.00 кв / 5	.12 TB Total



The **All Storage Objects** widget will not only show you all the storage devices, but also point to devices that are having problems using easy-to-see green, yellow, and red notifications. To get to the exact cause, you can drill down into the array data until you get to the specific storage resource with the problem.

All Storage Objects	EDIT HELP
- Dell	
▶ 🥞 Dell_MD3200i	
▶ 🛃 Dell_MD3600i	
🔻 🍓 Storage Center 60964	
▼ Storage Pools	
Assigned	
▶ LUNs	
stp-eqlogic-02	
The EMC	
🕨 🍓 isilon-cluster	
system:VNX5200:APM001451217922007	
Hitachi	
▶ □ 🔁 HP	
VetApp	
🕨 🍓 bas-netappv81	
Iab-netapp814-clus	
Image: March 100 metapp822-clus	
Pure Storage, Inc.	
> Story	

A faster way to recognize performance problems is with either **All Active Alerts** or **Storage Objects by Performance Risk.**

The **Storage Objects by Performance Risk** will give you a summary of performance problems sorted by latency. Like most things, high latency is not an ideal situation. However, the definition of "high" varies by environment and application. In addition to latency, IOPS and throughput are shown, and you can tailor the thresholds for the individual resources to be more specific to your requirements. Using this information allows you to troubleshoot your top performance problems by latency at the main screen immediately.



Storage Objects b	y Per	formance Risk			Q HELF
RESOURCE	TYPE	ARRAY	LATENCY	IOPS	THROUGHPUT
E tex-esx-02_Lun13	LUN		100 ms	8	0.10 MB/s
St.Petersburg ESX i 5.5 Cluster Lun12	LUN		64 ms	9	0.27 MB/s
👰 lab-dem-sql-lun0 1	LUN		62 ms	92	14.75 MB/s
👰 swi-esx	LUN	Compellent Storag e Center	51 ms	0	0.00 MB/s
St.Petersburg ESXi 5.5 Cluster Lun0	LUN		46 ms	4	0.11 MB/s
	536 🕥	🍥 Items on page	5 Show a Displa	II iying obj	ects 11 - 15 of 2680

In addition to the performance information on the SRM Summary Dashboard, the Performance Dashboard lets you see additional performance data points. It includes the performance objects by risk and information for **LUNs by Performance** and **NAS Volumes by Performance**. Any of these sections will allow you to instantly dig into the specific storage resource that is experiencing performance problems.

