Lab Validation Report

SAN Blueprints by SANpulse

Automated, Intelligent SAN Insight and Optimization

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ESG Lab Reports

The goal of ESG Lab reports is to educate IT professionals about emerging technologies and products in the storage, data management and information security industries. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by SANpulse.

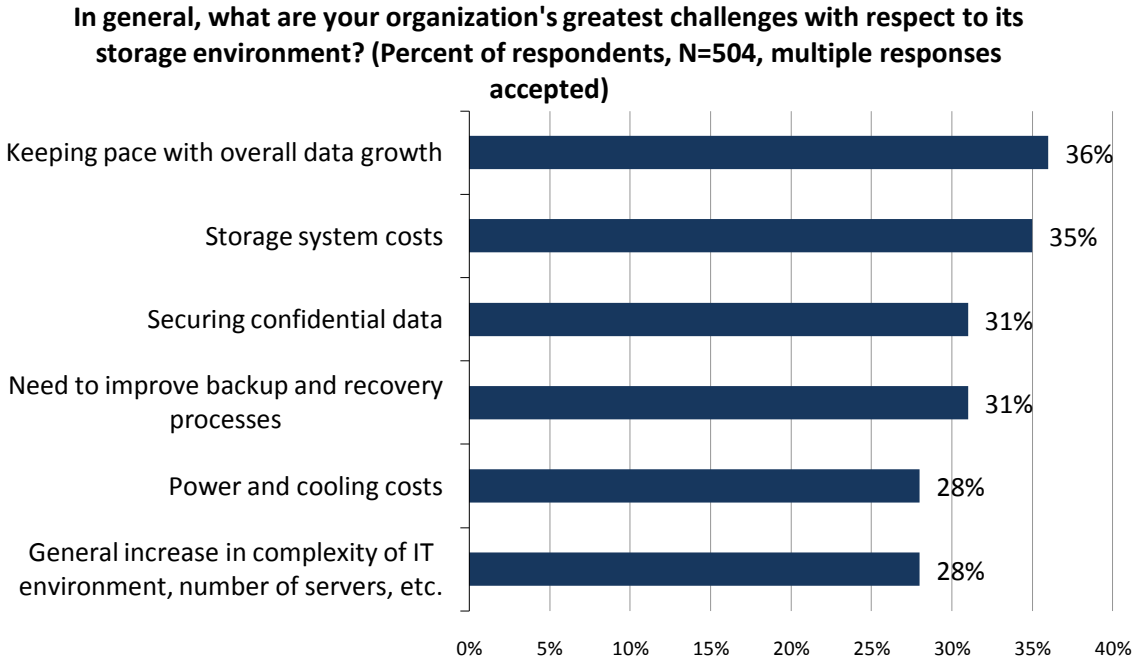
Introduction

A SAN Blueprint from SANpulse Technologies reduces the cost and complexity of SAN discovery and analysis as it provides the insight needed to understand, optimize, and update SAN infrastructure. This ESG Lab Validation report presents highlights of recently completed hands-on testing of a SAN Blueprint, the technology used to create that SAN Blueprint, and feedback from production users.

Challenges

In a recent ESG survey, more than five hundred IT managers within enterprise-class organizations outlined their greatest challenges with respect to their storage environments.[1] At the top of the list are issues that should sound familiar to any IT manager: keeping pace with data growth and rising storage system costs.

Figure 1. Enterprise Storage Challenges



Source: Enterprise Strategy Group, 2008.

While data growth is an obvious cause of rising storage costs, it's not the only culprit. In many cases, more than half of the cost of the storage infrastructure can be attributed to inefficient use of assets that have already been deployed. Often, there is a lack of visibility into the end-to-end relationship between applications and the storage assets they are using. This leads to high perceived utilization rates; the actual utilization rates are often quite low. Poor storage utilization not only increases capital costs, it also increases operational costs (e.g., space, power, cooling, and management).

It is unlikely that the growth of data will abate any time soon, so organizations looking to reduce costs need to focus on managing infrastructure more efficiently. The first step is gaining visibility into a complicated and rapidly growing storage environment. This is not an easy task; manual methods leveraging armies of people and Excel spreadsheets are time consuming and error prone. Storage resource management tools can be effective, but some require agents and others are limited to a single vendor's products. Ideally, insight into a large heterogeneous enterprise-class SAN infrastructure would be provided with a single tool that supports agent-less collection methods.

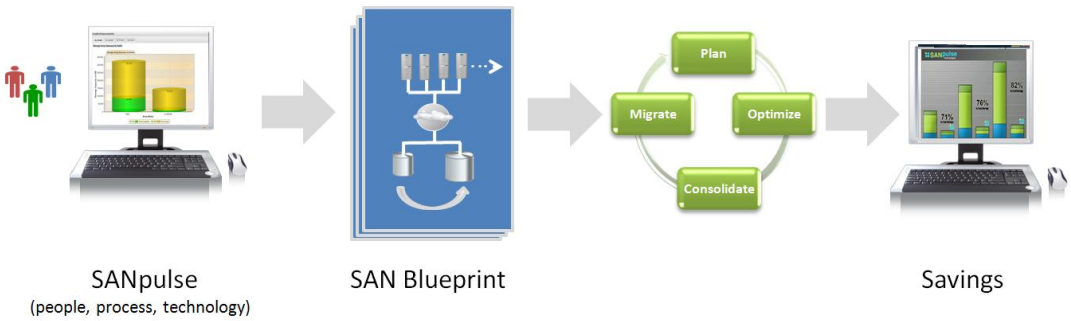
[1] Source: ESG Research Report, *2008 Enterprise Storage Systems Survey*, November 2008.

