

SAN ARCHITECTURE AND HARDWARE DEVICES

Network back-up systems can back up heterogeneous IT environments incorporating several thousands of computers largely automatically. In the classical form, network back-up systems move the data to be backed up via the LAN; this is where the name ‘network back-up’ comes from. This chapter explains the basic principles of network back-up and shows typical performance bottlenecks for conventional server-centric IT architectures.

7.1 CREATING A NETWORK FOR STORAGE

Back-up is always a headache for system administrators. Increasing amounts of data have to be backed up in ever shorter periods of time. Although modern operating systems come with their own back-up tools, these tools only represent isolated solutions, which are completely inadequate in the face of the increasing number and heterogeneity of systems to be backed up. For example, there may be no option for monitoring centrally whether all back-ups have been successfully completed overnight or there may be a lack of overall management of the back-up media. Changing preconditions represent an additional hindrance to data protection. There are three main reasons for this:

1. As discussed in Chapter 1, installed storage capacity doubles every four to twelve months depending upon the company in question. The data set is thus often growing more quickly than the infrastructure in general (personnel, network capacity). Nevertheless, the ever-increasing quantities of data still have to be backed up.
2. Nowadays, business processes have to be adapted to changing requirements all the time. As business processes change, so the IT systems that support them also have to be adapted. As a result, the daily back-up routine must be continuously adapted to the ever-changing IT infrastructure.

3. As a result of globalization, the Internet and e-business, more and more data has to be available around the clock: it is no longer feasible to block user access to applications and data for hours whilst data is backed up. The time window for back-ups is becoming ever smaller. Network back-up can help us to get to grips with these problems.

7.2 SAN HARDWARE DEVICES:

Network back-up systems such as Arcserve (Computer Associates), NetBackup (Veritas), Networker (EMC/Legato) and Tivoli Storage Manager (IBM) provide the following services:

- back-up
- archive
- hierarchical storage management.

The main task of network back-up systems is to back data up regularly. To this end, at least one up-to-date copy must be kept of all data, so that it can be restored after a hardware or application error ('file accidentally deleted or destroyed by editing', 'error in the database programming').

The purpose of archiving is to freeze a certain version of the data so that this precise version can be restored later on. For example, after the conclusion of a project its data can be archived on the back-up server and then deleted from the local hard disk. This saves local disk space and accelerates back-up and restore processes, since only the data that is actually being worked with has to be backed up or restored.

Hierarchical storage management (HSM) finally leads the end user to believe that any desired size of hard disk is present. HSM moves files that have not been accessed for a long time from the local disk to the back-up server; only a directory entry remains in the local file server. The entry in the directory contains meta information such as file name, owner, access rights, date of last modification and so on.

The metadata takes up hardly any space in the file system compared to the actual file contents, so space is actually gained by moving the file content from the local disk to the back-up server. If a process accesses the content of a file that has been moved in this way, HSM blocks the accessing process, copies the file content back from the back-up server to the local file system and only then gives clearance to the accessing process. Apart from the longer

access time, this process remains completely hidden to the accessing processes and thus also to end users. Older files can thus be automatically moved to cheaper media (tapes) and, if necessary, fetched back again without the end user having to alter his behaviour.

Strictly speaking, HSM and back-up and archive are separate concepts. However, HSM is a component of many network back-up products, so the same components (media, software) can be used both for back-up, archive and also for HSM. When HSM is used, the back-up software used must at least be HSM-capable: it must back up the metadata of the moved files and the moved files themselves, without moving the file contents back to the client. HSM-capable back-up software can speed up back-up and restore processes because only the meta-information of the moved files has to be backed up and restored, not their file contents.

A network back-up system realizes the above-mentioned functions of back-up, archive and hierarchical storage management by the co-ordination of back-up server and a range of back-up clients (Figure 7.1). The server provides central components such as the management of back-up media that are required by all back-up clients. However, different back-up clients are used for different operating systems and applications. These are specialized in the individual operating systems or applications in order to increase the efficiency of data protection or the efficiency of the movement of data.

The use of terminology regarding network back-up systems is somewhat sloppy: the main task of network back-up systems is the back-up of data. Server and client instances of network back-up systems are therefore often known as the back-up server and back-up client, regardless of what tasks they perform or what they are used for.

A particular server instance of a network back-up system could, for example, be used exclusively for HSM, so that this instance should actually be called a HSM server – nevertheless this instance could generally be called a back-up server. A client that provides the back-up function usually also supports archive and the restore of back-ups and archives – nevertheless this client is generally just known as a back-up client. In this book we follow the general, untidy conventions, because the phrase ‘back-up client’ reads better than ‘back-up-archive- HSM and restore client’.

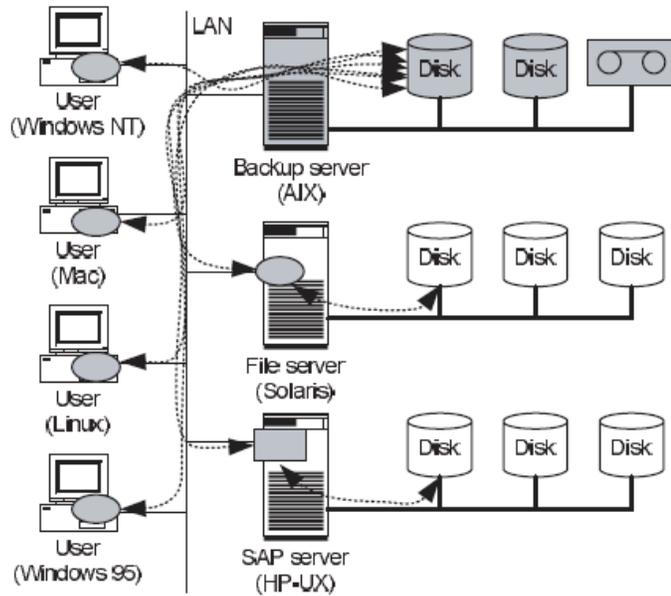


Figure 7.1 Network back-up systems can automatically back-up heterogeneous IT environments via the LAN. A platform-specific back-up client must be installed on all clients to be backed up

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