Understanding the Thin Provisioning Capability of Infortrend ESVA

White paper

Abstract

This white paper introduces the thin provisioning technology implemented on ESVA and illustrates the details about configuring thin provisioning through SANWatch.

ESVA Architecture

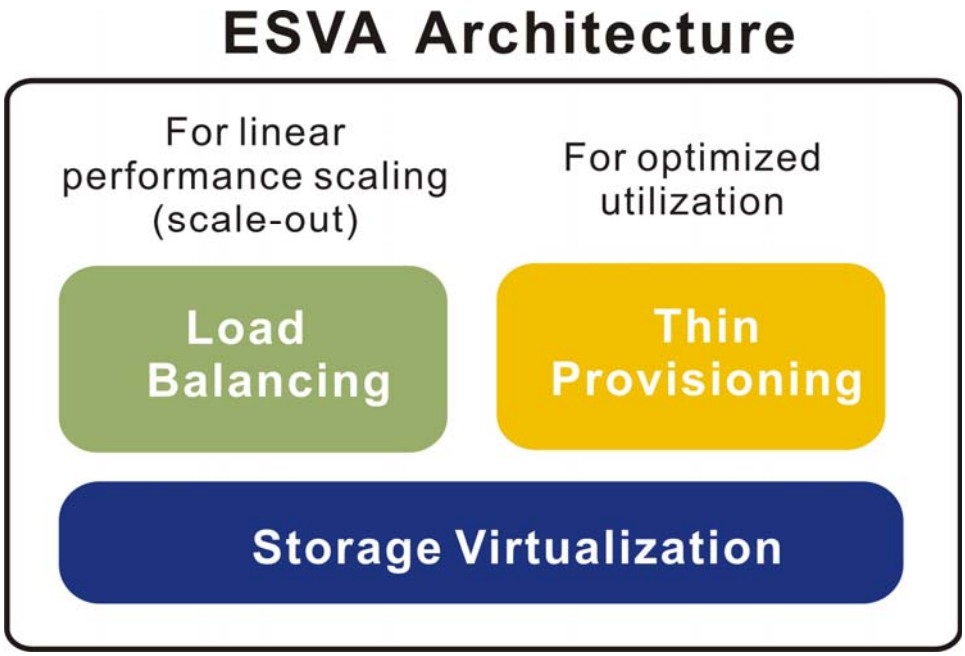

Figure1. ESVA Architecture

Infortrend ESVA Series is the company's revolutionary storage solution targeting at mid-range enterprises. ESVA stands for Enterprise Scalable Virtualization Architecture. Storage virtualization is the basis of ESVA. Multiple ESVA systems can be consolidated into a virtualized storage pool highly scalable in both capacity and performance. When users need to expand capacity, they can achieve it by attaching expansion enclosures to the member ESVA systems of the pool. As to performance scaling, thanks to the advanced technology of scaling out, it can be easily achieved by adding new ESVA systems to the pool. For optimized capacity utilization and linear performance scaling, thin provisioning and load balancing technologies are implemented on the virtualized foundation.

The main pain points ESVA deals with in today's storage deployment include:

- Storage is difficult to grow with demands
- Capacity needs are difficult to anticipate
- Costs and efforts grow with the complexity of managing and protecting multiple, heterogeneous storage systems
- Available budgets for floor space, power, and cooling are limited.
- Performance growth often means depleting current deployment and replacing it with new one

ESVA Thin Provisioning

The traditional way of storage provisioning for applications has several problems. Administrators need to allocate an anticipated amount of storage space dedicated to each specific application. When there is not enough capacity, users need to expand the LUN or create a new larger LUN. The reorganization of storage capacity will make the application suffer from downtime.

To delay the time-consuming and error-prone process, administrators may allocate a LUN of bigger size for the application at the beginning. This is so-called “fat provisioning”. Since the unused capacity provisioned for a specific application can not be utilized by other applications, this way of provisioning will result in poor storage utilization and wastes of money.

These problems can be overcome by the thin provisioning technology. The idea of thin provisioning is like bluffing a large amount of virtual capacity for an application server regardless of the actual physical capacity available. If an application is filling a virtual volume to full, the volume can be easily expanded by drawing space from a consolidated storage pool. When the pool is running out of storage capacity, it can be expanded on demand without disrupting the online service. Thin provisioning reduces much management overhead caused by traditional provisioning tasks.

ESVA’s thin provisioning is implemented on a virtualized base. Through Storage virtualization, resources on different physical storage systems are aggregated into a single “storage pool.”