SAN Blueprint from SANpulse Technologies

As shown in Figure 2, SANpulse Technologies uses a combination of people, processes, and technology to deliver a SAN Blueprint that provides visibility into the inner workings of a complex heterogeneous storage infrastructure. These SAN Blueprints are used to plan, optimize, consolidate, and upgrade complex enterprise-class storage infrastructures.

A SAN Blueprint is a vital first step in any SAN migration and optimization project. It delivers significant savings as it reduces capital costs (buy less or make better use of what you already own) and operational costs (use less manpower, space, power, and cooling). Ongoing and consistent use of a SAN Blueprint ensures that every project—whether it's storage consolidation, re-tiering, or migration—will be properly assessed, planned, and executed.

Figure 2. SAN Blueprint: The Key to Optimization, Consolidation, and Savings



The balance of this report explores how SANpulse has combined decades of hands-on expertise with powerful software and automation to create an agentless, modular, role-based software platform which provides an intuitive, end-to-end view of a heterogeneous SAN infrastructure. A SAN Blueprint not only provides a real-time view of the SAN, it can also be used to automate best practices as it delivers an actionable plan for optimization, consolidation, and savings.

ESG Lab Validation

ESG Lab first examined SANpulse's technology and services in 2008 with a focus on its ability to automate and streamline data migration projects. A hands-on analysis of SANpulse software (SANlogics) and a visit with a SANpulse customer in the middle of a multi-month data migration project proved that the automation and intelligence built into SANlogics can be used to significantly reduce the time and costs associated with a data migration project. Compared to traditional data migration methods, SANpulse customers reduced the time required for the planning phase by 65%, the implementation phase by 86%, and the execution phase by 52%. The average cost savings over the entire duration of a project amounted to 75%.

ESG Lab returned to SANpulse in 2009 and met two more customers with a goal of taking a closer look at the content and value of a SAN Blueprint. This second ESG Lab report begins with an examination of a SAN Blueprint recently created for a large, Global 100 organization. Next, the technology behind a SAN Blueprint is presented based on the results of hands-on testing of the latest version of SANlogics software. And finally, feedback on the value of a SAN Blueprint is presented based on the results of interviews with two satisfied SANpulse customers: one that had contracted SANpulse to do a SAN Blueprint of their massive SAN infrastructure for strategic planning purposes and a second that had witnessed the power and flexibility of a SAN Blueprint during a data migration project.

A SAN Blueprint

SANpulse creates SAN Blueprints for three types of projects:

1. As part of services engagement to help understand and optimize current SAN infrastructure
2. As a deliverable during the planning phase of a SANpulse managed data migration project
3. On an ongoing basis to optimize return on investment (ROI) during routine storage operations

A bound copy of the SAN Blueprint shown in Figure 3 was created as part of a data migration project with a large organization in the banking industry.[2]

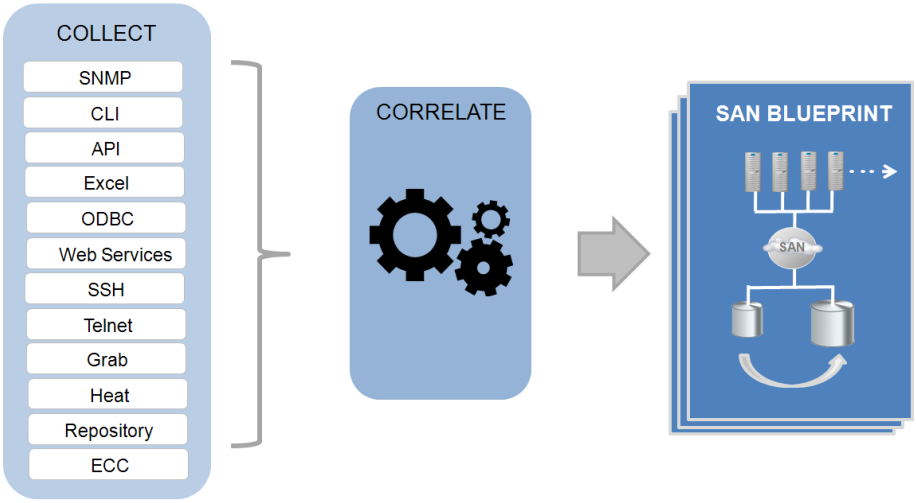
Figure 3. A SANpulse SAN Blueprint

The SAN Blueprint was used to investigate the connectivity, utilization, and efficiency of five EMC Symmetrix and five EMC CLARiiON disk arrays connected to servers running mission-critical banking and business productivity

[2] To protect the confidentiality of the SANpulse customer, all company-specific details including data center names, server names, zone names, and storage system serial numbers were redacted from the blueprint given to ESG Lab.

applications. The project began with a data collection effort aimed at creating a comprehensive inventory of the SAN infrastructure. Data collection and automated expert correlation were used to create the SAN Blueprint as shown in Figure 4.

