Practical Storage Management Addressing the Cause of Unnecessary Growth

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Customer Background

The Customer will be experiencing pressures created by; high annual growth rates within their Data Storage Tier, greater need for automation & uniformity or broad geographic distribution. The management of these represents significant and growing costs for their business. Pre-existing management communication efforts to control growth by deleting unneeded and unwanted data have been very limited/tough to implement and consistently difficult to maintain.

The exact commercial profile of the organization can vary broadly and can cross between many segments, however they will typically exhibit one or many of the following attributes:

- They may currently be managing substantial pre-existing storage assets, either centralized or distributed.
- They may be experiencing high annual growth rates emphasizing the necessity to take control now in order to facilitate a structured growth in the future.
- They may have substantial user populations, generating a highly diverse catalog of user-generated content meaning the use of a structured data system is not practical.
- They may use multiple storage platforms & topologies, negating their ability to uniformly manage them with embedded toolsets.
- They may have small administrative workforces comparative to the scale of storage estate or end-user population; demanding the need for uniformity and automation in order to drive down the time and cost invested in potential non-line-of-business activities.
- They may have a broad geographic distribution potentially multiple small remote offices with dedicated storage asset as well as centralized storage located in the larger primary sites.

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Customer Objectives

Our experience, obtained by working closely with other customers, has taught us that while there may not be uniformity of scale or a similarity to the market space which they occupy, they all wish to take control of data growth and associated costs within their environment. Furthermore, they have been unable to do so in the past without the appropriate tools or processes in place to enforce their goals. Below is an outline of the typical objectives our customers share.

The Customer will be looking to drive down storage related costs, facilitate and police a thorough review of individual file value and sensitivity and assert storage 'accountability'. A primary asset in this effort would be a user-friendly tool that facilitates Storage clean-up and management at a user and share administrator level; delegating the task of data management, and delivering data accountability, to data owners. In many cases they also seek the ability to prevent users from saving excessive amounts of data and to control the types of files that can be saved.

In addition, top-level monitoring and reporting would be introduced to provide the business with a richer understanding of the status of the storage resources; enabling more robust strategic decision making.

In some cases Customer's seek to gain the ability to understand and illustrate the financial association between storage use and the cost of the infrastructure and services necessary to provide that service, either conceptually or practically. In either case the goal would be to better understand the source of data-storage related costs, and to drive efficiency in the use of corporate storage.

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How to realise your Objectives - the NSS Concept

Northern Storage Suite provides the policy-makers with the ability to define uniform storage utilisation protocols that can be enforced at the end-user level; where necessary restricting the individual to a predefined usage level and influencing their ability to save undesirable data types. Furthermore, Northern Storage Suite engages with the end-users providing them with timely notifications and summaries through which they may directly interact in order to support the end-user in compliance with organizational objectives

The initial definition of these policies is facilitated through Northern Storage Suite's ability to capture and distribute current information relating to existing utilisation profiles ensuring that the business can set appropriate, and achievable, goals. Through the on-going review of the dynamic reports produced by Northern Storage Suite the organisation may understand the level of effectiveness of their control policies as well as providing the ability to understand when new forces start to take effect, enabling them to adapt more rapidly to business needs.

Northern Storage Suite facilitates the ability to convert the organisational storage utilisation objectives into uniform functional capabilities enforcing policy and achieving real-world results.

Below is an outline of how Northern Storage Suite addresses the common objectives described in the previous section:

Storage Reporter

In addition, top-level monitoring and reporting would be introduced to provide the business with a richer understanding of the status of the storage resources; enabling more robust strategic decision making.

Northern Storage Suite provides the analytical reporting capability companies need in order to make educated decisions and know that their action plans are based on fact.

Storage Reporter provides the Administrator with the ability to interact with a drill down interface designed to provide key information in order to understand growth and utilisation metrics for the Storage devises maintained by NSS.

Storage Reporter's interactive overview facilitates the quick identification of problematic areas within the storage pool, saving time and increasing productivity. Where necessary, the administrator can schedule more granular reports to capture a detailed image of the issue they wish to understand further. These reports can then be distributed within the organisation in order to share the information and gain consensus.