erformance Dash	boa	ď													6
Storage Objects by	Perf	ormance Risk			Q EDIT HELP	All Active Alert	s (44) LERTS			EDIT HELP	LUNs by	Performance			Q EDIT HELP
RESOURCE	TYPE	ARRAY	LATENCY	IOPS	THROUGHPUT				ACTIVE	RELATED	LUN	STORAGE POOL	IOPS	LATENCY	THROUGHPUT
SYD-2K3-FCHBA: E MC	LUN	CLARIION+APM000 71600268	1076 ms	0	0.00 MB/s	ALERT NAME	MESSAGE	TRIGGERING OBJECT	TIME	NODE		Co Virtual P	1855	0.62 mr	10.80 MB
90 SYD-2K3-FCHBA; E	IUN	CLARIION+APM000	801 ms	0	0.00 MB/s	Minimum IOPS	IOPS was triggered.	CDC_ESX_FC_VMFS02	1m		FS01	ool	1055	0.02 115	10.00 MID
MC SYD-2K3-FCHBA+E MC	LUN	71600268	667 ms	0	0.00 MB/s	LUN Total Latency is greater than or equal to	LUN Total Latency is greater than or equal to 20ms was triggered.	LUN 13 - Ticket 110757	4d 13h 32m		CDC_IS CSI_DEV_VM FS02	Col Virtual P	860	0.76 ms	31.13 MB
Description Syd-2K3-FCHBA	LUN	CLARHON+APM000 71600268	667 ms	0	0.00 MB/s	20ms	LUN Total Latency is				CDC_IS CSI_VMFS06	Co Virtual P col	650	0.45 ms	20.64 MB
20 SYD-2K3-FCHBA, E MC	LUN	CLARIION+APM000 71600268	534 ms	0	0.00 MB/s	Latency is greater than or equal to 20ms	greater than or equal to 20ms was triggered.	SYD-2K3-FCHBA, EMC	47m		DCLIS CSL_VMFS03	Co Virtual P ool	598	0.46 ms	15.16 MB
	4 🕥	Items on page 5	Show all E	lisplaying	g objects 1 - 5 of 1168	LUN Total Latency is greater than or equal to	LUN Total Latency is greater than or equal to 20ms was triggered.	SYD-2K3-FCHBA: EMC	5d 1h 47m		CDC_ES X_FC_VMF50 1	Col Virtual P	458	0.58 ms	17.10 MB
All Storage Objects					EDIT HELP	20ms	LUN Total Latency is					ge 1 of 215 (ms on page Displaying o	5 Show all bjects 1 - 5 of 1071
Cigo IBM						Latency is greater than or equal to 20ms	greater than or equal to 20ms was triggered.	SYD-2K3-FCHBA*EMC	5d 1h 47m		NAS Volu	mes by Perfo	orm		Q EDIT HELS
► Co NetApp						O Page 1 of S	🛞 🍥 Items on page	Show all			ance				
► Cite EMC								Displa	ying objec	ts 1 - 5 of 44	VOLUME	STORAGE	IOPS	LATENCY	THROUGHPUT
						Event Summar	y			EDIT HELP	Be /ifs	Co Mittual Roo	821	Unknown	434.62 KR
						TODAY					Em vol0	CO	52	0.02 mr	41.45 KB
						82 LUN Critica							50	0.05	24.51 KB
						25 LUN Warnin	75					aggr0n2	50	0.00 ms	24.31 NB

This data allows you to instantly address performance problems. To see overall performance at the array and/or storage pool level, SRM gives you access to that data in just one or two clicks. For array-specific performance information, select an array in the **All Storage Objects**. The **Array Details** screen will show detailed information for that array. Clicking once more in the **All Storage Objects** section will show the storage pools and allow you to select the **Storage Pool Details** screen for each pool. Going even lower will show all the LUNs assigned to each pool.





Selecting a LUN will bring up the **LUN Details** screen. Each of these screens will present specific performance information as it relates to that storage resource.

All Storage Objects	All	Storage	Objects
---------------------	-----	---------	----------------

All Storage Objects GROUPED BY VENDOR
► Cio IBM
VetApp
Image: Bas-netappv81
▶ ੴ netapp822-clus
The EMC
CLARiiON+APM00071600268
The Storage Pools
E 0000
Description 10001
✓ □ 0002
✓ LUNs
SYD-2K3-FCHBA
SYD-2K3-FCHBA*EMC
SYD-2K3-FCHBA, EMC
SYD-2K3-FCHBA: EMC
SYD-2K3-FCHBA; EMC
SYD-2K3-FCHBA+EMC
Sydney Hyperv Cluster FC01
tex-esx-02_Lun11
Be bas-esx-02-rdm01
是 LUN 28
There are 2 more items. Show next 2.
isilon-cluster
lab-vnx5200
system:vNX5200:APM00145121/922007
Dell