Figure 4. Creating a SAN Blueprint

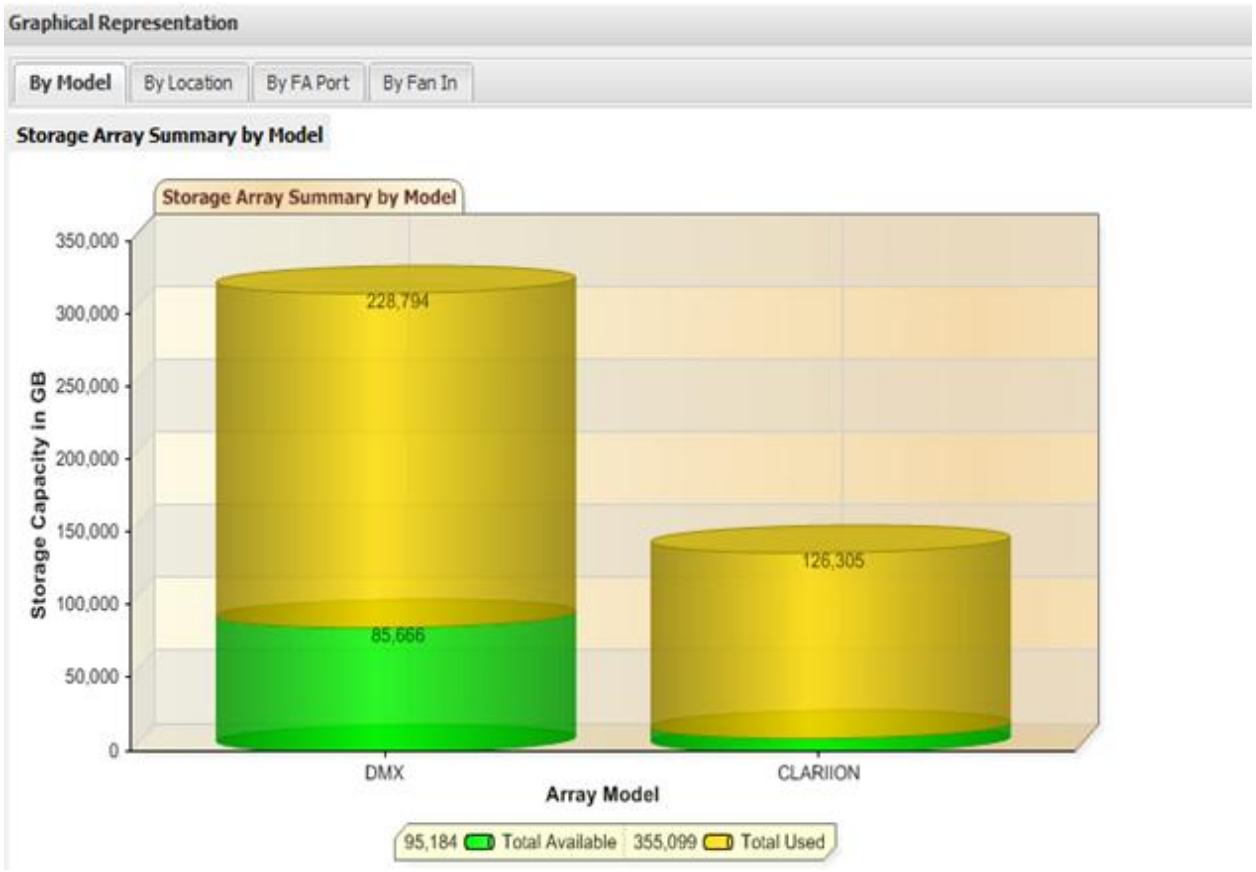


When collecting the information needed to create a SAN Blueprint, SANpulse engineers work hand-in-hand with an internal IT organization. A variety of collection models are supported, depending on an organization's security policies and the tools and processes already in place. Sometimes, gathered information is sent via FTP, but in most cases, a SANpulse engineer visits the data center and collects data under the direction of an authorized storage administrator. The administrator provides the security credentials needed to access the management interfaces of storage-related IT infrastructure including disk arrays, switches, and servers. Often, the administrator provides the SANpulse engineer with copies of offline reports and spreadsheets as well. In some cases, an organization's management security policies may not allow administrator-level access for third party service providers. In these instances, SANpulse prepares scripts which are then run by an authorized administrator. In this customer's case, a SANpulse engineer visited the bank's primary data center and spent approximately four hours collecting host, switch, and array configuration data.

To ensure that data collection is non-disruptive, SANpulse uses agentless data collection methods supporting a number of industry standards including SNMP, telnet, ssh, and Web services. Vendor-specific data collection methods including grabs, command line interfaces, application programming interfaces, and storage resource management reports are supported as well as customer-specific data sources such as Excel spreadsheets and ODBC enabled database exports. In this case, the bulk of the bank's SAN infrastructure data came from array-specific command line interfaces, the SNMP interfaces of servers and switches, and storage resource management software.

As configuration data is gathered from a number of sources, confidence in the accuracy of the inventory increases. This is accomplished using an intelligent correlation engine within the SANlogics software platform. Online data sources are trusted more than offline sources, since they are often out of date. As multiple data sources converge on the same data points, confidence in the configuration data is increased. The SANlogics software platform and the SANpulse team go to extreme measures to check, validate, and re-check the inventory at every stage. The end result of all of this data collection and expert correlation is a SAN Blueprint loaded with charts and tables giving a summary of the customer's SAN infrastructure. Consider, for example, the graph shown in Figure 5. This chart provides a useful high level summary of the total configured capacity for the five Symmetrix and five CLARiiON disk arrays. Note that the chart also shows how much of the storage capacity is actually used.

Figure 5. Storage Array Utilization Summary by Model



Excerpts from one of the tables in the SAN Blueprint are listed in Table 1.

