Storage Management First Steps - Inventory and Capacity Control

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Prepared on: 7/28/11
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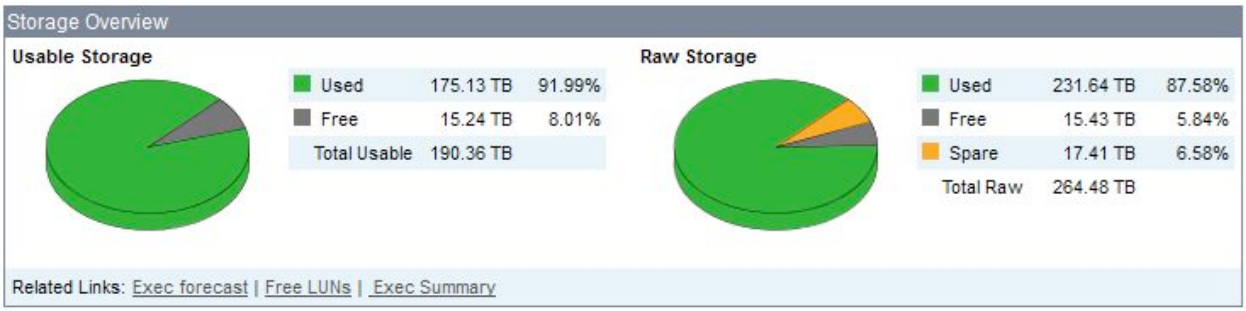
As discussed in Storage Switzerland's recent article "Why Bother Managing Storage?" one of the challenges when selecting a storage management application is knowing what to do with the solution once it's installed. The goal of that article was to motivate data center managers to deploy a storage resource management solution prior to storage problems arising. This allows for a more balanced approach to the use of the solution.

The challenge users face with SRM tools when first implemented is there are so many things to report on that it can overwhelm the storage administrator. The goal of this article is to help the storage administrator understand what they should do first as information begins to pour in from the SRM tool.

Take Inventory

The first step is to allow the storage management application to collect information about the physical and virtual environment so that an inventory of what's installed can be created. Products like SolarWinds Storage Manager powered by Profiler do this by pushing an agent onto the servers that are connecting to storage and scanning for devices where an agent can't be placed, like arrays, VMware and switches. The use of agents has the advantage of providing the inventory faster and allows for more real time updates than competitive agent-less crawl technologies. In today's dynamic, virtualized infrastructure, instant understanding of the environment is more important than ever.



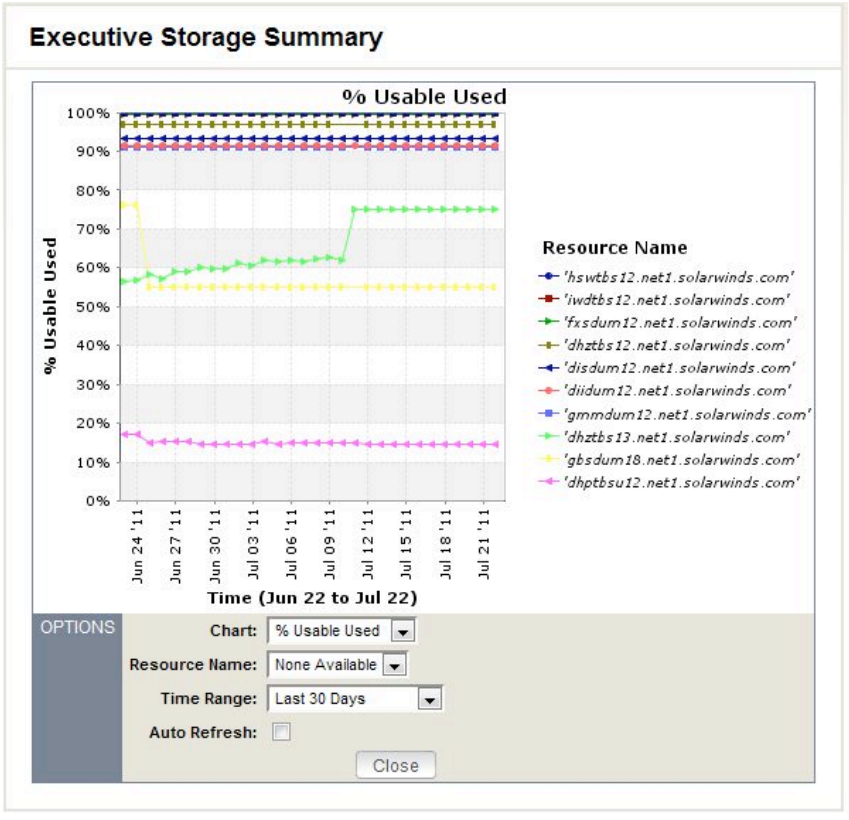
Simply gathering this inventory, by itself, has enormous value. Many organizations have grown so large and so fast they have lost track of their IT assets and have no real way of knowing what's available for use in their environment. As a result, new equipment is often purchased even though existing resources could have been used.

