SOLARWINDS WHITEPAPER

How to Build an Accurate Storage Budget

By: George Crump

© 2014, SolarWinds Worldwide, LLC. All rights reserved.

Follow SolarWinds:

solarwinds

Every year IT professionals turn their attention toward building a budget for their data centers. One of the more challenging line items in that budget is for the storage infrastructure that supports most of the data center operations. Storage, as everyone knows, is growing at unprecedented rates. Managing a storage environment has its own set of unique challenges; a storage admin has to look at potentially using solid-state storage appliances, putting primary storage into the cloud, and the continued rollout of both server and desktop virtualization.

Building an accurate storage budget is going to be more challenging than ever, but if mastered, has the potential to bring the greatest benefit to the applications in the data center. As IT administrators look out into this sea of disk capacity, the storage manager's single biggest question is: "What's the best way to get started?" The first step is to know what you have and that requires capturing or inventorying the environment.

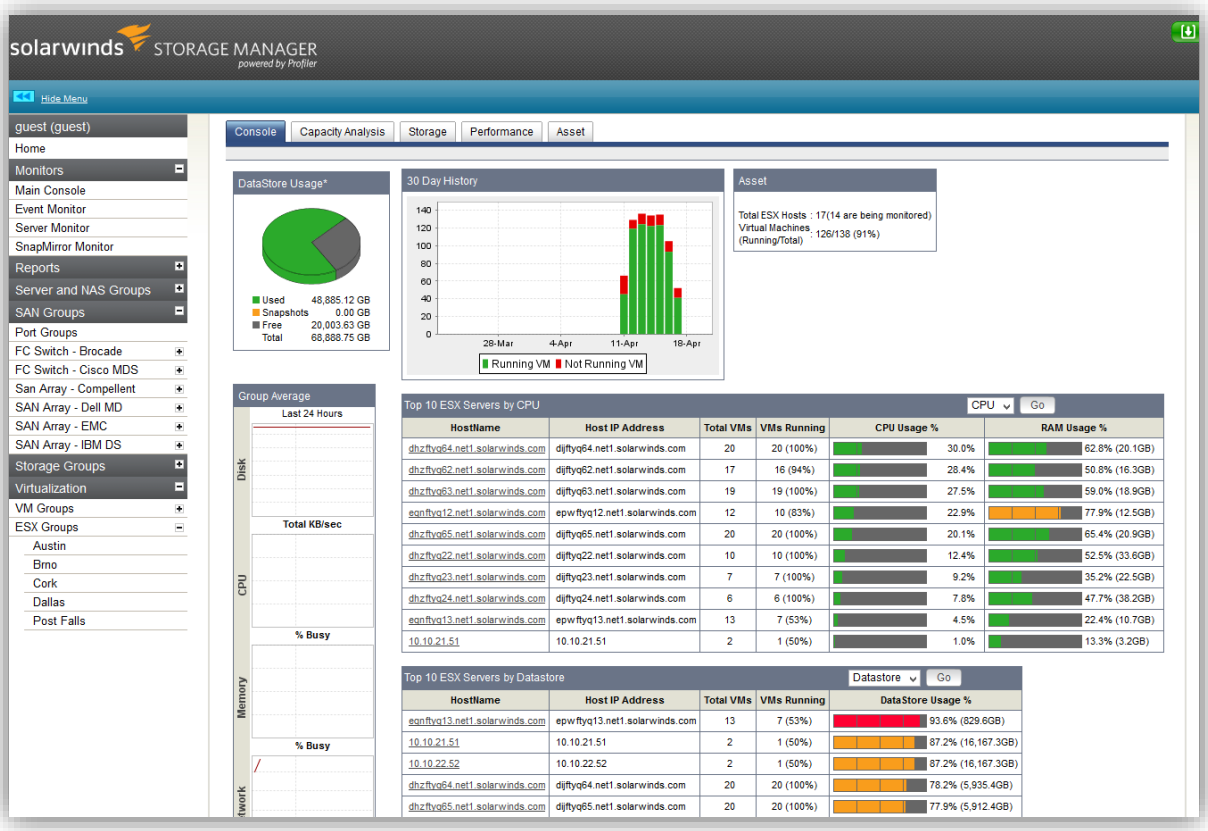
How to Capture Storage Analysis

There are three options when trying to capture the information needed to begin to form a budget for storage. The first is a manual process using spreadsheets. With this process, administrators manually access each system and faithfully record information like total capacity and space available. The problem with this approach is that in the modern data center, there are simply too many variables to properly capture all the required information across all the servers and storage.