Table 1: SAN Blueprint Data

Description	Count
Number of logged in and resolved servers	319
Path counts (front end disk array ports used)	78
Servers spanning more than one disk array	67
Servers with only one active path to storage	5
Servers that have never logged in (map or masking error?)	6
Servers with configured devices that aren't logging in (zone reclamation?)	5
Devices that have been configured, but not assigned to a server (pre-configured?)	427

The data presented in Table 1 illustrates one of the key advantages of a SAN Blueprint: knowing which servers are connected to each disk array. This seemingly simple information can be maddeningly difficult to obtain and maintain using traditional storage management methods. Disk array management information typically stops at the border between the disk array and the storage area network. Painstaking and error prone correlation is often

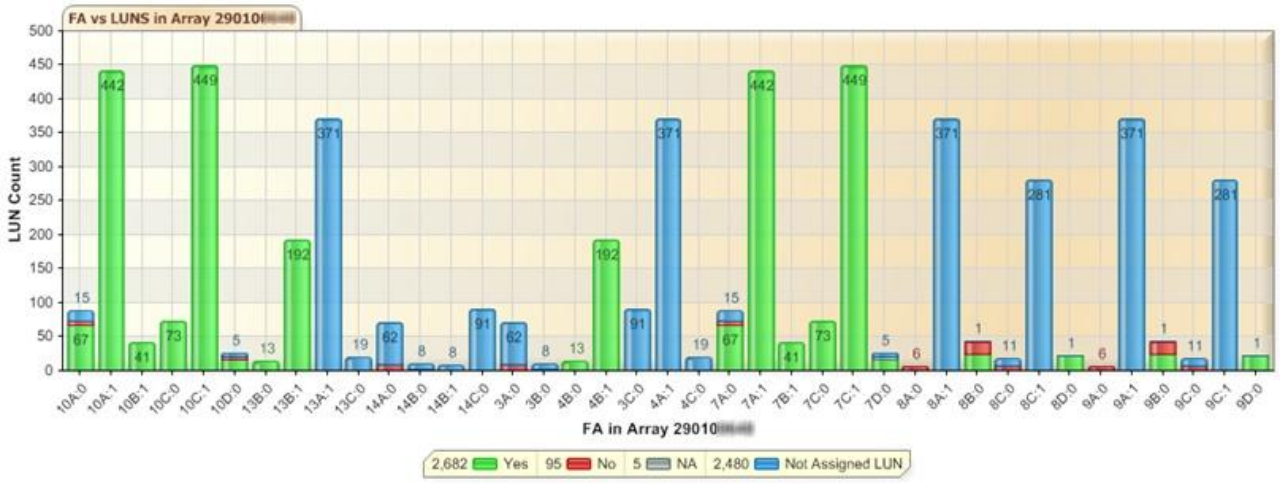
needed to turn the FC address and zoning data presented by servers, switches, and disk arrays into an end-to-connectivity map of the SAN.

The SAN Blueprint not only provides an up to date and accurate count of SAN attached servers, it also provides a list of those servers along with their storage-specific configuration details including the operating system, HBA firmware, HBA driver, multi-path, and volume manager.

Note that Table 1 also includes a list of SAN configuration problems that often occur within a dynamically changing SAN such as the number of servers with assigned storage that's never been accessed. Potential SAN wiring, zoning, and access control issues are reported. Potentially unsupportable software version levels (HBA, multi-path, disk array) are also noted. What's more, drill-down reports provide the information needed to find and fix each of these potential issues.

The SAN Blueprint also includes a number of charts which highlight potential resource balancing issues. For example, Figure 6 shows how LUNs are allocated on an uneven basis across a server-facing port within one of the disk arrays.

Figure 6. SAN Blueprint Array Connectivity Summary



Why This Matters

A recent ESG survey of IT managers within enterprise-class organizations indicates that operational cost is the most important criteria when making storage infrastructure purchasing and planning decisions.[3] This is due in no small part to the complexity of monitoring and managing SAN infrastructure—from servers filled with applications, operating systems, host bus adapters, and drivers; through to the switches that make up the storage network; into the storage system; and down to disk (or flash) drives. As budget and staffing pressures push IT managers to do more with less, keeping SAN operational costs in check is a challenge as the infrastructure grows to accommodate new applications, switches, and disk arrays.

ESG Lab has confirmed that a SAN Blueprint from SANpulse Technologies provides valuable insight into the end-to-end configuration of a SAN infrastructure. The expert insight contained within a SAN Blueprint can be used to improve efficiency, availability, and utilization as it saves time and money. A SAN Blueprint gives storage and infrastructure professionals the real-time, business-aware information that they need to most effectively allocate storage resources.

[3] Source: ESG Research Report, *2008 Enterprise Storage Systems Survey*, November 2008.