Executive Storage Summary

Show Description
Enterprise: Executive Storage Summary
Time Zone: US Central Standard Time (Chicago)
Time Range: Current
Printer Friendly

Row	Time	Resource Name	Physical Disks	Raw Capacity	Raw Spare	Raw Used	% Raw Used	Raw Free	Overhead	Usable Capacity	Usable Used	% Usable Used	Usable Free	Free LUNs	Estimated RAID5	Estimated RAID10
1	07/22/2011 00:08:59	dhptbsu12.net1.solarwinds.com	6	2.43 TB	414.01 GB	2.02 TB	100.00	0.00 Bytes	965.63 GB	1.08 TB	159.96 GB	14.48	944.46 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
2	07/21/2011 23:39:42	dhztbs12.net1.solarwinds.com	135	48.82 TB	1.81 TB	46.84 TB	99.65	169.08 GB	8.05 TB	38.79 TB	37.66 TB	97.08	1.13 TB	2.19 TB	112.72 GB	84.54 GB
3	07/22/2011 00:10:23	dhztbs13.net1.solarwinds.com	26	3.47 TB	273.54 GB	3.21 TB	100.00	0.00 Bytes	892.02 GB	2.33 TB	1.75 TB	75.04	596.75 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
4	07/21/2011 23:29:37	diidum12.net1.solarwinds.com	24	6.54 TB	278.90 GB	6.26 TB	100.00	0.00 Bytes	836.70 GB	5.45 TB	4.98 TB	91.50	473.93 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
5	07/21/2011 23:28:47	disdum12.net1.solarwinds.com	24	6.54 TB	278.90 GB	6.26 TB	100.00	0.00 Bytes	836.70 GB	5.45 TB	5.08 TB	93.34	371.53 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
6	07/21/2011 23:35:20	fxsdum12.net1.solarwinds.com	24	6.54 TB	278.90 GB	6.26 TB	100.00	0.00 Bytes	836.70 GB	5.45 TB	5.42 TB	99.56	24.55 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
7	07/21/2011 23:32:10	gbsdum18.net1.solarwinds.com	24	9.81 TB	977.03 GB	8.86 TB	100.00	0.00 Bytes	1.50 TB	7.36 TB	4.05 TB	55.03	3.31 TB	1.63 TB	0.00 Bytes	0.00 Bytes
8	07/21/2011 23:34:19	gmmdum12.net1.solarwinds.com	32	8.72 TB	278.90 GB	8.17 TB	96.77	278.90 GB	1.09 TB	7.08 TB	6.45 TB	91.11	644.91 GB	500.00 GB	185.93 GB	139.45 GB
9	07/21/2011 23:29:17	hswtbs12.net1.solarwinds.com	24	5.76 TB	601.49 GB	4.64 TB	89.72	544.93 GB	873.96 GB	3.79 TB	3.79 TB	100.00	0.00 Bytes	0.00 Bytes	363.29 GB	272.46 GB
10	07/21/2011 23:47:22	iwdtbs12.net1.solarwinds.com	24	6.54 TB	557.79 GB	5.99 TB	100.00	0.00 Bytes	1.09 TB	4.90 TB	4.90 TB	100.00	0.00 Bytes	0.00 Bytes	0.00 Bytes	0.00 Bytes
11	07/21/2011 23:47:08	iwdtbs13.net1.solarwinds.com	16	4.36 TB	557.79 GB	3.81 TB	100.00	0.00 Bytes	557.80 GB	3.27 TB	3.27 TB	100.00	0.00 Bytes	3.27 TB	0.00 Bytes	0.00 Bytes
12	07/21/2011 23:46:40	iwdtbs14.net1.solarwinds.com	96	40.71 TB	3.45 TB	37.25 TB	100.00	0.00 Bytes	6.72 TB	30.53 TB	30.53 TB	100.00	0.00 Bytes	0.00 Bytes	0.00 Bytes	0.00 Bytes