The separation of an interactive overview from detailed reporting ensures the minimum possible impact on the storage device's performance. Furthermore, with the detailed understanding that Storage Reporter provides, the administrator can now take actions to reclaim wasted capacity within the Storage device. Reducing un-necessary growth and extending the productive life of existing investments.

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Quota Server

In many cases they also seek the ability to prevent users from saving excessive amounts of data and to control the types of files that can be saved.

The first step in encouraging users to use Storage resources appropriately is to ensure that they understand that the resource is not infinite. Through the definition and enforcement of a user-level/share-level quota, users become accustomed to this concept thereby understanding that they need to be responsible for their own activities.

Northern Quota server provides the means to define quotas quickly and easily for one, or one thousand, user/s. It can be integrated with Active Directory to enable management of the user population based upon AD attributes i.e. membership of the HR department, specific location, etc.

In many cases where users have not been accustomed to quotas, NSS has the ability to create soft quotas that will be used to trigger activities in the Storage Portal, following which hard quotas may be deployed if desired. A Hard Quota will stop the user from saving additional content should they exceed their limit, while a soft quota will allow them to continue, the ability to apply either approach is key to introducing the concept to the organisation

Management of user-level or share-level quotas is simplified for the administrator as NSS uses LDAP information, filters and tabs to group quotas (and hence Users). This enables the administrator to immediately locate users that have exceeded their quota and take action. The interface employs a simple to use, intuitive layout, tailored towards effective efficient management of the user population and file systems. The interface supports tens of thousands of individual quotas, but allows for them to be managed as groups or individually just as easily.

Quota Server has the ability to create Black or White list quotas; this enables the company to control specific file types within storage resources. Be it that the company may wish to block media content in a step to protect against potential Copyright infringement or that it wishes to direct all .PSTs towards a dedicated group share so that important company communications are collected and archived to adhere to legislative directives.

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Storage Portal

A primary asset in this effort would be a user-friendly tool that facilitates Storage clean-up and management at a user and share administrator level; delegating the task of data management, and delivering data accountability, to data owners.

Storage Portal deals with notification and engagement of the end-user population. Once parameters have been defined within Quota Server (be those hard of soft), Storage Portal will notify the end user when they near, or exceed, pre-defined usage levels.

Held within the user notification is: content relating to company usage policy, their personal usage levels, interactive reports providing an insight into their data - highlighting high-probability candidate content for review and possible deletion. The interactive reports included information related to: Media content (MP3, AVI, M4V and similar files), Largest Files, Oldest Files, Duplicate files and Files own by other users.

By enforcing a reasonable personal utilisation level, users are encouraged to take ownership of their personal usage are enabled to do so and are held accountable for adhering to company guidelines.

As an additional benefit, this process of the data creators being accountable for the management, means that content is not handled by generic automated rules engines which do not understand the individual value of the data.

Storage Chargeback

In some cases Customer's seek to gain the ability to understand and illustrate the financial association between storage use and the cost of the infrastructure and services necessary to provide that service, either conceptually or practically. In either case the goal would be to better understand the source of data-storage related costs, and to drive efficiency in the use of corporate storage.

More often than not the need for a storage infrastructure is considered to be a cost of doing business; when the reality is that this highly complex system provides a corner-stone service to the organisation. Many organizations now wish to understand the costs incurred throughout the company in an attempt to drive efficiency and motivate change, this ability can now be extended to Storage through the use of Storage Chargeback

Northern Storage Suite enables the organisation to define the costs associated with the procurement, maintenance and delivery of their storage resources. These costs, when combined with utilization reports illustrate the financial impact on the organisation of the use, and miss-use, of those assets. This conversion, from conceptual to actual, enables each department to understand their own impact on the company resources in a way that is universally understood.

In the past many organisations would have struggled to find the means to motivate change; nothing is more effective than the ability to illustrate the financial impact upon a business.

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Applying the concept to reality

In this section we deal with the practical application of the typical organisational objectives discussed in earlier sections. The Objectives are broken down into functional goals each being addressed by capabilities built-in to Northern Storage Suite

Analytics – Storage Reporter

In addition, top-level monitoring and reporting would be introduced to provide the business with a richer understanding of the status of the storage resources; enabling more robust strategic decision making.