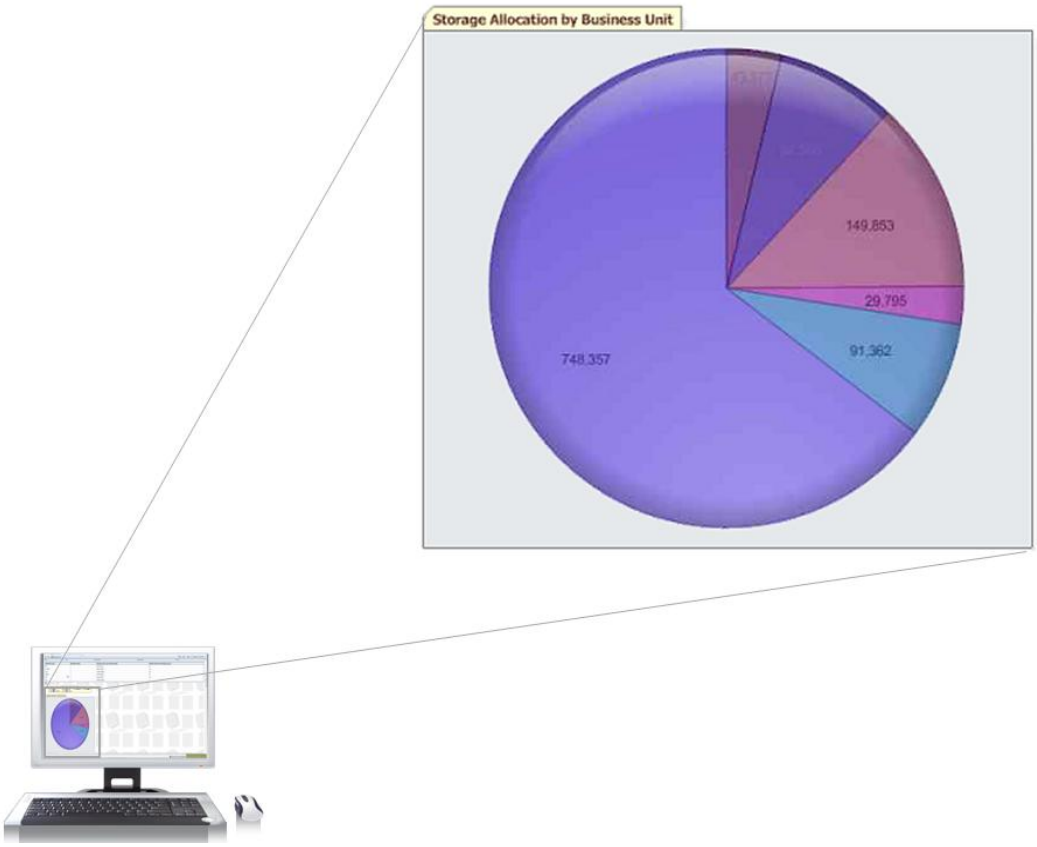
SANlogics

SANpulse experts use SANlogics software to deliver a SAN Blueprint as either a standalone offering or as part of a SAN optimization or data migration initiative. At the core of the SANlogics software platform is a powerful database and query engine. The database is used to collect and correlate a wide range of data sources and the codified expertise of expert SAN administrators. ESG Lab first evaluated SANlogics software in 2008 during a data migration project. During this second ESG Lab Validation, we examined the enhanced SANlogics software platform with a focus on its role in creating a SAN Blueprint.

ESG Lab worked side by side with SANpulse engineers browsing a SANlogics database being used to plan for a large-scale data migration project at a Fortune 100 financial services company.

Working from the top down at a business unit level as shown in Figure 7 or from the bottom up with a detailed view of the configuration details within a single disk array, ESG Lab found that the latest version of SANlogics software provides a rich set of graphs and tables which provide intelligent and actionable insight into an organization's storage infrastructure.[4]

Figure 7. Macro- Level Visibility at the Business Unit Level



Moving from a macro-level review of the SAN infrastructure, ESG Lab examined a series of new micro-level reporting capabilities that have been built into the SANlogics software platform. The SAN Blueprint presented earlier shows how SANlogics helps identify potential FC wiring, zoning, and configuration errors. While the SAN Blueprint presents a high level summary of potential SAN issues, the SANlogics software platform provides detailed, on-demand reporting that can be used to find and fix common issues including:

1. Reclaiming wired, but unused, SAN switch ports
2. Reclaiming allocated, but incorrectly configured, storage capacity

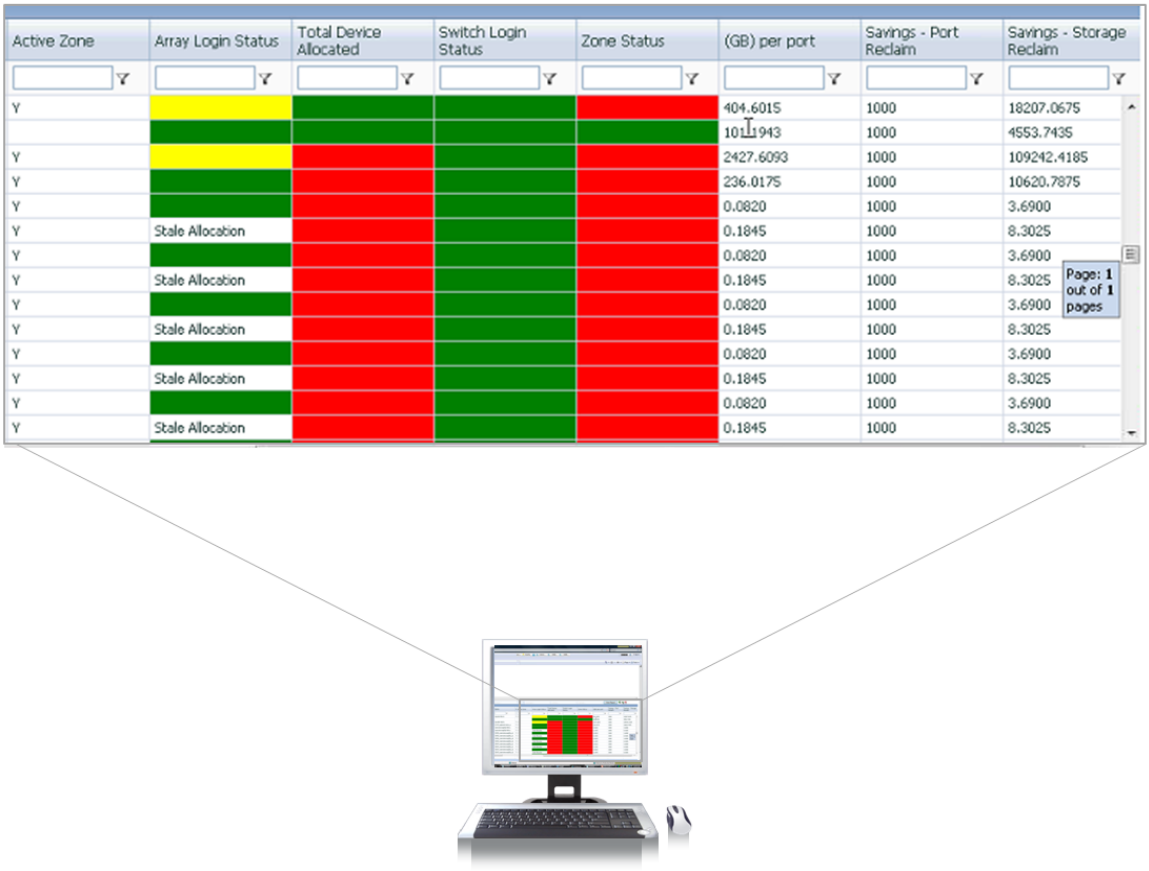
[4] For confidentiality, the actual business unit names were redacted from the graph shown in this report.