13	07/21/2011 23:34:40	jrrtbs12.net1.solarwinds.com	8	3.27 TB	418.69 GB	2.86 TB	100.00	0.00 Bytes	418.69 GB	2.45 TB	2.45 TB	100.00	0.00 Bytes	1.02 MB	0.00 Bytes	0.00 Bytes
14	07/21/2011 23:38:46	kbydum12.net1.solarwinds.com	24	6.54 TB	278.90 GB	6.26 TB	100.00	0.00 Bytes	836.70 GB	5.45 TB	4.94 TB	90.65	521.53 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
15	07/21/2011 23:39:23	mpodum12.net1.solarwinds.com	24	6.54 TB	278.90 GB	6.26 TB	100.00	0.00 Bytes	836.70 GB	5.45 TB	5.08 TB	93.34	371.53 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
16	07/21/2011 23:37:06	qpntbs12.net1.solarwinds.com	15	5.45 TB	372.03 GB	5.09 TB	100.00	0.00 Bytes	372.03 GB	4.72 TB	2.00 TB	42.35	2.72 TB	0.00 Bytes	0.00 Bytes	0.00 Bytes
17	07/21/2011 23:28:10	qudtbs12.net1.solarwinds.com	13	434.22 GB	33.40 GB	400.82 GB	100.00	0.00 Bytes	66.80 GB	334.01 GB	334.01 GB	100.00	0.00 Bytes	334.01 GB	0.00 Bytes	0.00 Bytes
18	07/21/2011 23:26:21	sentbs14.net1.solarwinds.com	12	4.85 TB	828.01 GB	4.04 TB	100.00	0.00 Bytes	1.97 TB	2.07 TB	2.06 TB	99.28	15.23 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
19	07/21/2011 23:27:10	sentbs15.net1.solarwinds.com	12	4.85 TB	828.01 GB	4.04 TB	100.00	0.00 Bytes	1.97 TB	2.07 TB	2.06 TB	99.33	14.17 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
20	07/21/2011 23:42:44	tdptbs12.net1.solarwinds.com	65	19.00 TB	939.41 GB	11.11 TB	61.42	6.98 TB	2.06 TB	9.04 TB	8.69 TB	96.03	367.34 GB	0.00 Bytes	4.65 TB	3.49 TB
21	07/21/2011 23:46:52	tohdum12.net1.solarwinds.com	16	4.36 TB	278.90 GB	4.09 TB	100.00	0.00 Bytes	557.82 GB	3.54 TB	2.93 TB	82.74	625.63 GB	0.00 Bytes	0.00 Bytes	0.00 Bytes
22	07/21/2011 23:39:49	uedtbs12.net1.solarwinds.com	98	26.28 TB	1.09 TB	17.98 TB	71.36	7.21 TB	2.45 TB	15.52 TB	14.16 TB	91.23	1.36 TB	5.00 MB	4.81 TB	3.61 TB
23	07/21/2011 23:39:06	upstbs12.net1.solarwinds.com	14	950.12 GB	67.87 GB	882.26 GB	100.00	0.00 Bytes	135.74 GB	746.52 GB	746.52 GB	100.00	0.00 Bytes	746.52 GB	0.00 Bytes	0.00 Bytes
24	07/21/2011 23:37:01	usmtbs12.net1.solarwinds.com	85	22.88 TB	1.63 TB	20.97 TB	98.72	278.90 GB	3.00 TB	17.98 TB	17.98 TB	100.00	0.00 Bytes	0.00 Bytes	185.93 GB	139.45 GB
25	07/21/2011 23:16:21	wiptbs13.net1.solarwinds.com	26	8.89 TB	828.01 GB	8.09 TB	100.00	0.00 Bytes	2.56 TB	5.53 TB	3.67 TB	66.40	1.86 TB	0.00 Bytes	0.00 Bytes	0.00 Bytes
Sum	25 Unique	25 Unique	867 (Sum)	264.48 TB (Sum)	17.41 TB (Sum)	231.64 TB (Sum)		15.43 TB (Sum)	41.27 TB (Sum)	190.36 TB (Sum)	175.13 TB (Sum)		15.24 TB (Sum)	8.63 TB (Sum)	10.29 TB (Sum)	7.72 TB (Sum)