Another option is to use the built-in utilities that come with some of the components in the storage environment. These include software that manages the switch, the storage, or potentially manages the server. While often inexpensive, these separate components aren't integrated and can't provide a single view of the environment. They also almost always show a total lack of understanding of the virtual environment which is of course a growing element in most data centers.

That means that these tools need to be manually consolidated and where there are gaps, data still needs to be manually captured. Once again, this takes time and has the potential for errors.

The third option is to use software like Storage Manager available from SolarWinds. These third-party, independent software tools provide a heterogeneous view of multiple vendors' storage systems. They also provide an end-to-end view of the storage environment, even in the virtualized infrastructure. As virtualization's adoption rate continues to rise, this end-to-end view becomes critical.



Software tools like Storage Manager also have the ability to provide real-time monitoring of the environment. As a result, when a storage plan and its associated budget are created, it's reflecting accurate and recent information which should allow for better decision making.

Step One: Understand What You Have

Once armed with a software application that can provide end-to-end analysis of the environment, the first step in developing a storage plan and budget is to understand what's currently installed in the environment. This includes relatively basic information like current capacity, current usage and current growth, but should also include calculating performance utilization statistics like disk queuing and latency.

Step Two: Before You Budget, Reclaim

One of the key values of a tool like SolarWinds Storage Manager is that prior to doing any planning or budgeting, Storage Manager can identify and reclaim storage capacity and performance that's being wasted. Many of these opportunities for reclamation require no change to applications or user profiles.

