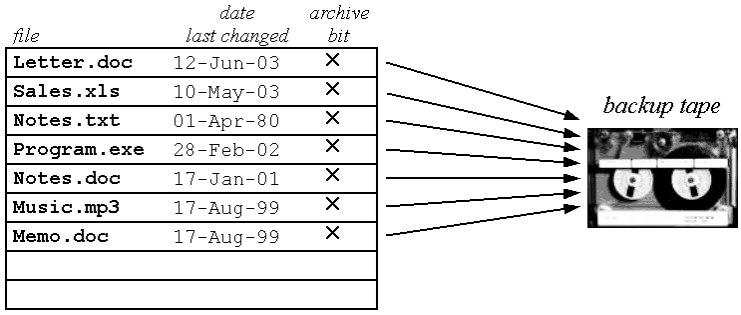
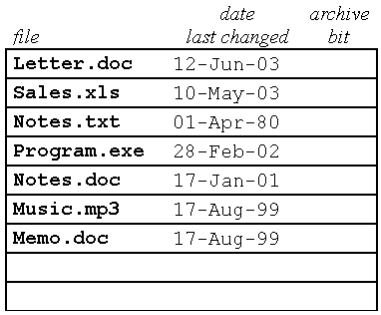
Full (Normal) Backup

In a full backup, **all** files are saved to the backup device.



Each file has an *archive bit* (one of the file attributes visible on the file's *properties*). The archive bit indicates whether the file has changed since the last full backup. Once these files have been saved, their archive bits are cleared.



Advantages & disadvantages

One tape (or set of tapes) contains a full copy of all data.
However regular full backups require lots of tapes.

Grandfather-Father-Son

If you do a regular full backup, it's common to use the *grandfather-father-son* (three-generation) technique, which requires two sets of backup media, alternated:

- First backup: full backup made to tape set A
- Second backup: full backup to tape set B — A is the "old" copy
- Third backup: full backup to tape set A — B is now the "old" copy
- Fourth backup: full backup to tape set B — A is now the "old" copy
- etc.

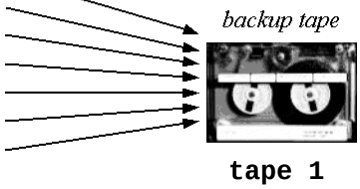
This has the advantage that there is always a safe (albeit older) copy, helpful if a catastrophe occurs during the backup process, damaging the current and immediate backup equipment.

Incremental backup

Full backups take time and require a lot of tapes or CDs.

Full backup made on 12-Jun-03:

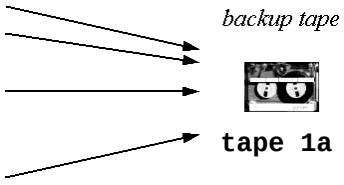
file	*date last changed*	*archive bit*
Letter.doc	12-Jun-03	×
Sales.xls	10-May-03	×
Notes.txt	01-Apr-80	×
Program.exe	28-Feb-02	×
Notes.doc	17-Jan-01	×
Music.mp3	17-Aug-99	×
Memo.doc	17-Aug-99	×



After a full backup, a partial backup can be made of only those files that have changed:

Incremental backup made on 13-Jun-03:

file	*date last changed*	*archive bit*
Letter.doc	12-Jun-03	
Sales.xls	13-Jun-03	×
Notes.txt	13-Jun-03	×
Program.exe	28-Feb-02	
Notes.doc	13-Jun-03	×
Music.mp3	17-Aug-99	
Memo.doc	17-Aug-99	
NewMemo.doc	13-Jun-03	×

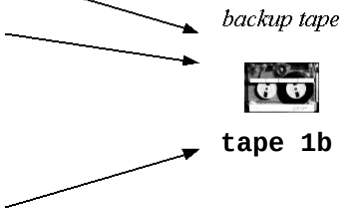


ALL ARCHIVE BITS WILL BE CLEARED.

The next day, another partial backup can be made of any files that have changed since the last partial backup:

Incremental backup made on 14-Jun-03:

file	*date last changed*	*archive bit*
Letter.doc	14-Jun-03	×
Sales.xls	13-Jun-03	
Notes.txt	14-Jun-03	×
Program.exe	28-Feb-02	
Notes.doc	13-Jun-03	
Music.mp3	17-Aug-99	
Memo.doc	17-Aug-99	
NewMemo.doc	13-Jun-03	
Sales2.xls	14-Jun-03	×



AGAIN, ALL ARCHIVE BITS WILL BE CLEARED.

Advantages & disadvantages

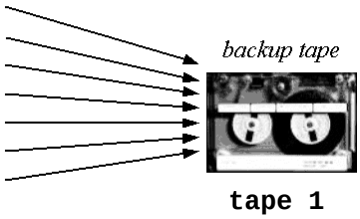
Fewer tapes are required, however when you restore you will need to restore the last full backup first, then each partial tape **in order** (i.e. tape 1 + tape 1a + tape 1b).

Differential backup

Again, we start with a full backup.

Full backup made on 12-Jun-03:

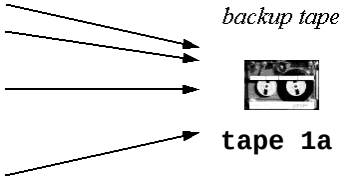
file	*date last changed*	*archive bit*
Letter.doc	12-Jun-03	×
Sales.xls	10-May-03	×
Notes.txt	01-Apr-80	×
Program.exe	28-Feb-02	×
Notes.doc	17-Jan-01	×
Music.mp3	17-Aug-99	×
Memo.doc	17-Aug-99	×



After a full backup, a partial backup can be made of only those files that have changed:

Differential backup made on 13-Jun-03:

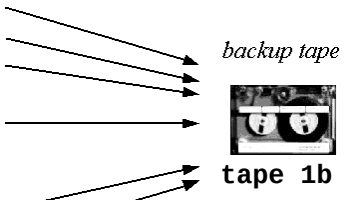
file	*date last changed*	*archive bit*
Letter.doc	12-Jun-03	
Sales.xls	13-Jun-03	×
Notes.txt	13-Jun-03	×
Program.exe	28-Feb-02	
Notes.doc	13-Jun-03	×
Music.mp3	17-Aug-99	
Memo.doc	17-Aug-99	
NewMemo.doc	13-Jun-03	×



However, this is where the process differs from an *incremental backup*.
ARCHIVE BITS ARE UNCHANGED. These files are still marked “to be archived”.

Differential backup made on 14-Jun-03:

file	*date last changed*	*archive bit*
Letter.doc	14-Jun-03	×
Sales.xls	13-Jun-03	×
Notes.txt	14-Jun-03	×
Program.exe	28-Feb-02	
Notes.doc	13-Jun-03	×
Music.mp3	17-Aug-99	
Memo.doc	17-Aug-99	
NewMemo.doc	13-Jun-03	×
Sales2.xls	14-Jun-03	×



Again, the ARCHIVE BITS ARE UNCHANGED.
Thus this tape contains the files that have been altered since the last full backup.

Advantages & disadvantages

When you restore you only need two tapes: the last full backup first, then the last differential backup (i.e. tape 1 + tape 1b).

Other backup processes

Daily backup

A minor incremental backup is made each day, but the archive bits are not cleared. The system takes note of which files are from previous days and need not be backed-up.

This allows a weekly proper incremental backup to be made, and a monthly full backup. To restore, use the monthly tape, then each week's incremental tape, then each day's minor-incremental tape.

Copy

A copy is like a full backup but archive bits are left unchanged.