1. Implement the framework necessary to allow regular monitoring of storage usage through summary data. The top level summary should be storage device, File Type or User based with drill down information at each level.

2. Implement the framework necessary to produce monthly management reports that include the following details:
    a. Top X Space Consuming users
    b. File Type Growth
    c. Storage Hosts growth and Storage Hosts near full (>90%)

Enforcement – Quota Server

In many cases they also seek the ability to prevent users from saving excessive amounts of data and to control the types of files that can be saved.

1. Implement the framework of policies to prevent File Shares and HomeDirs from increasing beyond a determined limit. Trigger Notifications to File/Home share owner based on AD attribute (Subject to AD information being available).

2. Implement the framework of policies to prevent users from saving prohibited file types into File Share and HomeDir objects (file blocking).

Engagement – Storage Portal

A primary asset in this effort would be a user-friendly tool that facilitates Storage clean-up and management at a user and share administrator level; delegating the task of data management, and delivering data accountability, to data owners.

1. Facilitate the cleanup and classification of files in home drives by delegating responsibility for housekeeping to the corresponding users.
    a. Delivering notifications describing share size
    b. Providing details of files within the share that could be considered for deletion

2. Facilitate the cleanup and classification in shared drives by delegating responsibility for housekeeping to designated users and/or share administrators (subject to share owner being defined in AD or within the File System as Share Remarks).
    a. Delivering notifications describing share size
    b. Providing details of files within the share that could be considered for deletion.

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Cost Distribution – Storage Chargeback

In some cases Customer's seek to gain the ability to understand and illustrate the financial association between storage use and the cost of the infrastructure and services necessary to provide that service, either conceptually or practically. In either case the goal would be to better understand the source of data-storage related costs, and to drive efficiency in the use of corporate storage.

1. Enable the periodic (monthly, quarterly) generation of reports that show current usage level by organizational unit or storage device in association with pre-defined billing structure.
    a. Provide details of organizational storage use including capacity utilization and associated financial cost (subject to AD attributes and File Systems Structure)
    b. Provide details of storage device use including capacity utilization and associated financial cost (subject to AD Attributes and Storage Architecture)

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Infrastructure Requirements

Northern Storage Suite installation components.

This section describes the deployment model for Northern Storage Suite. It provides a high-level explanation of the different components within an NSS deployment and how these components should be arranged in standard, high-availability and Disaster Recovery environments.

Key Components of NSS installation

1. Managing Host Server

   Northern Storage Suite is installed on one or more Windows servers. Each of these servers is referred to as an 'NSS Managing Host' or a 'Managing Host'. Managing Hosts can be either physical or virtual machines

2. Target storage device with CIFS access to target paths

   Once installed NSS is configured to control and monitor storage resources. These resources are either local to the Managing Host, a DAS or SAN configuration, or attached to a NAS appliance and accessed across a Local Area Network. Whether local or remote, the target of NSS operations is referred to as the 'Target Device'.

3. MS SQL database (one database per Business Unit)

   NSS operations require data to be stored in an MS SQL database. The database server does not need to be dedicated to NSS; any pre-existing SQL server can be used. Database size depends on how NSS is used, particularly the number and scope of scheduled reports configured as well as the amount of historical data that is retained. Empirical evidence points to database sizes equating to less that 1% of the size of the storage environment that is being managed.

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Additional Components

4. NSS API Server – conditional to deployed topology

   If the project defines there is a need for locking quotas (hard quotas). This feature of NSS is enabled within a NAS environment via the use of a vendor specific API or reversal of the ACLs (suitability of this approach requires further discussion).

   - In the case for EMC Unified Storage environment through the use of the EMC technologies CAVA and CEPA. This gives rise to the following additional need:
     - Minimum of two application servers running the EMC CEPA solution (can be co-hosted with NSS)
   - In the case for NetApp FAS Storage environments through the use of the Data OnTap fPolicy; this service runs on the filers requiring no further application servers.