Having an inventory of what is connected to the storage infrastructure is also critical when trying to diagnose a problem. By scanning the inventory, problems caused by such issues as out-of-date firmware or other device incompatibilities can be diagnosed quickly. The inventory also helps to facilitate better external support, as most organizations are going to start their support processes with a request for the inventory of the environment. Delays in gathering that information or providing an incomplete picture of the environment will subsequently delay any resolution. Or worse, it may lead to prescribing the wrong solution altogether.



After a few weeks of comparing inventories, the trending of storage consumption is possible. This allows for the plotting of storage capacity used, providing a key metric in storage budgeting. Instead of the storage purchase being a reactive process, with proper trend analysis, it can be a planned event. This should lead to greater budget accuracy and potentially better vendor negotiations.

Finally, the inventory process enables chargeback based on consumption of the storage capacity. Chargebacks have value, even in organizations where IT overhead is not charged to each department. By associating even a modest value to the storage resources being consumed other departments can begin to realize that IT services don't 'magically' occur.

With the initial inventory complete the next step is to start enacting changes that allow the storage resource management software investment to pay for itself while it increases overall IT efficiency. The two key areas for this change are in storage capacity and storage performance. Which step is taken next will largely depend on which is determined to be the most pressing need. Surprisingly, capacity is potentially the easiest, since in many cases capacity can be reclaimed without deleting actual data.

Free Luns

Show Description
Enterprise: Executive Storage Summary
Time Zone: US Central Standard Time (Chicago)
Time Range: Current
Printer Friendly

Row	Resource Name	▼ Free LUNs
1	iwdtbs13.net1.solarwinds.com	3.27 TB
2	dhztbs12.net1.solarwinds.com	2.19 TB
3	gbsdum18.net1.solarwinds.com	1.63 TB
4	upstbs12.net1.solarwinds.com	746.52 GB
5	gmmdum12.net1.solarwinds.com	500.00 GB
6	qudtbs12.net1.solarwinds.com	334.01 GB
7	uedtbs12.net1.solarwinds.com	5.00 MB
8	jrrtbs12.net1.solarwinds.com	1.02 MB
9	iwdtbs12.net1.solarwinds.com	0.00 Bytes
10	wiptbs13.net1.solarwinds.com	0.00 Bytes
11	diidum12.net1.solarwinds.com	0.00 Bytes
12	tdptbs12.net1.solarwinds.com	0.00 Bytes
13	qpntbs12.net1.solarwinds.com	0.00 Bytes
14	iwdtbs14.net1.solarwinds.com	0.00 Bytes
15	hswtbs12.net1.solarwinds.com	0.00 Bytes
16	usmtbs12.net1.solarwinds.com	0.00 Bytes
17	dhztbs13.net1.solarwinds.com	0.00 Bytes
18	sentbs14.net1.solarwinds.com	0.00 Bytes
19	sentbs15.net1.solarwinds.com	0.00 Bytes
20	fxsdum12.net1.solarwinds.com	0.00 Bytes
21	disdum12.net1.solarwinds.com	0.00 Bytes
22	kbydum12.net1.solarwinds.com	0.00 Bytes
23	mpodum12.net1.solarwinds.com	0.00 Bytes
24	dhptbsu12.net1.solarwinds.com	0.00 Bytes
25	tohdum12.net1.solarwinds.com	0.00 Bytes
Sum	25 Unique	8.63 TB (Sum)