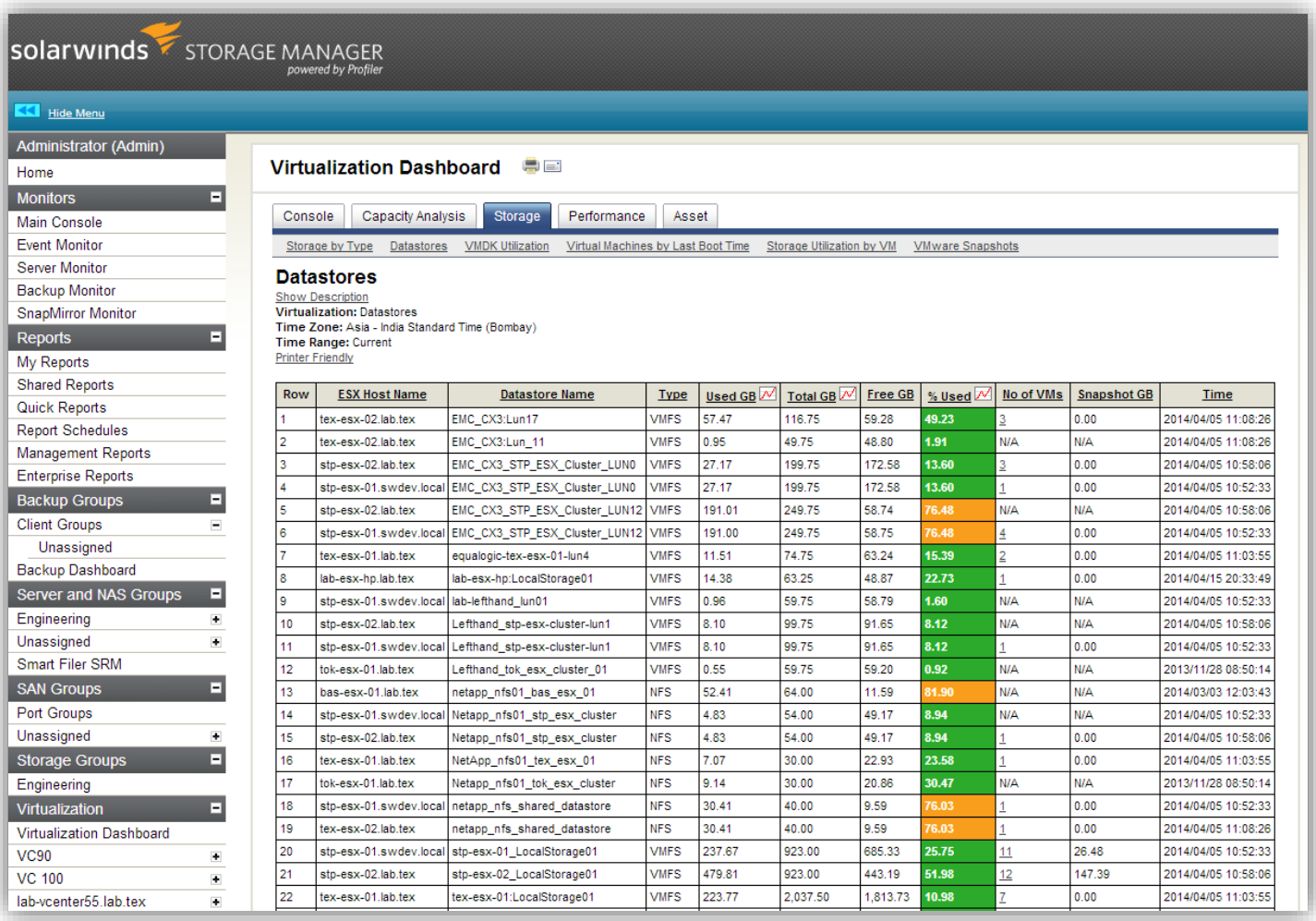
For example, tools like this can identify LUNs that have been created on the storage system, but were never assigned to the server. They show up as used volumes, but typically have no data on them. Simply returning them to the global pool immediately increases the amount of available disk capacity. In the same manner, orphaned LUNs can be identified. These

are LUNs that are assigned to a server but not used, typically not even formatted. Once again they can be returned to the global storage pool. In both cases, the amount of available total storage system capacity is increased without making any changes to the attached servers and their applications.

Another savings opportunity comes from identifying the old data that can be potentially moved off primary storage onto secondary storage or tape. While this does potentially mean a change to application or user access, the cost savings can be significant. Depending on the realities of the upcoming budget, those changes may be well worth the effort.

The virtual environment has also created an opportunity for capacity waste. This includes orphaned VMDKs that were created for virtual machines (VMs) that are no longer in use. While an unused physical server is typically pretty rare in a data center, the virtual nature of VMs make the occurrence of inactive VMDKs much more common.