3. Cleaning stale zoning and access control definitions

The report excerpt in Figure 8 shows an end-to-end view of FC connectivity status that ESG Lab believes to be powerful and unique in the industry. The table shows the current array, switch, and zone login status. This, and other information in the SANlogics database, is correlated with a goal of identifying configured array, switch, and host ports that have capacity allocated, but are not currently logged in and don't appear to have ever logged in.

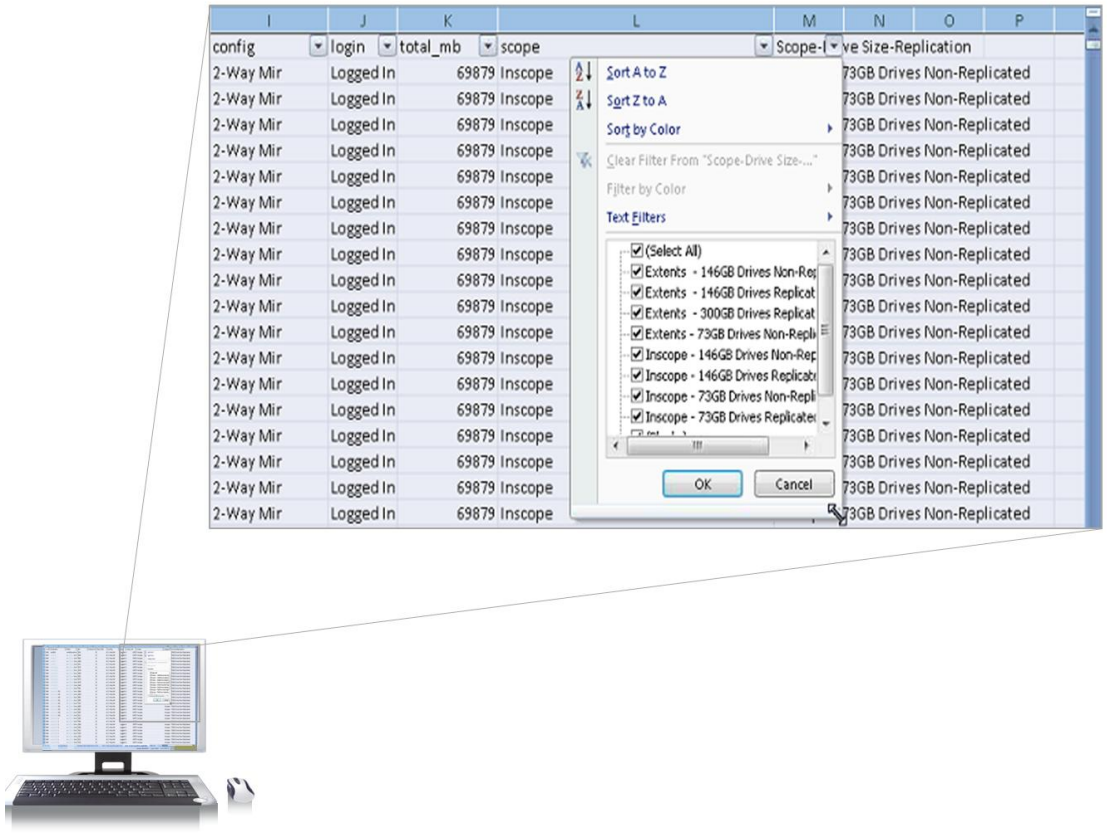
The richness of the table data is enhanced by a color coded map that makes it easy to identify potential candidates for reclamation. A green box indicates a potential resource that can be reclaimed. A row of green boxes indicates the best place to look for reclaimable ports and capacity. Note that the table not only presents the end-to-end details needed to isolate and reclaim potentially wasted SAN assets, it also calculates the capacity savings that can be achieved.

Figure 8. Micro-Level SAN Insight, Optimization, and Consolidation



SANlogics incorporates GUI-based, executive dashboard-level views as well as many drilled-down SAN Blueprint graphs and charts. Those graphs and charts can be either exported to Adobe PDF documents and Microsoft Excel spreadsheets or dynamically updated through the use of a SANlogics Excel Reporting Module. Microsoft Excel spreadsheets generated by SANlogics include built-in filters—as shown in Figure 9—that can be used to quickly and dynamically browse the correlated contents of the SANlogics database. While industry experts often malign the widespread use of manually created spreadsheets to keep track of SAN assets, ESG Lab believes that SAN administrators will appreciate the familiar look and feel of automatically created, easily sorted and filtered SANlogics spreadsheets.

Figure 9. Export, Filter, and Sort with Excel



Why This Matters

ESG research indicates that cost reduction and cost containment are top priorities for IT managers in 2009. An alarming number of enterprise-class organizations indicate that projects are being postponed (65%) and hiring has been frozen (64%) or reduced (43%).[5] Clearly, economic pressure is being felt by IT managers as they struggle to maintain performance and service level agreements for applications that rely on mission critical SAN infrastructure. Yet keeping track of SAN infrastructure is difficult. The SAN infrastructure is constantly evolving and planning and upgrades are ongoing. Reclaiming under-utilized SAN resources reduces the overall cost of the SAN assets that they already own, but it's complicated, time consuming, and error-prone.