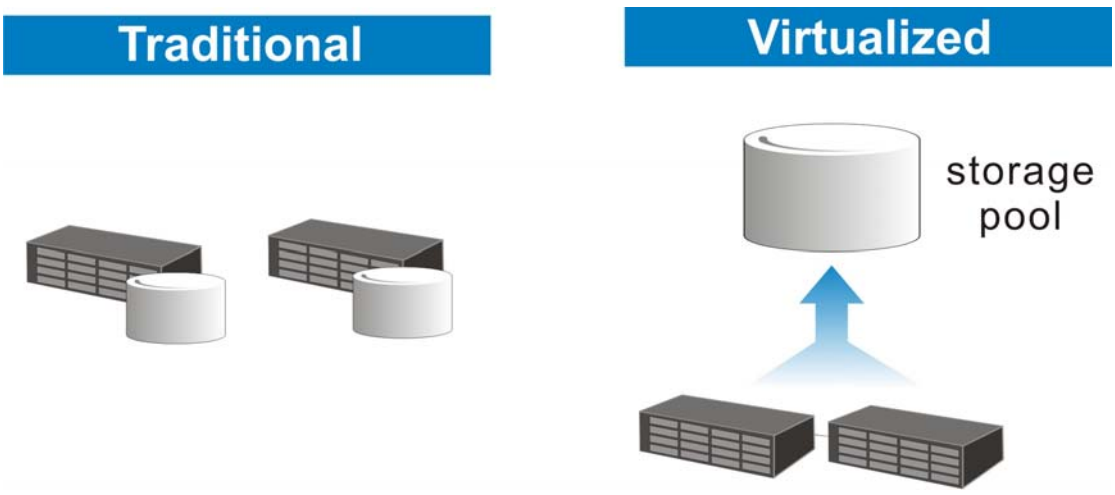

Figure 2. Storage Virtualization

The aggregated capacity is presented to applications in the form of virtual data volumes. A virtual volume can be created using a thinly-provisioned capacity, a capacity that does not need to be physically allocated at initial setup. The actual disk space is consumed only when data writes occur. Unlike a traditional LUN, a virtual volume is expanded by drawing capacity from a virtual pool, and the process is done on-the-fly.

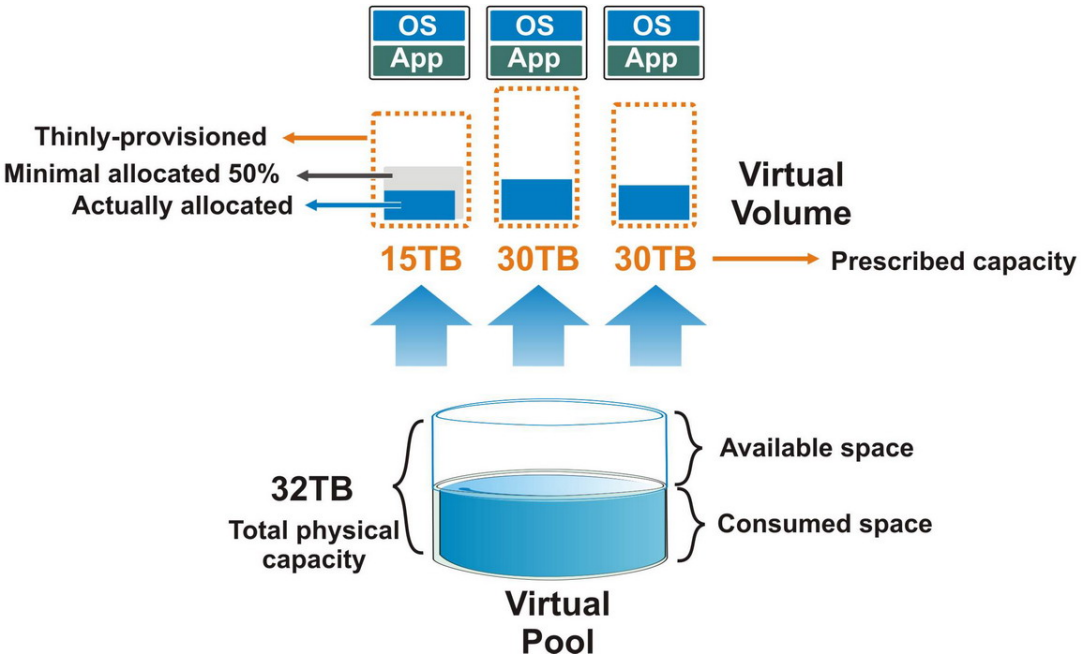

Figure 3. A Thinly-provisioned Volume

When creating a virtual volume for a specific application, you can first designate a large prescribed volume, and then designate a minimal allocated percentage of the prescribed volume that is physically allocated, say, 50% of the 15TB virtual volume. This preserves a fixed 7.5TB space from the virtual pool as the safe preserve set for this virtual volume. For efficient and easy monitoring of the virtual pool utilization, you can apply several watermark thresholds to it. When data writes fill up the pool space, system will automatically warn administrators to acquire more storage space.