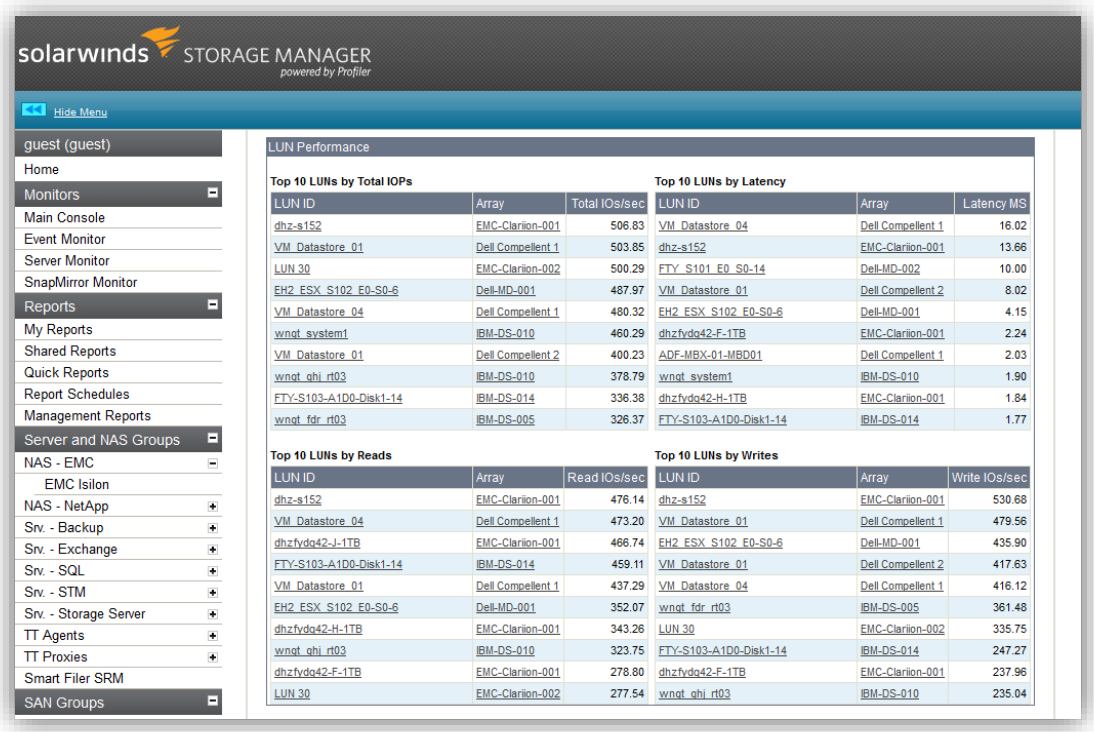
Another side product of the virtual environment that creates storage waste are VMs that have been provisioned from a template and have had a large default capacity assigned to them. In these cases, terabytes of disk capacity can be wasted. A storage management tool can identify these cases so that the storage manager can return the wasted space to the global storage pool.



