Using ESVA to Simplify Storage Infrastructure

White paper

Abstract

This white paper explains how ESVA helps users simplify storage infrastructure with advanced technologies and illustrates the benefits the simplified infrastructure realizes, including simplified storage scaling, simplified capacity planning and simplified performance optimizing.

The Infortrend ESVA Series is a leading-edge storage solution designed for mid-range enterprise Fibre Channel or iSCSI SAN. At affordable price, it meets mission-critical storage demands for performance, scalability and reliability with advanced hardware design and comprehensive data services. On the innovative Enterprise Scalable Virtualized Architecture, various features, including storage virtualization, thin provisioning, distributed load balancing, automatic data migration, prioritized volume accessibility, and array-based snapshot and replication, are consolidated to bring users three main benefits: optimize returns of investment, simplify storage infrastructure and maximize application productivity. In this document, we will illustrate in details how ESVA technologies help users simplify storage infrastructure.

How ESVA Simplifies Storage Infrastructure

In the traditional datacenter, storage infrastructure gets increasingly complicated along with time because data grow and different applications are introduced in. Whether the infrastructure is configured as DAS (Direct Attached Storage) or SAN (Storage Area Network), the independent data volumes presented as dispersed, isolated storage islands never stop bothering administrators with various management problems. To scale storage space and computing power when needed and to better utilize storage resources both require a great amount of administration efforts.

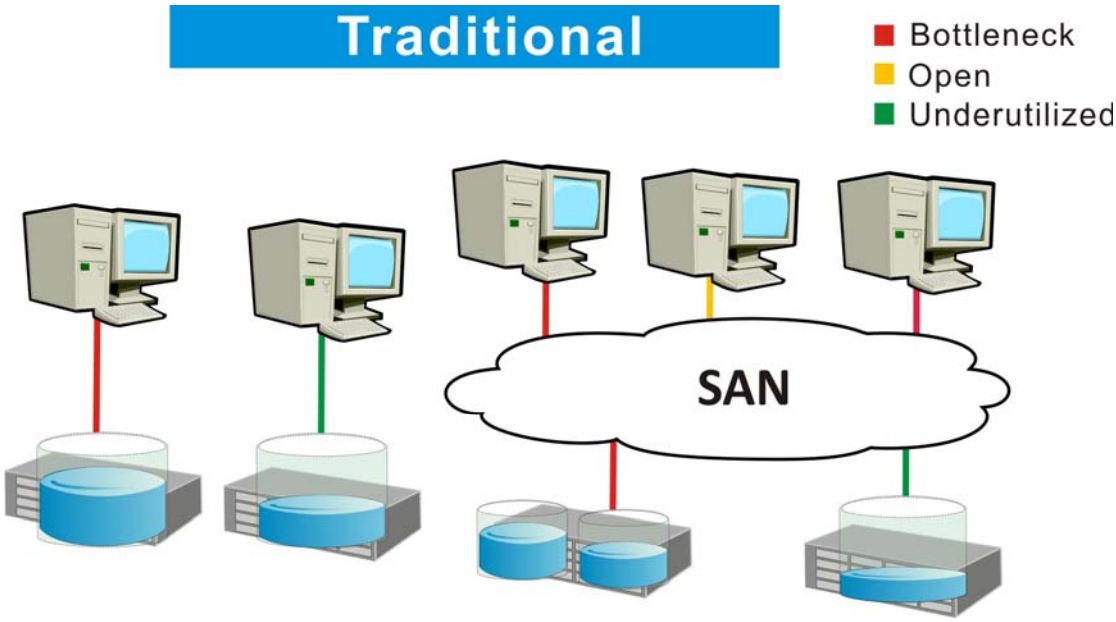

Figure 1. Complicated Storage Infrastructure

Now with ESVA, the storage infrastructure is greatly simplified. Through the virtualization technology, storage resources on multiple physical systems are

consolidated into a single storage pool. Only with the least human intervention can the storage resources be scaled and utilized to fulfill changing application needs in a most efficient way. Below we will have more detailed discussions on the benefits realized by the simplified infrastructure.