Array Details

Array Details - 🍬 F/	A-420 - 🗟 Summary				
~	Management		HELP	Array Status	HELP
SUMMARY BLOCK STORAGE	ARRAY	tistics Poll 🔿 Topology Poll 🐵 Rediscover 🖌	⁹ Map Server Volumes	Zoom 1h 12h 24h	AVERAGE THROUGHPUT
ADD TAB	Array Details		HELP	2,649.81 IOPS	47.34 MB/sec
	ARRAY STATUS	FA-420 is OK		մենենեննեն	datatulahatata.
	MANUFACTURER:	Pure Storage, Inc.		USABLE CAPACITY	NAS CAPACITY
	MODEL:	FA-420		0.006	006
	IP ADDRESS:	10.1.132.185		90%	0%0
	VENDOR STATUS CODE:	Active		13 79 TB / 15 24 TB	0.00 KB / 0.00 KB
	MONITORING PROVIDERS:	10.1.132.185 (Block)		13.13 137 13.24 13	0.00 10 1 0.00 10
	SERIAL NUMBER:	31b3d4d6-b7d6-0289-9ea9-ed154	dca6ffa	Performance Summary	HELP
	FIRMWARE:	4.6.3		,	
	LAST DATABASE UPDATE:	Saturday, September 3, 2016 1:19	AM	Oct 10 2016, 8:30 am - Oct 11 2016, 8:30 am	Zoom 1h 12h 24h
	Performance Comparison		HELP	IOPS Total IOPS	~~~~~
		Read IOPS and Total IOPS		Throughput Total MB / sec	
	Oct	10 2016, 8:00 am - Oct 11 2016, 8:00 am		IO Size Total KB	
	Read IOPS	▼ Total IOPS	v	R/W IOPS Ratio R / W %	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	4000				4:00 PM 11 Oct 8:00 AM

Storage Pool Details









LUN Details

JN Details		HELP Performance Summary
LUN STATUS:	RDM_for_Hyp is OK	Oct 10 2016, 8:30 am - Oct 11 2016, 8:30 am
NAME:	RDM_for_Hyp	
UUID:	624A937031B3D4D6B7D60289000	01135D Total IOPS
CACHE ENABLED:	True	Latency Total ms
STORAGE POOL:	Concrete.001	
ARRAY:	👘 FA-420	Throughput Total MB / sec
VENDOR STATUS CODE:	Information	
RAID CONFIGURATION TYPE:	RAID3D	
TYPE:	Thin	R/W IOPS Ratio R/W %
PROTOCOL:	iSCSI	4:00 PM
READ ONLY:	False	
MAPPED:	True	
TOTAL SIZE:	2.00 TB	
FILE SYSTEM USED CAPACITY:	Unknown	Active Alerts on This LUN (0)
CONSUMED CAPACITY:	1.34 TB	ALERT NAME MESSAGE TRICCEDING ODIECT ACTIV
LAST DATABASE UPDATE:	Saturday, September 3, 2016 1:11	AM
PROJECTED RUN-OUT:	> 1 year	IOPS Performance Per Related LUNs
pacity Summary		HELP CURRENT POOL: Concrete.001 V

Now, what do these high-level performance views do for the end-user? Right from the start, you can instantly discover, identify, and start troubleshooting performance problems. The goal is that the critical problems are up front, and the need to check each storage device one by one for problems is eliminated. In addition, having the ability to customize the dashboards and information is critical to tailoring the monitoring to your needs.

DRILLING INTO THE DETAILS

Having a high-level view of storage performance is good for a quick overview, or understanding how things are operating. To take your monitoring to the next level, having access to details is critical. Now that we have reviewed the top level storage dashboards and performance data points that SolarWinds Storage Resource Monitor provides. This section will cover performance monitoring at the array, storage pool, and LUN/Volume level.

The **Array Details** screen is usually the first stop when looking at your storage performance. This is a great starting point for when you want to get a look at the overall performance for a storage array. Having this information is ideal when you want to compare the expected performance of an array versus how the array is actually performing. In addition, you can get an understanding of read/write performance ratios in relation to the overall performance.