Row	ESX Host Name	Datastore Name	Type	Used GB	Total GB	Free GB	% Used	No of VMs	Snapshot GB	Time
1	tex-esx-02.lab.tex	EMC_CX3:Lun17	VMFS	57.47	116.75	59.28	49.23	3	0.00	2014/04/05 11:08:26
2	tex-esx-02.lab.tex	EMC_CX3:Lun_11	VMFS	0.95	49.75	48.80	1.91	N/A	N/A	2014/04/05 11:08:26
3	stp-esx-02.lab.tex	EMC_CX3_STP_ESX_Cluster_LUN0	VMFS	27.17	199.75	172.58	13.60	3	0.00	2014/04/05 10:58:06
4	stp-esx-01.swdev.local	EMC_CX3_STP_ESX_Cluster_LUN0	VMFS	27.17	199.75	172.58	13.60	1	0.00	2014/04/05 10:52:33
5	stp-esx-02.lab.tex	EMC_CX3_STP_ESX_Cluster_LUN12	VMFS	191.01	249.75	58.74	76.48	N/A	N/A	2014/04/05 10:58:06
6	stp-esx-01.swdev.local	EMC_CX3_STP_ESX_Cluster_LUN12	VMFS	191.00	249.75	58.75	76.48	4	0.00	2014/04/05 10:52:33
7	tex-esx-01.lab.tex	equalogic-tex-esx-01-lun4	VMFS	11.51	74.75	63.24	15.39	2	0.00	2014/04/05 11:03:55
8	lab-esx-hp.lab.tex	lab-esx-hp:LocalStorage01	VMFS	14.38	63.25	48.87	22.73	1	0.00	2014/04/15 20:33:49
9	stp-esx-01.swdev.local	lab-lefthand_lun01	VMFS	0.96	59.75	58.79	1.60	N/A	N/A	2014/04/05 10:52:33
10	stp-esx-02.lab.tex	Lefthand_stp-esx-cluster-lun1	VMFS	8.10	99.75	91.65	8.12	N/A	N/A	2014/04/05 10:58:06
11	stp-esx-01.swdev.local	Lefthand_stp-esx-cluster-lun1	VMFS	8.10	99.75	91.65	8.12	1	0.00	2014/04/05 10:52:33
12	tok-esx-01.lab.tex	Lefthand_tok_esx_cluster_01	VMFS	0.55	59.75	59.20	0.92	N/A	N/A	2013/11/28 08:50:14
13	bas-esx-01.lab.tex	netapp_nfs01_bas_esx_01	NFS	52.41	64.00	11.59	81.90	N/A	N/A	2014/03/03 12:03:43
14	stp-esx-01.swdev.local	Netapp_nfs01_stp_esx_cluster	NFS	4.83	54.00	49.17	8.94	N/A	N/A	2014/04/05 10:52:33
15	stp-esx-02.lab.tex	Netapp_nfs01_stp_esx_cluster	NFS	4.83	54.00	49.17	8.94	1	0.00	2014/04/05 10:58:06
16	tex-esx-01.lab.tex	NetApp_nfs01_tex_esx_01	NFS	7.07	30.00	22.93	23.58	1	0.00	2014/04/05 11:03:55
17	tok-esx-01.lab.tex	Netapp_nfs01_tok_esx_cluster	NFS	9.14	30.00	20.86	30.47	N/A	N/A	2013/11/28 08:50:14
18	stp-esx-01.swdev.local	netapp_nfs_shared_datastore	NFS	30.41	40.00	9.59	76.03	1	0.00	2014/04/05 10:52:33
19	tex-esx-02.lab.tex	netapp_nfs_shared_datastore	NFS	30.41	40.00	9.59	76.03	1	0.00	2014/04/05 11:08:26
20	stp-esx-01.swdev.local	stp-esx-01_LocalStorage01	VMFS	237.67	923.00	685.33	25.75	11	26.48	2014/04/05 10:52:33
21	stp-esx-02.lab.tex	stp-esx-02_LocalStorage01	VMFS	479.81	923.00	443.19	51.98	12	147.39	2014/04/05 10:58:06
22	tex-esx-01.lab.tex	tex-esx-01:LocalStorage01	VMFS	223.77	2,037.50	1,813.73	10.98	7	0.00	2014/04/05 11:03:55

Performance Reclamation Issue

With the rise of solid-state disk storage, there may also be the opportunity to reclaim disk space by converting to solid-state disk systems. Here, look for LUNS that have been designed with dozens of hard disk drives (HDDs) to help solve a performance issue, such as solving storage I/O or latency issues. Again, these LUNS can have terabytes of available disk space. These configurations not only waste capacity, but they also waste data center floor space and power. A single solid-state storage device can often replace dozens of hard drives offering better performance at the correct capacity, while saving floor space and power. Once again, a storage management tool can identify applications with large I/O queue depths that are ideal use cases for solid-state storage devices.



Another performance reclamation area may be in the switch infrastructure. Storage management software that has an end-to-end view of the environment can identify switch ports that are being overused, impacting overall switch performance. With this type of software, these connections can be rebalanced to other switches, which improves storage infrastructure performance and potentially eliminates the need for expensive bandwidth upgrades or additional switches.

Purchasing Storage

Once the environment has been identified, inventoried and any reclamation potential has been captured, an accurate representation of what's truly in the environment can be developed. The next step is to trend the growth rate of the existing storage and existing applications to see how much, if any, additional capacity is needed, both in terms of storage and performance. Storage Management software like SolarWinds Storage Manager automates the collection and presentation of storage forecasting data and tracks performance over time to identify hot spots, peak hours and potential outages, and helps with the overall storage capacity utilization and planning.

After that, there must be a business examination conducted to understand any internal or external changes that will substantially alter the growth curve. Internal changes are typically new initiatives or expansion of existing initiatives that will increase capacity and performance demands. Examples might be increased rollout of server virtualization, movement of desktop virtualization from test to production and a rollout of exchange 2013.