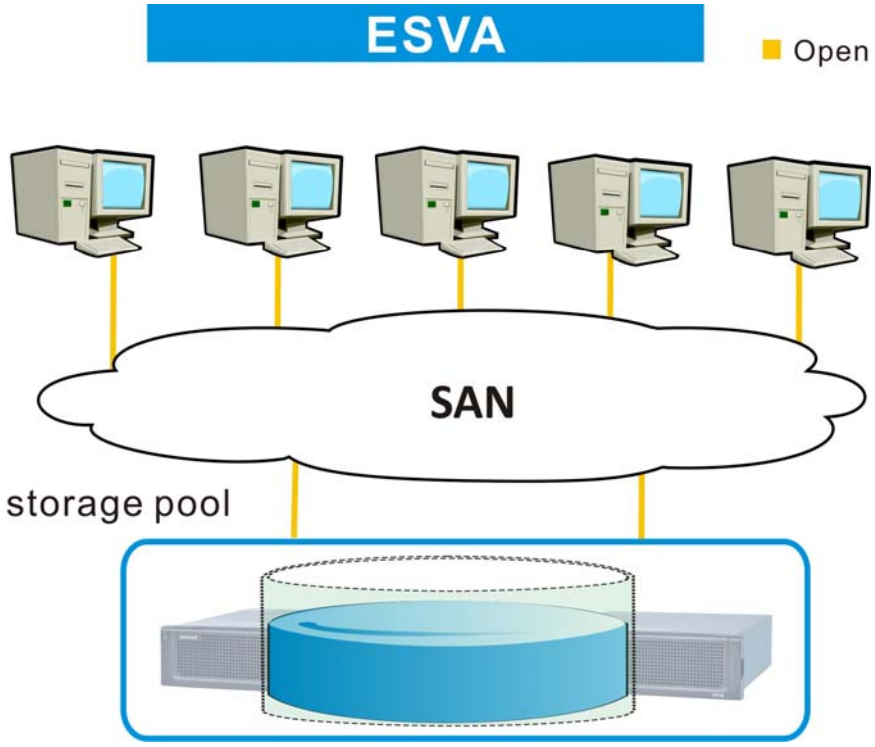

Figure 2. Simplified Storage Infrastructure

Benefits of Simplified Infrastructure

Simplified Storage Scaling

Storage scaling takes much time and effort in the IT environment using scale-up storage systems. When users need more capacity or better performance but the storage system they are currently using has reached its limitation, users need to buy a new system to replace the current one. The process of replacement involves migrating data onto the new system and doing this requires getting service offline. According to researches, planning and staging data migration takes 2 to 4 weeks. It is undoubtedly a time-consuming and labor-intensive nightmare for IT managers.

In the virtualized and scale-out architecture of ESVA, storage scaling does not inflict downtime. As shown in the figure below, to expand the storage pool for several times more capacity and better performance, users simply need to connect a new system and add it to the storage pool.