Array Details - 🤏 F	A-420 - 🕯 Summary				
<	Management		HELP	Array Status	HEL
SUMMARY BLOCK STORAGE	ARRAY	ics Poll 🔿 Topology Poll 🖗 Rediscover 🖉 Map Se	rver Volumes	Zoom 1h 12h 24h	AVERAGE THROUGHPUT
ADD TAB	Array Details	int	HELP	2,649.81 NPS	47.34 MB/sec
	ARRAY STATUS	FA-420 is OK		մեմենինեննեն	վ. վ. կ. կ. կ. կ. կ. կ. կ. կ.
	MANUFACTURER:	Pure Storage, Inc.		USABLE CAPACITY	NAS CAPACITY
	MODEL:	FA-420		0006	004
	IP ADDRESS:	10.1.132.185		90%	0%0
	VENDOR STATUS CODE:	Active		12 TO TR / 15 24 TR	0.00 KB (0.00 KB
	MONITORING PROVIDERS:	10.1.132.185 (Block)		13/79 107 13:24 10	0.00 KB / 0.00 KB
	SERIAL NUMBER:	31b3d4d6-b7d6-0289-9ea9-ed154dca6ffa		Performance Summary	не
	FIRMWARE:	4.6.3			
	LAST DATABASE UPDATE:	Saturday, September 3, 2016 1:19 AM		Oct 10 2016, 8:30 am - Oct 11 2016, 8:30 am	Zoom 1h 12h 24
	Performance Comparison		HELP	Total IOPS Total IOPS	~~~~~
	Re	ead IOPS and Total IOPS		Throughput Total MB / sec	\sim
	Oct 10	2016, 8:00 am - Oct 11 2016, 8:00 am		IO Size Total KB	
	Read IOPS	v Total IOPS	v	R/W IOPS Ratio R / W %	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	4000		_	4	00 PM 11 Oct 8:00 AM

The **Block Storage** and **File Storage** tabs allow you to quickly get into the underlying performance information for the device's storage pools and LUNS/Volumes. Each of these tabs will show you latency summaries and performance summaries for the individual resources. At a glance, this will let you see if you have any latency issues at the LUN/Volume level, and what your highest performing LUN/volumes are by IOPS, throughput, or latency.

Arra	y Details - 🛸	Ne	tApp (7-Mode) - 🗏 Bl	ock Stor	age					
ŵ	SUMMARY	«	Thin LUNs							Q HELP	Latency Histogram for LUNs
	BLOCK STORAGE		LUN	STORAGE POOL	ASSOCIATED ENDPOINT	TOTAL SIZE ▼	PROVISIONED CAPACITY	PROVISIONED	FILE SYSTEM USED CAPACITY	FILE SYSTEM USED %	Latency Performance across LUNs Oct 11 2016, 7:00 am - Oct 11 2016, 8:00 am
•	ADD TAB		/vol/lun_mveno0 2_disk2_vol /lun_mveno02_di sk2	D o ag gr1		3.00 GB	39.25 MB	196	Unknown	Unknown	Zoom Latest PollTh12h24h
			Vol/netapp_7mo de_rdm01_bas_e sx_04 /netapp_7mode_ rdm01_bas_esx_ 04	Co ag gr1		1.50 GB	0.00 KB	0%	Unknown	Unknown	0 2 3 0 11 0 21-30 0 5 4 0 1 0 5 0
			20 /vol/netapp_7mo de_rdm02_bas_e sx_04 /netapp_7mode_ rdm02_bas_esx_ 04	D e ag gr1		1.50 GB	0.00 KB	0%	Unknown	Unknown	milliseconds 2 8
			Vol/netapp_7mo de_iscsi_vol01_ba s_esx_04 /netapp_7mode_i scsi_vol01_bas_e	De ag gr1		1.50 GB	26.08 MB	2%	Unknown	Unknown	LUN STORAGE LATENCY 1005 THEOUGHPUT POOL (TOTAL) (TOTAL) (TOTAL) //ool/un_mveno02_disk2 vol/un_mveno02_disk2
			sx_04					[Q HELP	Joslinetapp_7mode_rdm 01_bas_tex.Q4 Qm_aggr1 0 ms 0.00 KB /netapp_7mode_rdm01_b as_tex_04 0 ms 0.00 KB
			LUN STORAGE	ASSO	CIATED	TOTAL SIZ	E.▼ FIL	E SYSTEM	FILE SY	STEM	20 /vol/netapp_7mode_rdm