Configuration Details

When user wants to create a new virtual volume, SANWatch pops a dialog box for configuration as shown below.

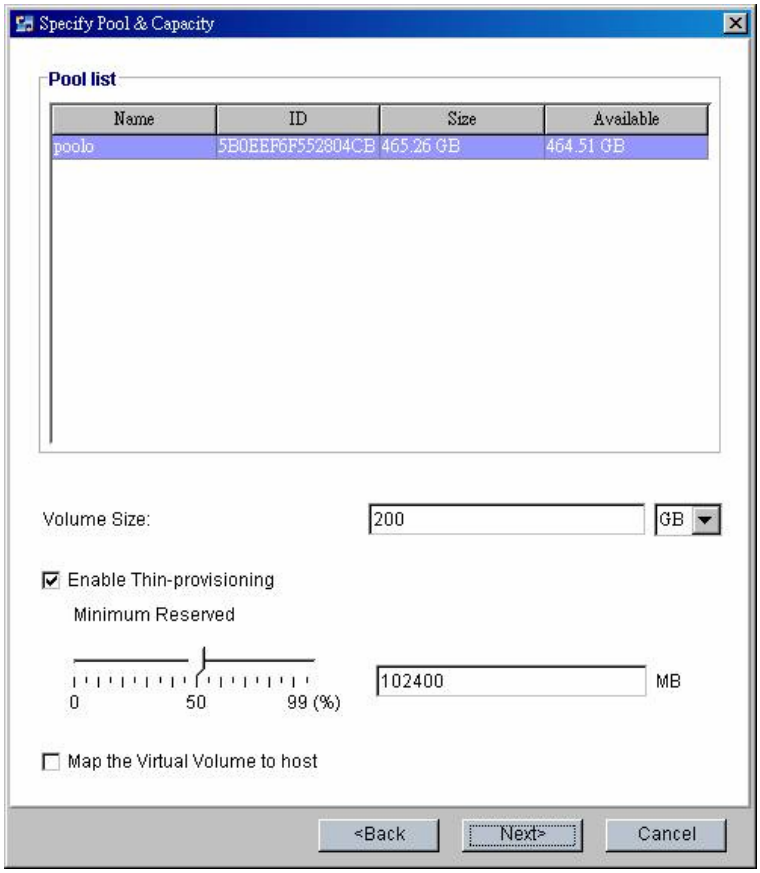

Figure 4. Thin Provisioning Configuration

In the dialog box, all available pools and the parameters for the new virtual volume are shown. The steps of virtual volume creation are:

1. User selects a pool from the pool list.
2. User sets the maximum size of the virtual volume.
3. User can check the option "*Enable Tin-provisioning Minimum Reserved*" to enable the setting of minimum reserved space of the virtual volume. The minimum reserved size can be set in percentage or a specific size, and the default setting is 0%.

In **Figure 4** above, user selects the pool *"poolo"* to create a new virtual volume, and the size (maximum size) of the virtual volume is 200GB. The minimum reserved space is enabled and the minimum reserved space is 50%, i.e., 100GB.

The option "*Map the Virtual Volume to host*" is used to map the virtual volume to host automatically when volume created.

The configuration of a virtual volume in use can be modified. By selecting the option

"Edit Virtual Volume" from SANWatch, a dialog box as shown in the following figure will pop up.