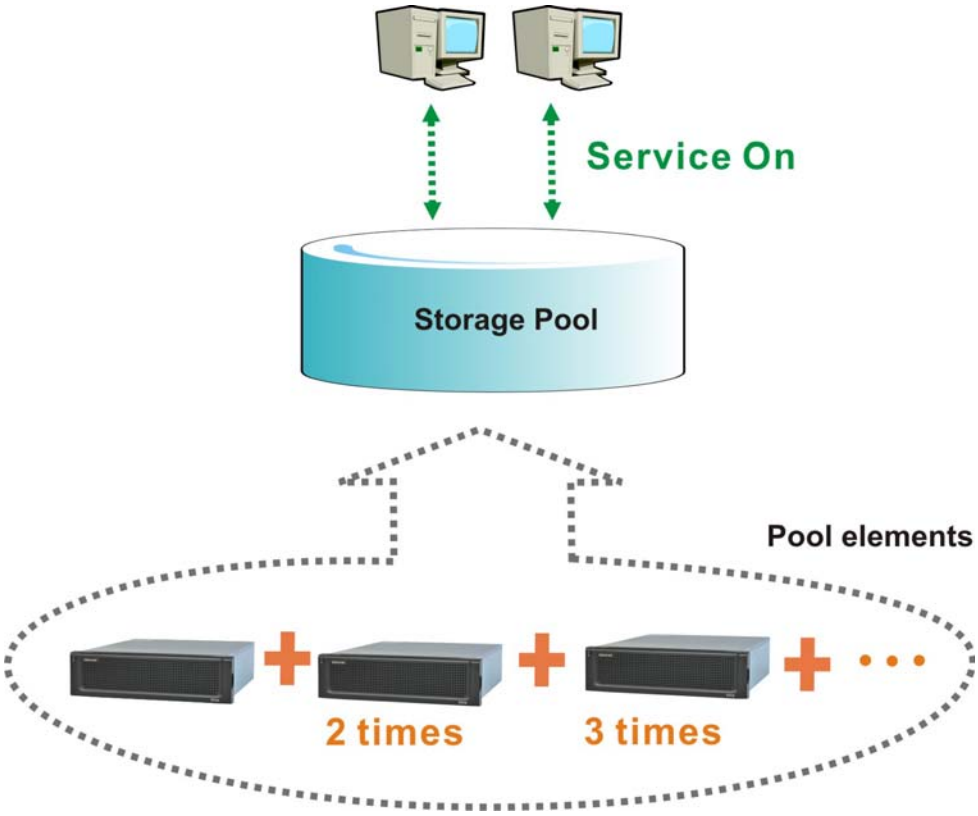

Figure 3. Simplified Scaling

If users need to increase only capacity, they can also choose to connect expansion enclosures to the existing member ESVA system. Whether adding additional systems or expansion enclosures, the configuration process requires neither downtime nor manual data migration. All online operations can run normally to deliver productivity.

Simplified Capacity Planning

In the traditional way of provisioning, for an application to leverage a certain amount of capacity, IT managers have to first create a data volume of the amount and then allocate it to the host. Forecasting and planning individual data volumes often take much effort because IT managers are faced with a dilemma. On the one hand, to delay volume expansion hassles, they have to create data volumes of the amount much larger than immediately required. On the other, since the act of allocation means privileging a certain host to use a certain amount of capacity, the more storage space they over-provision, the more storage space they risk wasting. As shown in **Figure 4**, host 1 currently has only 5TB of data but is assigned a data volume of 20TB. And host 2 currently has 3TB of data but is assigned a volume of 10TB.

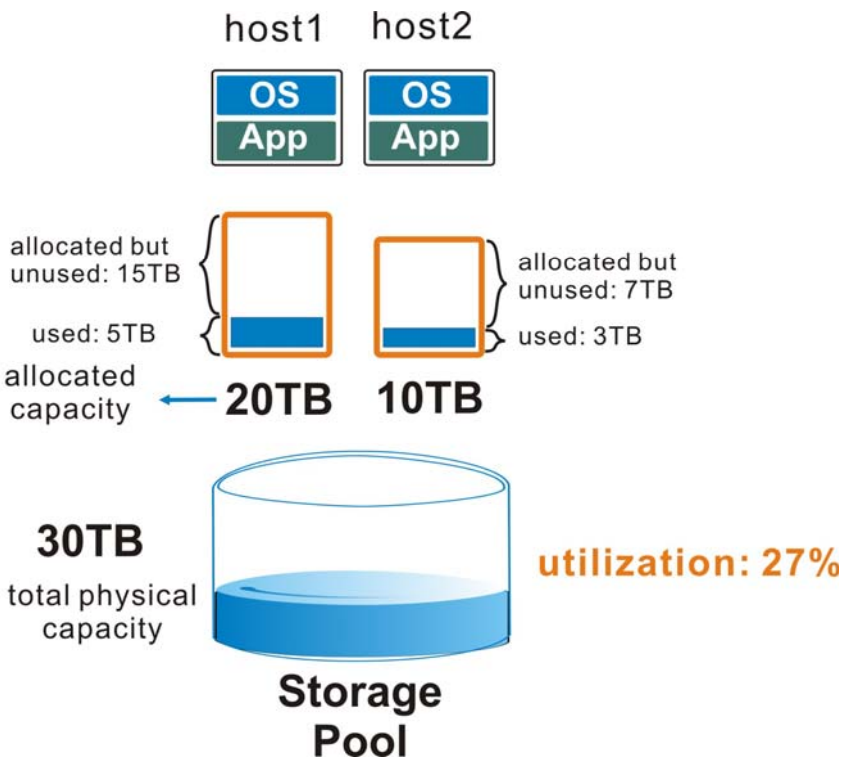

Figure 4. Traditional Provisioning

The 15TB and 7TB of free space are reserved to accommodate the predicted data growth of the host applications they are assigned to. The longer IT managers want the volume expansion hassles to be delayed, the more wasted investment on these large and underutilized data volumes they have to bear. Infortrend ESVA Series delivers thin provisioning capability to free IT managers from the dilemma.

