

Please note that although cost is almost always a consideration, we do not use cost in any of the storage network evaluation criteria. The logic is to find what fits best, and then scale back from there based on cost. However, ensure you do not jeopardize security in this process without properly documenting the risk.

Storage Solution Component Matrix

It quickly becomes apparent that many factors must be considered when selecting a secure storage solution. In addition to the matrices, found on the companion Web site and already presented, pertinent areas of the following components are included in the selection process.

- ◆ Capacity planning (sizing)
- ◆ Need/use
- ◆ Hardware platforms
- ◆ Operating systems
- ◆ Applications
- ◆ Architecture (file systems, protocols, and topology)
- ◆ Data classification categories (sensitivity)
- ◆ Fault tolerance (failure avoidance)
- ◆ Performance tuning/Quality of Service (QoS)
- ◆ Storage software requirements/data availability
- ◆ Data protection
- ◆ Choosing a security infrastructure (NASD, Zoning, Security Domain Zones, and so on)

The selection matrix here is designed to help you determine which type of solution or solutions best fit the requirements entered into the evaluation criteria matrix. This matrix is not meant to include every possible scenario; rather, you should view it as a solid foundation on which to build your evaluation criteria.

Each of the areas in the matrix has been previously discussed, with the exception of data classification. Data classification is a critical component for ensuring that data security is appropriate.

CROSS-REFERENCE: For more on data classification, see Chapter 8.

Environment

The matrix is divided into 14 parts and contains two worksheets. The first worksheet contains pertinent environment questions with the ability to select requirements. The second worksheet summarizes the selections. The first component of the first worksheet, shown in Figure 7-5, is a validation that the work outlined earlier in this chapter has been performed and the target network is capable of supporting storage centralization/consolidation.

Selection Components	
9/8/2002	
Based on the analysis of your environment using the information contained in Storage Security, is your environment capable of supporting a NAS or SAN solution at this time? ✓=Yes, Blank=No	<input checked="" type="checkbox"/> Yes/No
<p>This is returned if "Yes/No" is checked.</p> <p>The current environment is capable of supporting a NAS or SAN based on the input provided. Please continue the selection process.</p> <p>This is returned if "Yes/No" is not checked.</p> <p>The current environment is not capable of supporting a NAS or SAN based on your selection. Please resolve network issues before proceeding. However, you can continue to the evaluation process.</p>	

Figure 7-5: Component selection with the storage network matrix

Before moving on, it is important to note that the matrix is designed to be simple. It uses a simple requirement scheme that allows the user to select only those components that are required. Simply check the box if a given item is required in the environment, and the summary builds itself based on your selections. Once all the selections have been made and the summary is complete, you can print out the results of the summary. Figure 7-6 illustrates a needs-versus-use list.

Note that multiple requirements are selected in Figure 7-6. Only one priority rating of (5) exists (for Storage Consolidation), and only one priority rating of (1) exists (for API Interface). This means that out of the requirements, Storage Consolidation is the most important and API Interface is the least important. The rest of the priorities are somewhere in between.

Need/Use		R
7.	Server consolidation (is server consolidation a requirement)?	<input checked="" type="checkbox"/>
8.	Storage consolidation (is storage consolidation a requirement)?	<input checked="" type="checkbox"/>
9.	Increase backup window (is addressing an extended backup window a requirement)?	<input checked="" type="checkbox"/>
10.	Multihardware platform support (is multiplatform support a requirement)?	<input checked="" type="checkbox"/>
11.	Clustering (is clustering a requirement for storage consolidation)?	<input checked="" type="checkbox"/>
12.	Multiplatform development (is file sharing between platforms a requirement)?	<input checked="" type="checkbox"/>
13.	File sharing (is over-the-network file sharing a requirement)?	<input checked="" type="checkbox"/>
14.	Web services (will Web services be attached to the central storage device)?	<input type="checkbox"/>
15.	API interface (is near-line storage in addition to centralized storage a requirement)?	<input checked="" type="checkbox"/>
16.	Data replication (is data replication and or tape library support a requirement)?	<input checked="" type="checkbox"/>
17.	Business continuance (excluding general fault tolerance, are higher levels of data availability a requirement)?	<input checked="" type="checkbox"/>

Figure 7-6: Selecting service requirements is easy with the selection matrix

Capacity

The next worksheet “Capacity in Megabytes,” shown in Figure 7-7, is a simple way to determine how much storage is required for those systems that use the central storage device (NAS or SAN). This worksheet calculation is not a total of all systems, but only those that use the central storage system rather than the current method. Remember to use megabytes as the baseline (for example, you would convert 1GB to 1,000MB). Therefore, 500GB is equal to $500 \times 1,000\text{MB}$, or 500,000MB.