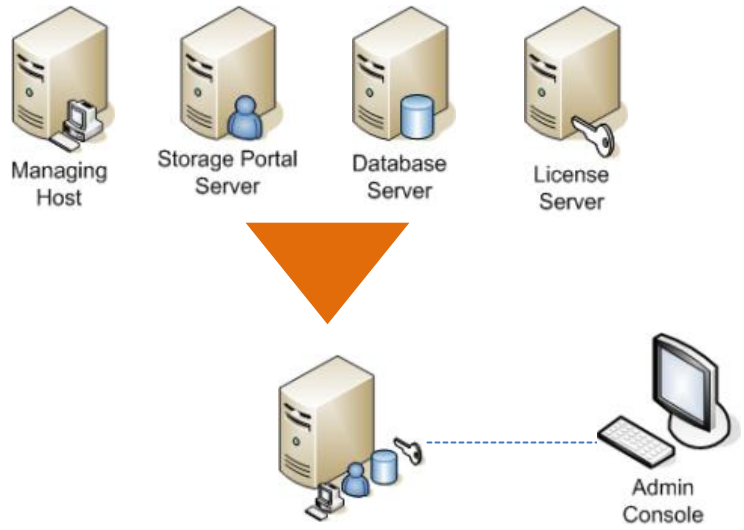
   Otherwise NSS requires no additional Servers within a windows based SAN or DAS environment

5. Storage Portal Server

   If there is a need within the project for users to have access to the Storage Portal feature of NSS, this feature requires that a web server be available within the environment.

   - ISS must be enabled on one of the NSS application servers

Diagram 1: Northern Storage Suite Server Components



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Application Server Specifications

- Server type: virtual, Windows 2003 or higher
- CPU: 4 core Intel Xeon 5500 or equivalent
- RAM: 8GB
- HDD: 20 GB
- NIC: A single NIC is required, teaming is recommended for maximum scan performance

Sizing Application Server Pool

The numbers of servers per logical unit (Business Unit) and the specifications of the servers depend on two key factors: the number of TBs that will be scanned in order to achieve project goals and the (total) number of directories that will be managed within quotas.

Database Server

- Server type: virtual/physical, MS SQL 2005 or higher
- CPU: 4 core Intel Xeon 5500 or equivalent
- RAM: 8GB
- HDD: 750GB free space
- Databases for each BU are created automatically during NSS configuration. No additional requirements.

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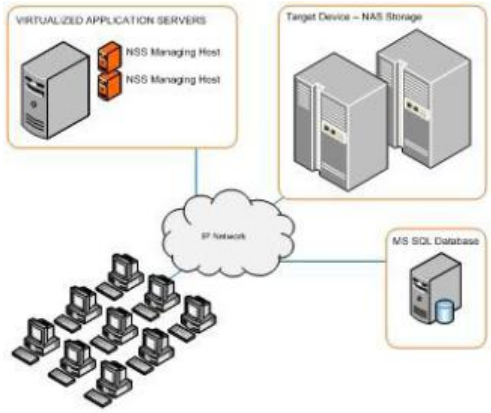
NSS Deployment Architecture

Northern Storage Suite supports DAS, SAN and NSS deployment architectures; the following diagrams illustrate examples of the typical NSS topology for each storage architecture. Northern suggests that when evaluating either approach consideration be given to the potential for NSS Application server scaling. Northern prefer to work with each customer in order to scope the exact requirement in order to tailor performance, manageability and scalability.

Typical Deployment

The diagram below shows a typical deployment of NSS within a NAS environment. The NSS Managing Hosts are virtual machines accessing the target storage devices across the LAN and storing report data within database served from a physical SQL server.

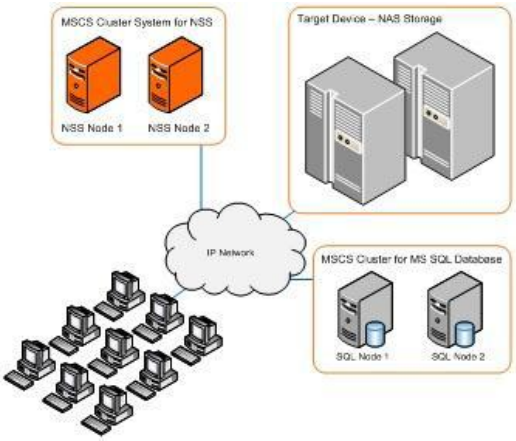
Diagram 2: Northern Storage Suite DAS Deployment Architecture.