Thin provisioning is a technology to allocate just-in-time free space to applications when data are written. In the figure below, we can see a storage pool of 10TB.

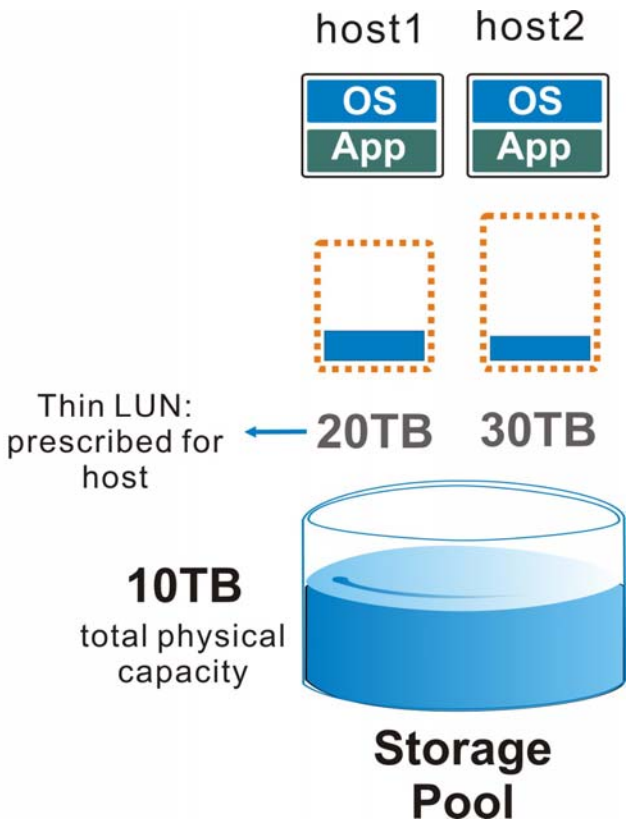

Figure 5. Thin Provisioning

With thin provisioning, users can “bluff” capacity to applications by prescribing 20TB of space to host 1 and 30TB to host 2. But the prescription does not mean fixing any amount of space for the applications. The pooled capacity is dynamically allocated as needed. This way of provisioning eliminates the management efforts of forecasting, planning, pre-allocating and monitoring individual data volumes. IT managers need only to keep a check on the utilization of the storage pool as a whole. They can also set a utilization threshold for the pool. When the threshold is reached, a notification would be automatically issued. As illustrated in the former section, expanding capacity of an ESVA storage pool is simple and can be done without disrupting business applications. The administration efforts of planning and staging data migration are completely eliminated.

Simplified Performance Optimizing

In the traditional IT environment, since applications produce data in different I/O rates, the uneven data distribution causes poor performance utilization. While some channels are overloaded and become performance-dragging bottlenecks, some are underutilized. To optimize overall performance, administrators have to regularly re-allot workloads among hardware resources concerning required capacity, performance and service levels of applications. This task takes much time, effort and downtime to

complete, and what's worse, only if workloads vary, the optimized state would be easily broken. To restore the state, the whole process has to be gone through all over again.

In ESVA's scale-out architecture, optimized performance can be easily achieved without any manual intervention. When host issues a write request to a storage pool, its composing data blocks would be distributed to member storage systems in a balanced way. As shown in **Figure 6**, the six data blocks composing the write request are evenly distributed on the three member storage systems, with each member receiving two blocks.

