
Network Backup with the HP C1553A DDS Autoloader

The four main applications for the HP C1553A autoloader described in the accompanying article are:

- Single large backup
- Centralized network backup
- Fully automated backup
- Near-line data storage.

The backup of a large amount of data in a single session is a clear application for the autoloader. Today there are many servers with a disk capacity exceeding that of a single DDS-2 cartridge, which is typically 8 gigabytes with 2:1 data compression. The system administrator with a single tape drive must either manually insert new tapes into the drive when doing full backups, or must settle for incremental backups that only back up the data that has changed since the last full backup. These two options present some difficulties. Backups are typically carried out at night when server use is lower, so tape changing is inconvenient at best. A restore based on an incremental backup routine can be complicated since it will involve using several unrelated tapes. The autoloader, with its six cartridges, enables the system administrator to protect up to 48 gigabytes of data in one single unattended session.

Most of today's local area networks consist of several servers and many clients. Centralized network backup involves backing up all servers and clients across the network onto one high-capacity drive such as the autoloader. This is a cheaper alternative to having a separate tape drive on each server. Other benefits include having only one tape drive and one software package to administer and enhance security by having all removable data in one location, which can be physically secured. This is the same rationale that has been employed for centralizing network printing on one high-duty-cycle printer. For additional flexibility each of the the autoloader's six cartridges can be configured to hold data from a specific source. For example, each server can be backed up to its own cartridge and all clients to one of the other cartridges. Alternatively, all servers and clients on a segment of the network can be backed up to a specific cartridge. The exact choice will depend on restore and disaster recovery considerations.

Fully automated backup relieves the busy system administrator from another task previously taken for granted in the days of central mainframes: tape rotation. Methods such as "grandfather-father-son" and "tower of Hanoi" were developed to prevent overuse and wearout of media and to make available several differently aged versions of data when restoring. These methods involve backing up to a different cartridge every day. For the system administrator with a single tape drive this means manually changing the tape in the drive every day. If for some reason this does not happen most software packages will abort the backup, meaning that the system is unprotected. More significant, when the time comes for a restore, the system administrator must be on hand to retrieve the correct cartridge from secure storage and manually load it into the drive. These tasks can now be automated by making use of the autoloader's multiple-cartridge capacity. A simple routine with five data cartridges and a cleaning cartridge could be configured to perform a full backup every weekday to a new tape. This weekly cycle could be repeated over an extended period of time. A routine giving a longer file history would involve performing a full backup on the first day of the week, followed by daily incremental backups to the same tape. The magazine would then provide five weeks of protection for a server of up to five gigabytes. Using a tower of Hanoi rotation scheme, sixteen weeks of protection can be achieved with a single magazine. In all cases, the only manual intervention would be periodic magazine rotation to a fireproof safe or offsite location. Restores no longer need to involve the system administrator, either. With all of the cartridges available by random access in the magazine, the backup software can give users the ability to restore their own files with overall access rights controlled by the system administrator.

Prolonged operation of tape drives without any tape head cleaning can result in a media warning that causes the backup software to abort the backup. This need not be the case with the DDS-2 drive, which has a self-diagnostic capability that senses the write error rate. When this increases beyond a conservative threshold, the drive sends a message to the backup software, which can respond with the initiation of a head cleaning cycle using the cleaning cartridge included in the magazine. This will typically occur every twenty-five hours of use and ensures a long period of error-free operation without system administrator intervention.