In this example, 2.75TB of total space is available, but you are only using 1.25TB. Growth is not a driving factor, since the environment contains enough storage space to accommodate the estimated growth. However, 12 systems of the total 53 will run out of storage space sometime within the first 2 years. This may necessitate adding drives or further review of centralizing storage.

NOTE: It is not uncommon to have less than 50 percent used space when multiple hosts and volumes are considered.

Need/use and hardware platform

In most cases, storage centralization doesn’t occur unless there’s a reason for it. Current devices, for example, may have reached their capacity limits.

Capacity in Megabytes		
1.	Drives (add up the capacity of all drives being considered for centralization).	27500000.00
2.	Volumes (add up all the volumes and provide a volume count).	63
3.	Minus required for operating systems (how much internal space will be used for operating systems)?	88000.00
4.	Used (what's the total drive space actually in use)?	1250000.00
5.	Estimated growth (what is the current 2-year data-growth-rate estimate above what is currently in use in MB)?	1000000.00
6.	Are there any devices that are (or will be in the next year) out of disk space? If so place the number here, or 0 for none.	12
<p>Based on your input above, the summary worksheet returns this.</p> <p>Storage Space Requirements</p> <p>The storage space requirements for the next two years = 2162 GB</p> <p>You currently have 2750 GB Total available and 45.4545454545455% of your available space is currently being used.</p> <p>Storage should be consolidated because one or more systems are low on space.</p>		

Figure 7-7: The capacity worksheet

The following two sections of the matrix (Need/Use and Hardware Platform) help you determine which type of storage is needed—DAS, NAS, SAN, or even *near-line storage* (also called *Content Addressed Storage*, or *CAS*). Figure 7-8 illustrates the Need/Use section.

Operating systems

With the possible exception of not being able to find any support for a specific network operating system (NOS), the choice of storage technology (DAS, NAS, or SAN) may not depend as much on the operating system as on other factors. However, the NOS(s) that is used may tip the scales in one direction or another, and the choice of which (manufacturer's) solution to implement will almost certainly be affected. For example if you use only one network operating system, and it is Microsoft Windows 2000, there are many options to choose from. However, if multiple operating systems, such as OpenVMS and Novell, are the products, the options are more limited. Selecting and prioritizing each assists in the evaluation process. Figure 7-9 illustrates the selection process and one possible result.

Need/Use		R
7.	Server consolidation (is server consolidation a requirement)?	<input checked="" type="checkbox"/>
8.	Storage consolidation (is storage consolidation a requirement)?	<input checked="" type="checkbox"/>
9.	Increase backup window (is addressing an extended backup window a requirement)?	<input checked="" type="checkbox"/>
10.	Multihardware platform support (is multiplatform support a requirement)?	<input checked="" type="checkbox"/>
11.	Clustering (is clustering a requirement for storage consolidation)?	<input checked="" type="checkbox"/>
12.	Multiplatform development (is file sharing between platforms a requirement)?	<input checked="" type="checkbox"/>
13.	File sharing (is over-the-network file sharing a requirement)?	<input checked="" type="checkbox"/>
14.	Web services (will Web services be attached to the central storage device)?	<input type="checkbox"/>
15.	API interface (is near-line storage in addition to centralized storage a requirement)?	<input checked="" type="checkbox"/>
16.	Data replication (is data replication and/or tape library support a requirement)?	<input checked="" type="checkbox"/>
17.	Business continuance (excluding general fault tolerance, are higher levels of data availability a requirement)?	<input checked="" type="checkbox"/>
Hardware Platform (direct usage)		R
18.	Intel (if the environment contains Intel platforms that will be connected to central storage, list Intel as required).	<input checked="" type="checkbox"/>
19.	Apple (if there are Apple platforms that will be connected to the central storage, list Apple as required).	<input type="checkbox"/>
20.	RISC (if there are RISC platforms that will be connected to central storage, list RISC as required).	<input type="checkbox"/>
21.	Alpha (if there are Alpha platforms that will be connected to central storage, list Alpha as a required).	<input checked="" type="checkbox"/>
22.	Mini (mini platforms include such devices as AS/400, VAX, and HP9000).	<input type="checkbox"/>
23.	Mainframe (mainframes that must connect to central storage).	<input type="checkbox"/>
24.	Supercomputer (it is likely that a supercomputer may drive the storage initiative in many instances).	<input type="checkbox"/>
Based on your input above, the summary worksheet returns this.		
<p>Storage Type Requirements</p> <p>Based on the current data, Network Attached Storage and a Storage Area Network should be used. In addition to the above listed requirements, some benefit may be derived from near-line storage.</p>		