High Availability Deployment

Northern Storage Suite is fully cluster aware. This feature can be utilized to ensure high-availability of quota policies, storage reporting, chargeback, etc. The following deployment diagram shows both NSS and MS SQL installed on physical [MSCS] cluster systems, delivering high-availability.

Diagram 3: High availability deployment of NSS within a NAS environment



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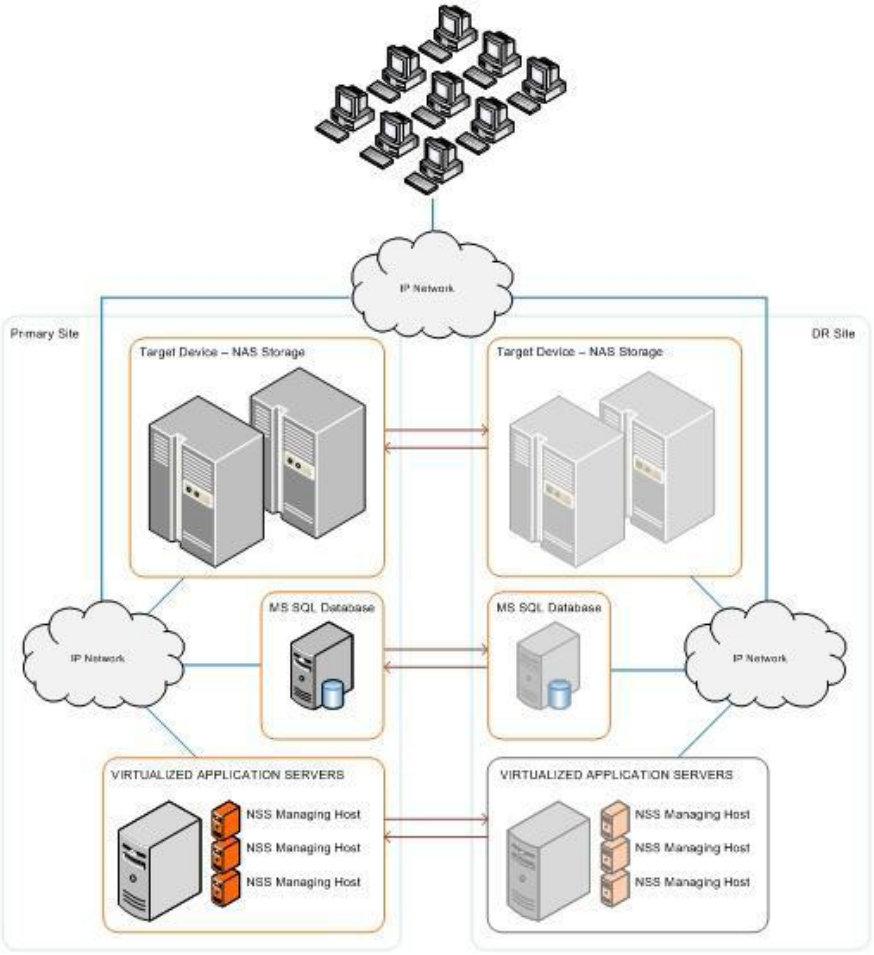
Disaster Recovery Deployment

Northern Storage Suite can be installed in a Disaster Recovery configuration through the combined use of MS SQL synchronization tools and human processes to ensure mirroring of quota, reporting, chargeback, etc. policies. The diagram below shows NSS deployed within an environment that includes a Disaster Recovery capability.

Here vendor-specific tools are being used to ensure near real-time data replication between the Primary and DR storage devices as well as the Primary and DR MS SQL Database servers. Configuration of quotas, reporting, and chargeback policies is manually duplicated at both sites. Hardware emulation and VM staging tools can also be used to ensure policies are accurately duplicated.

Diagram 4: Deployment of NSS within an environment that includes disaster recovery capability



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