Storage Pool Details provide storage administrators the ability to understand performance at a pool/RAID level. Depending on how storage resources are assigned to applications, this can provide the ability to understand performance for similar applications. For example, a VM farm can be created for different instances of the same application. Having the applications tied to the same pool of storage with different LUNs is ideal as you have the same pattern of read/write ratio without running into instances where different read/write ratios are involved. This can cause application performance problems if the disk is having to store random data in one instance and sequential the next.



The **LUN and Volume Details** screen is where you can see performance at the lowest level. This is where you can tie application performance directly to the assigned storage, and where the power of SRM really comes into play. Not only can you see the individual LUN performance, you can also see it in relation to other LUNs in the same storage pool. Did a LUN in the same pool spike performance? Are all the LUNs in the same pool experiencing high latency? These are the kinds of questions the LUN Details screen can help answer.

LUN Details	(3		HELP	Performance Summary
LUN STATUS:	9 0	RDM_for_Hyp is OK		Oct 10 2016, 8:30 am - Oct 11 2016, 8:30 am
NAME:		RDM_for_Hyp		
UUID:		624A937031B3D4D6B7D602890001135D		Total IOPS
CACHE ENABLED:		True		Latency Total ms
STORAGE POOL:		Concrete.001		
ARRAY:		FA-420		Throughput Total MB / sec
VENDOR STATUS CODE:		Information		
RAID CONFIGURATION TYPE:		RAID3D		
TYPE:		Thin		R/W IOPS Ratio R/W %
PROTOCOL:		iSCSI		4:00 PM
READ ONLY:		False		
MAPPED:		True		() () () () () () () () () ()
TOTAL SIZE:		2.00 TB		
FILE SYSTEM USED CAPACITY:		Unknown		Active Alerts on This LUN (0)
CONSUMED CAPACITY:		1.34 TB		ALEDT NAME MESSAGE TRIGGERING ORIECT ACTIVE
LAST DATABASE UPDATE:		Saturday, September 3, 2016 1:11 AM		ACTIVE MESANCE INIGERING OBJECT ACTIVE
PROJECTED RUN-OUT:		> 1 year		IOPS Performance Per Related LUNs
apacity Summary			HELP	CURRENT POOL: Concrete.001 V





As you can see, the more in-depth you go with Storage Resource Monitor, the more information and comparisons become available. All of the information presented is critical to understanding your storage performance and how it affects your overall environment. In the next section we will cover thresholds and alerting and how with the right settings and planning you can make Storage Resource Monitor not just an important monitoring tool, but a critical one.

THRESHOLDS AND ALERTING: WHERE THE MAGIC HAPPENS

Above we talked about how SRM presents high level performance information and then we dove into the details around storage performance from the array, pool, and LUN/Volume detail. Now let's look at using thresholds and alerting to maximize your storage monitoring. This is where you can make Storage Resource Monitor adapt to your environment, while also showing what performance information matters to you.

Thresholds

Setting thresholds is a key step in making sure your data center runs efficiently. When you start Storage Resource Monitor the first time, there are pre-set thresholds based on general best practices. This will work in most situations, however there are solutions that require something more specific. There are applications in your environment that require low latency, and if any of them deviate from that, it would cause major headaches. There are other applications that require a specific amount of IOPS, and any dip will slow the business down and lead to your inbox being filled with not-so-nice requests for information. Having your thresholds set properly can help you avoid so-called fire drills. The SRM Settings section is where you can set global thresholds for key storage resources.