ESG Lab has confirmed that SANlogics software is powerful technology that enables SANpulse experts to help IT organizations save time, save money, and reduce risk. A typical manual discovery and analysis project can take months and costs hundreds of thousands of dollars. With a SAN Blueprint from SANpulse Technologies, goals can be reached in days, instead of months, with virtually no risk.

[5] Source: ESG Research Report, *2009 Data Center Spending Intentions Survey*, March 2009.

SANpulse in Action

ESG Lab met with IT managers from two enterprise-class SANpulse customers that have recently received a SAN Blueprint as part of a professional services engagement.

First Customer Evaluation

The first customer interviewed by ESG Lab is a storage architect for a large enterprise services division of a Fortune 100 organization that delivers technology products and services. Its extremely large SAN infrastructure has swelled in recent years, with hundreds of enterprise-class disk arrays and tens of thousands of SAN ports deployed in multiple data centers that are running out of space, power, and cooling capabilities. A number of strategic global initiatives are underway with a goal of better utilizing the existing infrastructure (e.g., server virtualization, data archiving, and storage consolidation).

The Challenges

While the size of the SAN infrastructure has grown dramatically in recent years, the headcount within the IT organization has not kept pace. Existing storage acquisition and deployment processes are unable to keep up with the needs of new and existing applications.

The storage architect knew intuitively that existing SAN assets were not being fully utilized. His new boss wanted a better view of the storage assets he was responsible for, but he didn't have the tools or manpower for a detailed assessment of his SAN infrastructure. SANpulse was hired to provide a SAN Blueprint.

The Solution

SANpulse presented the SAN Blueprint and all the supported findings during a meeting with the storage architect, his boss, members of the storage team, and representatives from their preferred storage vendor. As the storage architect expected, the utilization of the existing SAN infrastructure was low (less than 50%). While his boss had been told that the infrastructure was underutilized and would benefit from tuning and consolidation, he was alarmed by the scale and the cost of the wasted resources that had accumulated before he took charge.

The Benefits

The SAN Blueprint led to a number of significant benefits for this organization:

1. **Reducing Costs:** Analysis of the SAN Blueprint identified 55 TB of storage that was pre-mapped, but not allocated to any host. Further investigation led to a disaster recovery reconfiguration with storage being released for other applications. Additional storage was reclaimed based on a SAN Blueprint inspired recommendation of using RAID-5 instead of RAID-1 for disaster recovery. Using RAID-5 for disaster recovery can release significant amounts of disk capacity as it uses less disk capacity than RAID-1 (50+%). The customer was able to delay upcoming storage purchases and repurpose the funds by moving from RAID-1 to RAID-5 replication for nearly 60% of its applications.
2. **Mitigating Risk:** Load balancing and failover issues were identified and corrected based on the information provided by the SAN Blueprint. In addition, the SAN Blueprint identified approximately 900 devices that were not mapped, zoned, or allocated. This did not comply with best practice and could have easily led to operational and business application outages in the event of a disaster. Further investigation corrected the problem and ensured business continuity for all applications.
3. **The Bottom Line**, as estimated by this happy SANpulse customer, began with a minimum of $250,000 in storage capacity savings. This is on top of the immeasurable, but sizable, indirect cost savings associated with lessening the risk of data loss after a disaster. Overall, the storage architect was thrilled with the results. First, it required no effort on his part and required minimal interaction with his production team. Second, it provided his boss with a realistic view of the challenges he was facing. Third, he had a current view of his SAN infrastructure with more detail than he could have obtained using existing tools and

processes. And, last but not least, he and his boss felt that the value greatly exceeded the reasonable price of the SANpulse engagement.

Second Customer Evaluation

This Fortune 100 SANpulse customer received a SAN Blueprint as part of a proof of concept data migration project. For this organization, large-scale data migration projects are required on an ongoing basis to accommodate the replacement of disk arrays that have reached the end of a lease or depreciation schedule. A proof of concept team worked with SANpulse to determine the feasibility and value of a SANpulse professional services engagement.

The Challenges

This organization routinely outsources data migration projects, which take months to complete and cost hundreds of thousands of dollars. The sheer number of ongoing projects was straining the limits of the existing staff and budget.

The Solution

SANpulse captured data from existing EMC DMX 2000 and DMX 3000 storage arrays that were scheduled to migrate to DMX-3 and DMX-4 arrays located at a different data center. A SAN Blueprint was used to determine the readiness and remediation required for the migration. The automated discovery of array, switch, host bus adapter, driver, operating system, and multi-path driver configuration data was compared to vendor and internal support matrices to create a plan for remediation.

The Benefits

The SAN Blueprint was used to optimize the data migration planning process.

1. **Automating Remediation:** The customer provided a list of 104 hosts that were targeted for the initial migration. Only 41 of the 104 hosts were up to date. The rest required a multi-level remediation initiative which included service pack upgrades, HBA firmware upgrades, HBA driver upgrades, multi-path driver upgrades, volume manager upgrades, and cluster server upgrades. In addition to the list of 104 hosts that were scheduled to migrate, the SAN Blueprint identified an additional 127 host connections that appeared to be connected to the disk arrays that were scheduled for migration. This information was used to clean up the configuration and add missing servers to the remediation and migration plan.
2. **Reducing Risk:** The SAN Blueprint was used to identify and fix a number of issues that put the schedule for the project—and the likelihood of success—at risk. A number of potential issues were investigated and resolved (e.g., switch zone entries that were configured incorrectly, array masking that was wrong, fiber connections with low light, and ports that were disabled). In addition, eleven hosts were identified as being connected to multiple disk arrays. This is a common issue that has an impact on data migrations—especially when a file system or application unintentionally spans multiple arrays.
3. **The Bottom Line** for this customer was a data migration project that completed flawlessly and on schedule. The SAN Blueprint automated the planning process. SANlogics software generated executable work files which automated the remediation and migration. The customer was very impressed by the speed and ease in which the data was collected and correlated, the depth of the findings, and the minimal impact to their team. SANpulse has been added to the approved vendor list and has won subsequent data migration projects.