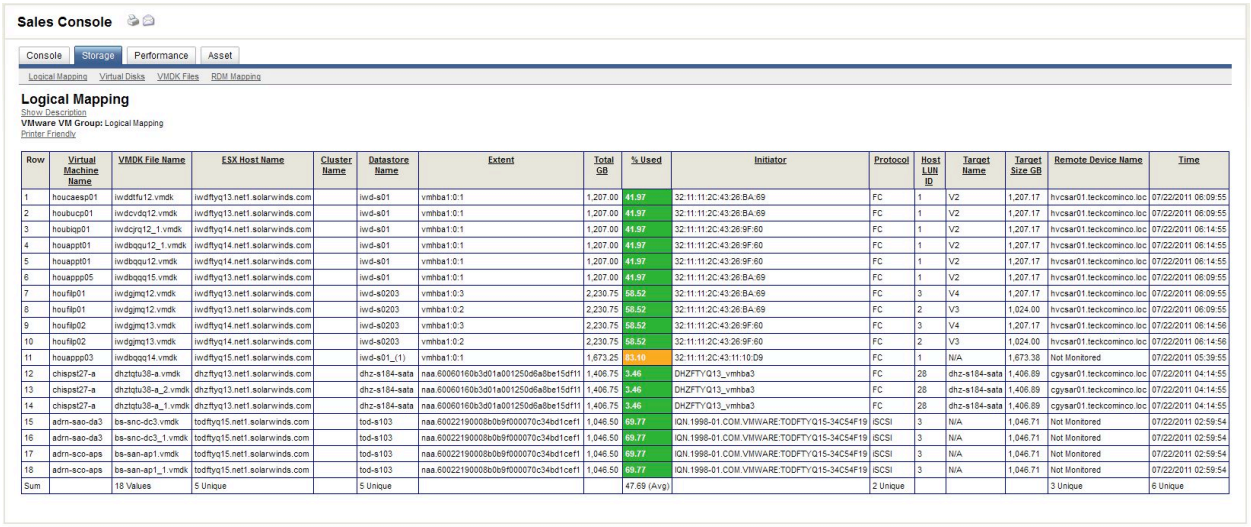
Reclaim Space

When the discussion of reclaiming disk capacity comes up most IT professionals think about identifying and deleting old data. Unfortunately, this thought can produce anxiety in IT administrators who see it as creating work for themselves, since they have to restore the deleted files which are ironically requested just after their deletion (also known as Murphy's Law of Archiving). The reality is that considerable space can be reclaimed without impacting users or applications.

The first area to look at is allocated but unused storage. This can be storage that has been allocated on the array but not assigned to a server, storage that has been assigned to a server but never mounted or storage that has been assigned to a server and mounted, but not formatted for use. In each of these situations storage is not available to other servers but is

also not being used by the server to which it was assigned. In such cases, storage should be unassigned from the server it was assigned to and returned to the general storage pool.

A similar captive free space problem can occur in server virtualization as well. This often happens when creating new virtual machines using templates with large default disk sizes. The capacity that a virtual machine will need can vary greatly from VM to VM and a default sizing technique will often lead to this wasted capacity. A standard SRM tool or internal storage system reporting utility will see this as active and used space because its knowledge of how the capacity is used ends at the hyper-visor. By adding virtualization awareness to the SRM product, as can be done with SolarWinds Virtualization Manager, wasted storage capacity per virtual machine can be identified and these volumes resized as needed.