Getting Started with	SRM	
Start Discovering and mo	onitoring your storage devices.	
» Add Storage Device	Map Server Volumes to Storage Targets Manage Storage Objects	
Global SRM Settings		
View and manage global	SRM Settings	
» Global Array Threshold	ls	
» Global Storage Pool Th	resholds	
» Global LUN Thresholds		
» Global NAS Volume Th	resholds	
» Global File Share Thres	holds	
» Global Vserver Thresh	olds	
License Summary		
View your license type ar	id configure your SRM Profiler Module Integration.	
» Manage SRM Profiler N	Nodule Integration	
Groups		
Storage objects may be a	dded to groups. Groups may also contain other groups, nodes and interfaces.	
» Manage Groups		
Manage Credentia	ls	
Add, remove, and edit	credentials used to monitor devices in SRM	
• EDM Condensiele Librer		





Thresholds can be set for IOPS, throughput, I/O size, capacity, and latency (LUN and volume specific). In addition, some of these can be set by read, write, or total, so you can even customize for applications that are heavy on read or heavy on write performance.

SRM Array T	hresholds						
Configure Array thres	holds for all Orion module	5					
IOPS (TOTAL)							
Critical Level	1000000	1 IOPS to 56294995	3421312 IOPS	,	Arrays with Total KOPS above	e the currently's	
Warning Level	900000	1 IOPS to 56294995	3421312 IOPS	,	e the currently s		
IOPS (READ)		SRM Storage					
Critical Level	1000000	Configure Storage Po					
Warning Level	900000	IOPS (TOTAL)					
IODS (WRITE)		Critical Level	1000000	1 IOPS to 562949953421312 IOPS		Storage Pools with Total IO	5
Critical Level	1000000	Warning Level	900000	1 IOPS to 562949953421312 IOPS		Storage Pools with Total IO	s
Warning Level	900000	IOPS (READ)		SRM LUN The	resholds		
IOPS (OTHER)		Critical Level	1000000	Configure LUN shreaho	ids for all Orion modules		
Critical Level	1000000	Warning Level	900000	IOPS (TOTAL)			Line on Tracings' share the surrent set of
Warning Level	900000	IODE ANDITES		Critical Level	1000000	1 KUPS to 562949953421312 KUPS 1 KUPS to 562949953421312 KUPS	LUNs with Total IOPS above the currently set ve
Harring Level	900000	IOPS (WRITE)	(worning Level	900000		
THROUGHPUT (TOTAL)		Critical Level	1000000	IOPS (READ)			Line on Read Mark to the survey of the
Critical Level	1024	Warning Level	900000	Critical Level	1000000	1 KOPS to 362949953421312 KOPS	LUNs with Read IOPS above the ourrently set ve
Warning Level	1000	IOPS (OTHER)		marined rane	900000		
		Critical Level	1000000	IOP5 (WRITE)			
THROUGHPUT (READ)		Warning Level	900000	Critical Level	1000000	1 KOPS to 562545953421312 KOPS	LUNS with Write IOPS above the currently set vi
Critical Level	1024			warring Level	900000		care was providently about the carrieray and
Warning Level	1000	THROUGHPUT (TOTAL)		IOP5 (OTHER)			
		Critical Level	1024	Critical Level	1000000	1 KIPS to 562949953421312 KIPS	LUNs with Other IOPS above the currently set v
		Warning Level	1000	Warning Level	900000	1 IGPS to 562940053421312 IGPS	LUNs with Other IOPS above the currently set w
		THROUGHPUT (READ)		LATENCY (TOTAL	3		
		Critical Level 1024		Critical Level	20	1 ms to 10000 ms	LUNs with Total Latency above the currently set
		Warning Level	1000	Werning Level	10	1 ms to 10000 ms	LUNs with Total Latency above the currently set
		warning cever 1000		LATENCY (READ)			
		THROUGHPUT (WRITE)		Critical Level	20	1 ms to 10000 ms	LUNs with Read Latency above the currently set
				Warning Level	10	1 ms to 10000 ms	LUNs with Read Latency above the currently set
				LATENCY (WRITE	0		
				Critical Level	20	1 ms to 10000 ms	LUNs with Write Latency above the currently set
				Warning Level	10	1 ms to 10000 ms	LUNs with Write Latency above the currently set