This customer was most impressed by the flexibility of the SANpulse technology and team. They were amazed that last minute changes in the scope of the project did not impact the scheduled migrations. Just before the planned migration during a weekend maintenance window, the team learned that a number of hosts were not ready to be migrated based on the lack of approval from the application owner. Another potential delay was identified when an automated pre-migration audit revealed that an array which was planned to be migrated was not available. Based on their experience with past data migration projects, the client team assumed that a last minute change in scope

would defer the migration to the next available maintenance window. Instead, SANlogics software was used to instantly re-discover the environment and create a new set of data migration output on the fly. Shortly afterwards the migration was underway as planned.

Why This Matters

The automation and intelligence built into SANlogics software can be used to drastically reduce the impact—and manpower requirements—of a major SAN infrastructure project. A SAN Blueprint empowers the management team as it provides a clear picture of the infrastructure, illustrates the value of best practices, and leads the way towards lower cost and complexity. As a result, all of the customers ESG has spoken with praise the value of SANpulse technology and services. Each is looking forward to doing business with SANpulse again in the future.

ESG Lab Validation Highlights

- ☑ ESG Lab examined a SAN Blueprint that had been created for a large financial services organization.
- ☑ End-to-end details presented in the SAN Blueprint included a number of graphs and tables which not only presented the overall utilization of infrastructure, but also provided guidelines for remediation, consolidation, and savings.
- ☑ ESG Lab performed hands-on testing of SANlogics, the software used to create a SAN Blueprint. High level utilization at the business unit level and low level reports which provided a view into SAN fabric utilization and optimization were examined. The ability to export tables in Microsoft Excel format with built-in filtering and sorting was noted.
- ☑ ESG Lab met with two customers who have received a SAN Blueprint as part of a professional services engagement with SANpulse Technologies. Both extolled the value of a SAN Blueprint. Both indicated that they plan on doing business with SANpulse again in the future.

Issues to Consider

- ☑ SANpulse currently delivers SAN Blueprints as a standalone offering or as part of a larger SAN migration and optimization initiative. As a result, it represents the state of the SAN at a single point in time. To keep up with the ever-changing nature of an enterprise-class SAN, ESG Lab recommends that IT organizations consider the purchase of SAN Blueprint on an ongoing, scheduled basis (e.g., quarterly).
- ☑ SANlogics software has undergone a recent usability enhancement with a goal of turning it into a product that IT administrators can run on their own. At this time, however, ESG Lab believes that SANlogics should be managed by an experienced SANpulse professional. The value that SANpulse delivers includes the team and its rich heritage of SAN management expertise.

The Bigger Truth

Modern data centers are incredibly complex. In order to meet the needs of the business in a dynamic global market, IT is always changing and adapting. New applications are added, IT infrastructure is continually growing, and new technology is constantly being deployed in order to keep pace. IT organizations struggle to keep up and bad habits tend to develop due to a lack of time and resources. Consider, for example, how fully documented change processes are circumvented with hand-written notes, spreadsheets, and Visio diagrams. IT administrators with the best of intentions plan on updating documentation to reflect changes that were made during the heat of a moment. Yet, more often than not, the next emergency comes before the last round of changes can be documented.

Clearly, these ad hoc methods are not scalable. They often result in underutilized infrastructure and changes can have unintended negative consequences. In many cases, as new technology is brought in, those bad habits are migrated to the new infrastructure, reducing the potential return on investment. IT needs to be able to get an accurate view of the infrastructure in order to make intelligent decisions. Getting more out of your existing investment is clearly more cost effective than buying new capital equipment. If and when it makes sense to invest in new capital equipment, a good understanding of your current infrastructure is needed to maximize the value of your investment. Put simply, it's hard to improve what you can't measure.

Measuring an enterprise-class SAN storage infrastructure is particularly challenging. Even in the current economic climate and depressed global economy, the growth of data has not slowed. Unless the organization is prepared to dramatically reduce other areas of the budget, IT needs to find ways to reduce costs and become more efficient. Given that storage consumes such a large portion of the IT budget, it makes sense to start there. Since most storage utilization rates are typically less than 50%, this would seem like an easy task. Unfortunately it isn't. Trying to get a holistic view of an enterprise-class SAN infrastructure can be very difficult.

The bigger problem is that storage administrators—and their managers—often aren't aware of the extent of the problem. To a storage administrator, storage that has been allocated is utilized. It is only when we take a top down view from the server's perspective that many of the real inefficiencies can be spotted. Orphaned and underutilized storage need to be identified and reclaimed, if possible. Only by getting complete visibility and a deep understanding of the current environment can IT hope to reduce capital and operational expenses.

ESG Lab testing and conversations with customers have confirmed that the actionable output of a SAN Blueprint delivers measurable results. Customers that we talked to realized considerable savings from the reclamation of unutilized storage resources. As a matter of fact, the savings were far more than the cost of the original investment in a SAN Blueprint.

ESG Lab has confirmed that SANpulse offers solutions which help organizations measure—and improve—their current SAN infrastructure. Leveraging skilled people, proven processes, and a flexible, automated SANlogics technology platform, a SAN Blueprint provides the visibility that is needed to make strategic decisions about the storage environment, defer capital purchases, optimize existing assets, and, last but not least, ensure that bad habits are not migrated to a new infrastructure.

If your organization would like to know more about its SAN infrastructure as part of a server virtualization, data center consolidation, disk array upgrade, or long-term data archiving project, ESG Lab recommends that you consider a SAN Blueprint from SANpulse Technologies.

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