Figure 7-8: The Need/Use worksheet versus the Hardware Platform (direct usage) worksheet

Network/Mini/Mainframe Operating System		R
25.	Microsoft (Windows NT, 2000).	<input checked="" type="checkbox"/>
26.	Novell (NetWare 4.x through 6.x).	<input checked="" type="checkbox"/>
27.	Unix (is direct attachment to central storage device needed)?	<input type="checkbox"/>
28.	Linux (does a Linux device require attachment to the central storage device)?	<input checked="" type="checkbox"/>
29.	Mac OS (specific versions and compatibility must also be checked here).	<input checked="" type="checkbox"/>
30.	VMS (if Virtual Memory System/OpenVMS is used, it needs to connect to the central storage).	<input type="checkbox"/>
31.	OS/400 (OS/400 as well as other midrange operating systems do not connect to all central storage devices).	<input type="checkbox"/>
32.	OS/390 (OS/390 and other mainframe operating systems).	<input type="checkbox"/>

Based on your input above, the summary worksheet returns this.

Technology Requirements
 The NOS(s) used in the environment = Microsoft, Novell, Linux, Mac-OS.
 Ensure the tape backup software is compliant with the above selections.

Figure 7-9: The operating system worksheet

In Figure 7-9, you can see that four network operating systems are in use. The summary worksheet displays both the NOSs and also ensures that the backup software is capable of handling them.

The operating systems of the workstations themselves are not likely to determine the storage technology used unless they need to share files directly between multiple workstation operating systems. This is addressed in the Needs/Use section. However, it is important to know which operating systems are used for security backup and data protection issues. Figure 7-10 illustrates a sample output.

Note that as you continue to fill out the “Selection Criteria” worksheet, you are building a summary document that will help you evaluate the effectiveness of a given solution. Figure 7-10 shows that, in addition to the NOS selections made earlier, you now have the correct information from the workstation OS section.

The remaining areas in the “Storage Selection Criteria” worksheets are:

- ◆ Applications
- ◆ Architecture (file systems, protocols, topology)
- ◆ Data classification categories (sensitivity)
- ◆ Fault tolerance (failure avoidance)

- ◆ Performance tuning/Quality of Service (QoS)
- ◆ Storage software requirements/data availability
- ◆ Data protection
- ◆ Choosing a security infrastructure (NASD, zoning, security domain zones, and so on)

Workstation Operating System		R
33.	Microsoft (Windows 95, 98, ME, NT, 2000, XP)	<input checked="" type="checkbox"/>
34.	Unix (there are many versions; the key here is if the devices require direct attachment to the central storage).	<input type="checkbox"/>
35.	Linux (much like Unix the key here is if the devices require direct attachment to the central storage).	<input checked="" type="checkbox"/>
36.	Mac OS (is direct attachment to the central storage device required)?	<input type="checkbox"/>

Based on your input above, the summary worksheet returns this.

Technology Requirements
 The NOS(s) used in the environment = Microsoft, Novell, Linux, Mac-OS.
 Ensure the tape backup software is compliant with the above selections.
 The Workstations Operating systems in the environment = Microsoft, Linux.
 Multiple workstation operating systems exist—ensure proper classification and storage measures are taken.

Figure 7-10: Operating system selection worksheet

If you have not already done so, obtain a copy of the matrix from the companion Web site, and familiarize yourself with the remaining contents. Fill it out in its entirety to determine the important criteria for your environment.

Once you have determined which storage solution(s) is/are best for your environment, go to the evaluation matrices listed in the individual chapters (also downloadable from www.wiley.com/compbooks/chirillo and www.TigerTools.net or www.InfoTress.com) and complete them to determine which overall solution is best for your environment.

SECURITY THOUGHT: If you have data that is considered “CONFIDENTIAL” or “TOP SECRET,” we highly recommend enlisting the services of a competent data security company.