Using global settings allows you to tailor monitoring for your data center, but, as you know, there are also applications that differ from the others that need special attention. If that's the case, Storage Resource Monitor has you covered. Under each details screen (array, pool, and LUN/Volume), you can adjust the thresholds for that specific resource. Pool 1 needs to maintain 500 IOPS and I need to know when it goes below it. You can set the threshold to warning when IOPS are less than or equal to 600, and critical when IOPS are less than or equal to 550. LUN 2 has to maintain latency of 50ms. You can set the threshold to warning when it hits 40ms, and critical when it hits 50ms. The thresholds you set for the individual resources will translate to the summary screens we talked about before, so you can see at-a-glance if the required performance needs are being met.





torage Pool Details - 🏾 lab-vnx5	200 - 🤍 0001 - 🕯	Summary		
Storage Pool Details		MANAGE EDIT HELP		
STORAGE POOL STATUS:	0001 is OK			
NAME:	0001			
ARRAY:	lab-vnx5200			
VENDOR STATUS CODE:	ок			
TYPE:	S Edit Properties	owing selected objects		
RAID CONFIGURATION TYPE:	R • 0001	ound server orders		
LUN COUNT:	2 Name:	0001		
TOTAL USABLE CAPACITY:	2			
TOTAL SUBSCRIBED CAPACITY:	2 IOPS(Total)	☑ Override Orion G	eneral Thresholds	
OVER-SUBSCRIBED CAPACITY:	0 🔺 Warning:	Less than or Equal to	600	
PROVISIONED CAPACITY:	2			
LAST DATABASE UPDATE:	F O Critical:	Less than or Equal to	500	
PROJECTED RUN-OUT:	> IOPS/Read)			



Alerting

So now you're thinking, "Thresholds are great, but if something happens when the custom thresholds are reached, I need to be alerted." In addition to custom thresholds, setting custom alerts will make sure you know when something goes wrong quickly. Like before, the standard alerts in SRM will get you going, however custom alerts help make sure you understand if all of your resources are performing as required. Creating custom alerts can be done for groups of resources with the same performance profile or for specific resources that have a very unique requirement.







You can set a single alert for a specific storage resource, or set an alert for multiple resources that share a common performance profile. There is the ability to customize everything from a specific team to handle the alert, to setting that the condition has to exist for a period of time. You can even set the alert to be enabled only during a certain time of day. Setting a custom alert for a specific time helps avoid the unwanted alerting noise during expected downtime and/or planned degraded performance.



Alert Definition Details		EDIT ALERT DEFINITION EDIT HELP
Name: DEMO LUNs Minimum IOPS		
Description: No description specified		
Type of Property to monitor LUN		
Severity: Serious		
Evaluation Frequency of alert: Every 30 seconds		
Alert Custom Properties: (1) ResponsibleTeam: Not specified		
Scope of this Alert: LUNs Custom Properties - FC_DEM	O_LUNs - is	equal to - DEMO_Luns
Trigger Condition: At least one child condition must be IOPS (Total) Threshold - Warning V IOPS (Total) Threshold - Critical Va	satisfied (Of Value Reach alue Reache	R) ed - is equal to - 1 d - is equal to - 1
Reset Condition: When the trigger condition is no long	ger true	
Time of Day schedule: Alert is always enabled		
Trigger Action: No trigger action specified		
Reset Action: No reset action specified		

By using thresholds and custom alerts, Storage Resource Monitor has you covered when monitoring storage performance for all your applications. Along with dashboards and storage resource details, you can easily stay ahead of your storage performance needs and track when more resources are needed.







ABOUT SOLARWINDS

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