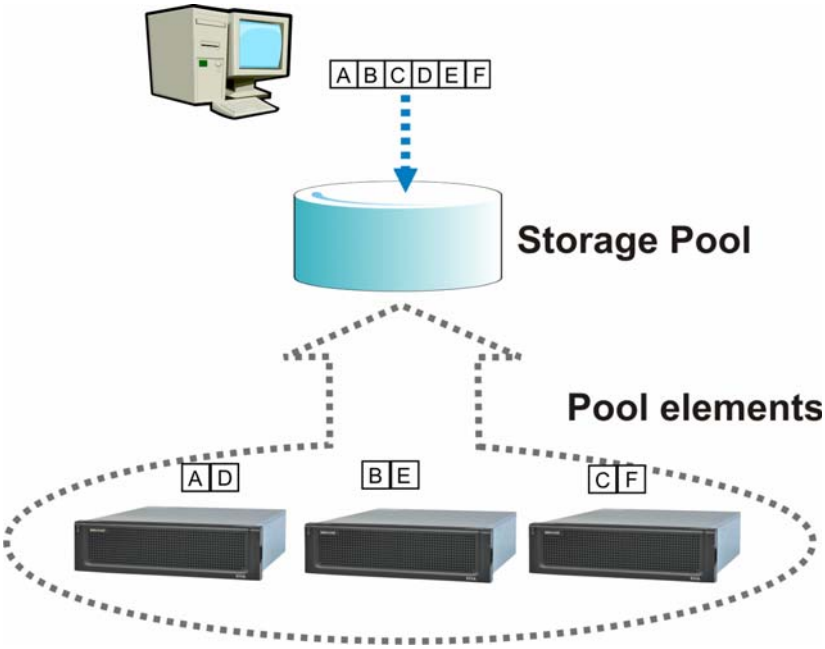

Figure 6. Distributed Load Balancing

The automatic and continuous load-balancing enables applications to be served by the fullest storage power. Even if users add or remove systems so that the configuration changes, the optimized state can still be maintained since the existing data would be migrated in a balanced way. In **Figure 7**, originally there are three data blocks on each of the two member systems. When a new member is introduced in, the data blocks are migrated to make all members equally share the workloads, with each carrying two blocks.

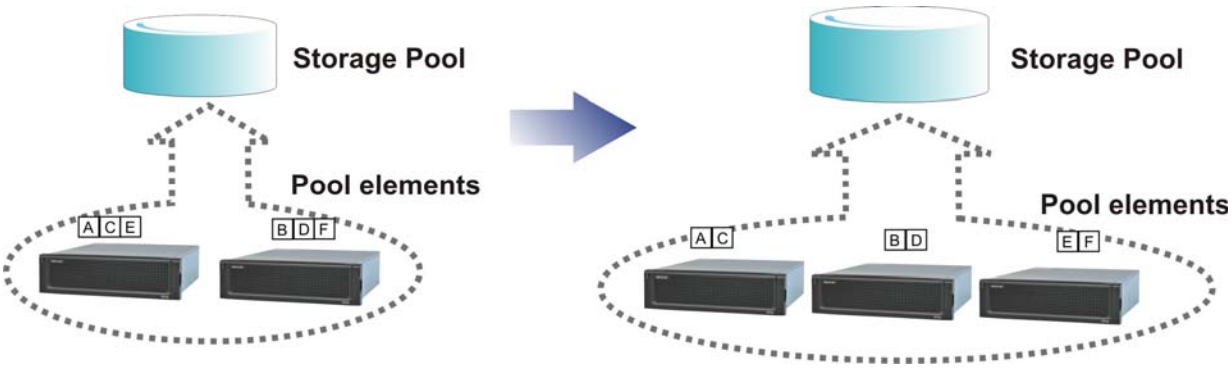

Figure 7. Automatic Data Migration

With ESVA, IT managers can make storage always working in its fullest power with even no manual intervention.

Conclusion

While data grow explosively, so do the challenges to manage them. In the traditional IT environment, it often costs several times the amount to manage storage than to purchase storage. Infortrend ESVA Series greatly simplifies some of the most time-consuming and labor-intensive storage administration tasks, such as storage scaling, capacity planning and performance fine-tuning. Only with much reduced time and efforts can IT managers perform non-disruptive scaling and achieve efficient capacity allocation and optimized performance in their storage environment.