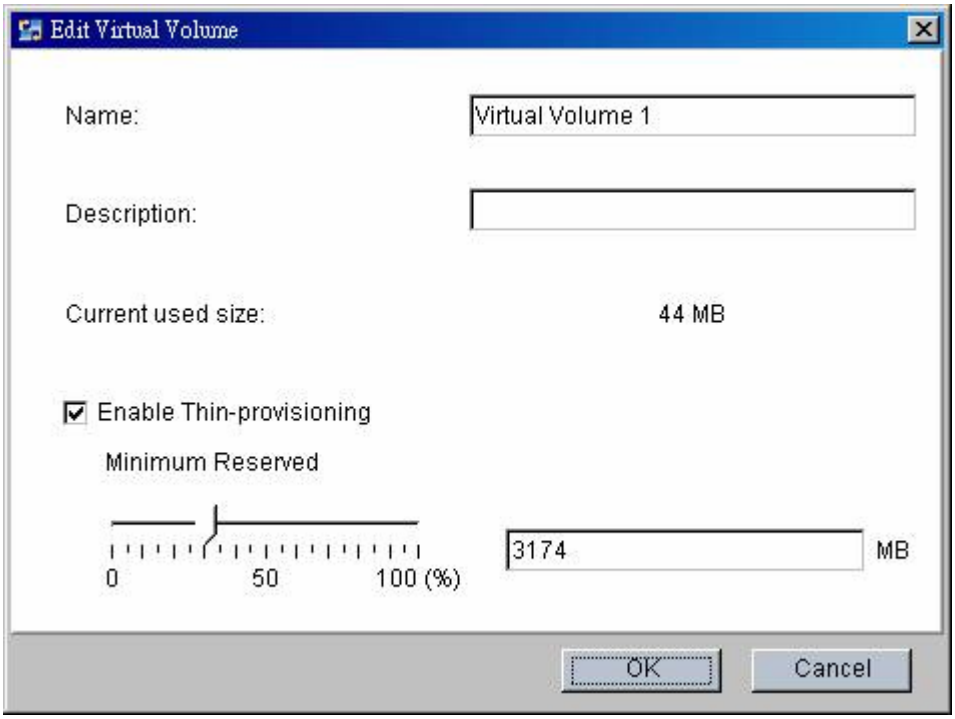

Figure 5. Thin Provisioning Setting for an Existing Virtual Volume

User can modify the *Name*, *Description* of the selected virtual volume. User can also enable/disable *Thin-provisioning Minimum Reserved* space and adjust its size. There's one thing to note: the size of the *Thin-provisioning Minimum Reserved* space must be greater than *Current used size*.

Thresholds and Events

To prevent the possible system crash resulted from storage shortage, ESVA enhances its thin provisioning technology by allowing users to easily monitor the utilization of virtual pools with the watermark mechanism. The following dialog box is used to configure the thresholds and related actions.

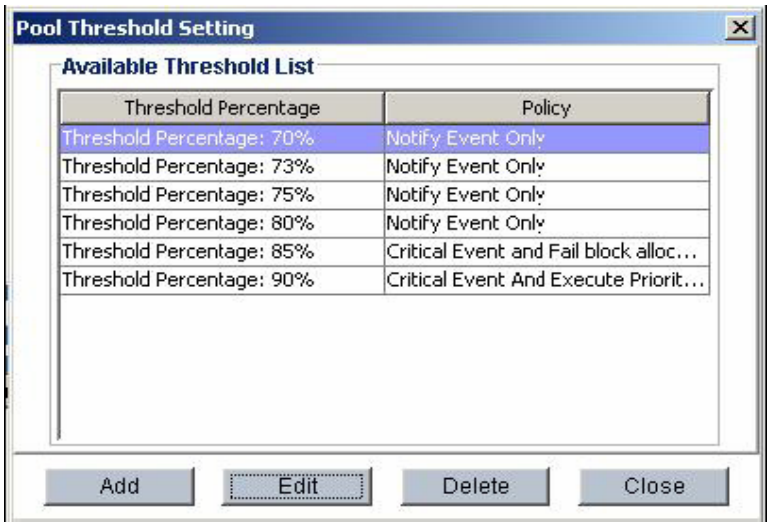

Figure 6. Pool Threshold Setting

Users may assign multiple threshold values on each virtual pool so that they will be notified when applications are filling up usable space. Adding more thresholds can prevent them from missing a single event. Seeing the capacity is running out, users can choose to remove obsolete data or expand virtual pools.

Conclusion

Thin provisioning ranks at the top of the hottest technologies of storage systems. It brings a number of benefits which traditional methods can't provide. The "just in time capacity" essentially eliminates allocated but unused storage. It also greatly simplifies storage provisioning tasks, reducing administration costs. When evaluating the initial capacity configuration, budgeting ad planning capacity growth over time, and calculating the total cost of ownership, users should look at storage systems that support thin provisioning differently than those that do not.

The award-winning ESVA series is a SAN storage system built upon a revolutionary concept to reinforce storage virtualization capability, realize performance advancement and deliver massive scalability. The innovative architecture of a 'scale-out' storage pool, exclusively designed by Infortrend, can deliver outstanding business benefits in cost, management and productivity. Together with several other leading-edge features optimized to best performance to meet mission-critical demands for scalability, performance and availability, the new ESVA series can provide mid-range enterprise users the ability to achieve optimized returns of investment, simplify storage infrastructure and maximize application productivity to ensure a much lower total cost of ownership.