External business issues are typically represented in the form of mergers and acquisitions. While these are sometimes hard to predict, in many cases they are the integration work from the previous year's business decisions. As a result, it's something that's known and can be planned for.

Mergers can often result in a further mixing of vendors and a consolidation of the environments so that storage investments can be maximized. In this case, storage assets from the other organization need to go through the above analysis prior to being integrated into a combined data center.

With an understanding of organic storage capacity and performance growth, as well as growth caused by new projects or external sources, a reasonable prediction of additional storage capacity and performance can be projected. The final decision is whether to purchase a new system, add to the existing system, or augment the existing infrastructure with storage system 'point purchases'.

System Decisions

When developing a new storage system, the budget status of the current system of course has to be factored in. For example, if the current system is coming off of lease or has been fully depreciated then it may be time for a storage system refresh. This is especially true if the cost to keep the system under maintenance is prohibitive compared to the cost of a new system with a warranty.

If either of these scenarios is the case, the storage team has to be careful not to use the current system's capacity as a starting point. Instead, they should look at the data collected through the above discovery process and at the storage efficiency features that the storage system may offer (thin provisioning cloning etc.) to develop a required capacity for the new system. Another factor is the ease of expansion of the new storage system. For example, if storage can be added relatively quickly with little disruption it may be worth it to run the system at a higher utilization level than was the norm for the past.

The new technology available in modern storage systems combined with the reclamation steps above may, in many cases, lead to storage system purchases that have less overall capacity than the current one. This of course also means better data center floor space utilization and increased power efficiency.

The other consideration is an existing storage system that has not been fully depreciated and needs to be expanded. Again, armed with the trending data of growth as well as the added business processes, an accurate projection of additional capacity and performance can be made. However, in the modern data center it may not make sense to expand the "old war horse" - instead it may make more sense to add a project-specific storage system alongside the existing system.

For example, a VMware® environment, where a percentage of the VMs are having performance issues, may be better served by buying a solid-state storage appliance and migrating just those VMs to it. Conversely, older data could be migrated to a high-capacity storage system allowing the current storage system to focus on more performance-sensitive operations. In either case, a storage management software application like those available from SolarWinds make it easier to manage and monitor this mixed environment.

Summary

Building an accurate storage budget and plan requires first understanding the state of the storage environment as it stands today. Next, the reclamation of both wasted capacity and performance will produce an accurate picture of the storage asset base. Both internal and external business initiatives that will distort the storage growth curve should be factored in so that managers get an accurate understanding of how much additional storage, if any, will be required. Finally, don't be locked into assuming that additional capacity performance must come from the current system, but instead evaluate systems that can augment the current system.

The key to making this informed decision and charting the right course for the storage infrastructure is an independent storage software management application that can provide real time management and monitoring of a mixed environment. This allows you to make the right decisions, at the right time, and at a price you can afford.

SolarWinds Storage Manager

- Monitoring storage performance & isolating hotspots in your multi-vendor SAN fabric
- Maps virtual machines to physical storage
- Automates storage capacity planning & reporting
- Simplifies analysis of storage usage & reclamation of storage space
- Monitor storage arrays from EMC®, NetApp®, HP®, IBM®, Dell®, Hitachi Data Systems® (HDS), and more
- Integration with Virtualization Manager and Server and Application Monitor for end-to-end visibility from application to virtualization to the storage

About SolarWinds

SolarWinds (NYSE: SWI) provides powerful and affordable IT management software to customers worldwide. Focused exclusively on IT Pros, we strive to eliminate the complexity in IT management software that many have been forced to accept from traditional enterprise software vendors. SolarWinds delivers on this commitment with unexpected simplicity through products that are easy to find, buy, use, and maintain, while providing the power to address any IT management problem on any scale. Our solutions are rooted in our deep connection to our user base, which interacts in our online community, thwack®, to solve problems, share technology and best practices, and directly participate in our product development process. Learn more at http://www.solarwinds.com.