Sales Console

Console | Storage | Performance | Asset

Logical Mapping | Virtual Disks | VMDK Files | RDM Mapping

Logical Mapping

Show Description

VMware VM Group: Logical Mapping

Printer Friendly

Row	Virtual Machine Name	VMDK File Name	ESX Host Name	Cluster Name	Datastore Name	Extent	Total GB	% Used	Initiator	Protocol	Host LUN ID	Target Name	Target Size GB	Remote Device Name	Time
1	houcaesp01	iwddtfu12.vmdk	iwdftyq13.net1.solarwinds.com		iwd-s01	vmhba1:0:1	1,207.00	41.97	32:11:11:2C:43:26:BA:69	FC	1	V2	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:09:55
2	houbucp01	iwdcvdq12.vmdk	iwdftyq13.net1.solarwinds.com		iwd-s01	vmhba1:0:1	1,207.00	41.97	32:11:11:2C:43:26:BA:69	FC	1	V2	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:09:55
3	houbiqp01	iwdcjrq12_1.vmdk	iwdftyq14.net1.solarwinds.com		iwd-s01	vmhba1:0:1	1,207.00	41.97	32:11:11:2C:43:26:9F:60	FC	1	V2	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:14:55
4	houappt01	iwdbqqu12_1.vmdk	iwdftyq14.net1.solarwinds.com		iwd-s01	vmhba1:0:1	1,207.00	41.97	32:11:11:2C:43:26:9F:60	FC	1	V2	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:14:55
5	houappt01	iwdbqqu12.vmdk	iwdftyq14.net1.solarwinds.com		iwd-s01	vmhba1:0:1	1,207.00	41.97	32:11:11:2C:43:26:9F:60	FC	1	V2	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:14:55
6	houappp05	iwdbqqq15.vmdk	iwdftyq13.net1.solarwinds.com		iwd-s01	vmhba1:0:1	1,207.00	41.97	32:11:11:2C:43:26:BA:69	FC	1	V2	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:09:55
7	houfilp01	iwdgjmq12.vmdk	iwdftyq13.net1.solarwinds.com		iwd-s0203	vmhba1:0:3	2,230.75	58.52	32:11:11:2C:43:26:BA:69	FC	3	V4	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:09:55
8	houfilp01	iwdgjmq12.vmdk	iwdftyq13.net1.solarwinds.com		iwd-s0203	vmhba1:0:2	2,230.75	58.52	32:11:11:2C:43:26:BA:69	FC	2	V3	1,024.00	hvcsar01.teckcominco.loc	07/22/2011 06:09:55
9	houfilp02	iwdgjmq13.vmdk	iwdftyq14.net1.solarwinds.com		iwd-s0203	vmhba1:0:3	2,230.75	58.52	32:11:11:2C:43:26:9F:60	FC	3	V4	1,207.17	hvcsar01.teckcominco.loc	07/22/2011 06:14:56
10	houfilp02	iwdgjmq13.vmdk	iwdftyq14.net1.solarwinds.com		iwd-s0203	vmhba1:0:2	2,230.75	58.52	32:11:11:2C:43:26:9F:60	FC	2	V3	1,024.00	hvcsar01.teckcominco.loc	07/22/2011 06:14:56
11	houappp03	iwdbqqq14.vmdk	iwdftyq15.net1.solarwinds.com		iwd-s01_(1)	vmhba1:0:1	1,673.25	83.10	32:11:11:2C:43:11:10:D9	FC	1	N/A	1,673.38	Not Monitored	07/22/2011 05:39:55
12	chispst27-a	dhztqtu38-a.vmdk	dhzftyq13.net1.solarwinds.com		dhz-s184-sata	naa.60060160b3d01a001250d6a8be15df11	1,406.75	3.46	DHZFTYQ13_vmhba3	FC	28	dhz-s184-sata	1,406.89	cgysar01.teckcominco.loc	07/22/2011 04:14:55
13	chispst27-a	dhztqtu38-a_2.vmdk	dhzftyq13.net1.solarwinds.com		dhz-s184-sata	naa.60060160b3d01a001250d6a8be15df11	1,406.75	3.46	DHZFTYQ13_vmhba3	FC	28	dhz-s184-sata	1,406.89	cgysar01.teckcominco.loc	07/22/2011 04:14:55
14	chispst27-a	dhztqtu38-a_1.vmdk	dhzftyq13.net1.solarwinds.com		dhz-s184-sata	naa.60060160b3d01a001250d6a8be15df11	1,406.75	3.46	DHZFTYQ13_vmhba3	FC	28	dhz-s184-sata	1,406.89	cgysar01.teckcominco.loc	07/22/2011 04:14:55
15	adrn-sao-da3	bs-snc-dc3.vmdk	todftyq15.net1.solarwinds.com		tod-s103	naa.60022190008b0b9f000070c34bd1cef1	1,046.50	69.77	IQN.1998-01.COM.VMWARE:TODFTYQ15-34C54F19	iSCSI	3	N/A	1,046.71	Not Monitored	07/22/2011 02:59:54
16	adrn-sao-da3	bs-snc-dc3_1.vmdk	todftyq15.net1.solarwinds.com		tod-s103	naa.60022190008b0b9f000070c34bd1cef1	1,046.50	69.77	IQN.1998-01.COM.VMWARE:TODFTYQ15-34C54F19	iSCSI	3	N/A	1,046.71	Not Monitored	07/22/2011 02:59:54
17	adrn-sco-aps	bs-san-ap1.vmdk	todftyq15.net1.solarwinds.com		tod-s103	naa.60022190008b0b9f000070c34bd1cef1	1,046.50	69.77	IQN.1998-01.COM.VMWARE:TODFTYQ15-34C54F19	iSCSI	3	N/A	1,046.71	Not Monitored	07/22/2011 02:59:54
18	adrn-sco-aps	bs-san-ap1_1.vmdk	todftyq15.net1.solarwinds.com		tod-s103	naa.60022190008b0b9f000070c34bd1cef1	1,046.50	69.77	IQN.1998-01.COM.VMWARE:TODFTYQ15-34C54F19	iSCSI	3	N/A	1,046.71	Not Monitored	07/22/2011 02:59:54
Sum		18 Values	5 Unique		5 Unique			47.69 (Avg)		2 Unique				3 Unique	6 Unique

This captive capacity is critical to identify. Not only does it reclaim storage without application or user impact, it's capacity that can't be "optimized" by deduplication or compression, since there is no data for those technologies to act on.

The next step, if reclaiming free space did not yield enough results, is to begin identifying old data that can be moved to a less expensive archive storage area, or even deleted altogether. While this does represent the movement of data and the potential for user confusion if they need to access an old file, modern disk archives make this process as easy as accessing another network share. The key is to be able to identify the data.

Products like Storage Manager will graphically show the IT administrators which files are the oldest and which ones, by their movement, will pay the greatest return by sub-sorting by size. In a similar way, the type of file can be reported on, so that inappropriate file (personal files like music and videos, for example) can be moved or deleted as well.

Since the trending capabilities show how much storage capacity is going to be needed in the future, the archival of data only needs to be enough to accommodate for that growth. A selection of the oldest and largest files will cause the least impact on the environment and may free up enough capacity to accommodate future growth needs.

Inventorying and monitoring the capacity of a storage infrastructure is often thought of as a chore and left to the administrator that happened to be out when project assignments were made. In reality, this could be the most important project in the enterprise. Not only can it provide predictability for storage purchases, it can actually delay or eliminate those purchases altogether by identifying unused disk areas or old data that's not being accessed. It should be the first step when deploying a storage management application.

In our next article Storage Switzerland will cover the next step to take with a storage management software investment, improving storage performance.