

Example backup policy

The following information is designed to help users of the school network understand the nature of the ICT backup procedures and the availability of information beyond the date on which users delete it.

The school backs up files on its primary servers for the purpose of ensuring its ability to recover from computer or network failures or disturbances. The ICT backup system is not designed or intended to be a means for members of the school community to have access to long-term storage of files.

We run backups of the ICT user file systems daily, usually starting around midnight and finishing a couple of hours after that. Certain systems or disks may be backed up earlier and/or take longer to finish.

Each daily backup saves the contents of files and directories at the time the backup takes place. Therefore the backups do not record all activities or all contents of users' files throughout the day or week: a backup is simply a snapshot of the data present on the system at the time the backup ran. This means that during the course of a day it is possible for a user to create and delete a file which will never appear on a backup.

This is also true of email messages: a user may receive, read and delete an email message without the daily backup of the email storage ever recording that message. There would normally be a record of who sent and received an email message – but without the contents – in the system mail server logs.

We retain backups of user files (not to exceed 10MB) for only 30 days, so we can retrieve daily backups for up to 30 consecutive days before the date of request. Users are urged to back up any critical information themselves for archival purposes or long-term storage offline. For archive purposes, we retain backups of primary databases and system-wide software for one year.

Primary servers have a minimum of two forms of backup – at least RAID 1 and tape. Secondary servers have at least two full tape backups. RAID 1 (Redundant Array of Inexpensive Disks) is a method which spreads information is spread across several disks to achieve redundancy, lower latency and/or higher bandwidth for reading and/or writing and to facilitate recoverability from hard-disk crashes.

Whatever media we use as a removable form of data backup, we do a full backup weekly, monthly and yearly. The most recent weekly, monthly and yearly full backups we transfer to another building and store in a safe. Our daily incremental backups we store in another office. A full backup is a snapshot of the data we need for carrying out normal school business and may not include trivial data stored on some drives.

For more information see;

Grandfather-father-son

Tower of Hanoi

Grandfather–father–son (GFS)

One of the most common methods of media rotation, this system uses three sets of tapes for backing up data daily, weekly, monthly and quarterly.

Terms used in GFS

Daily incremental backup (son)

There are four daily tapes labelled with the days of the week Monday to Thursday or something similar. You re-use these tapes every week for partial backups on the day specified by the label.

Full weekly backup (father)

There are up to five weekly sets of tapes labelled with the weeks from 'Week 1' to 'Week 5' or something similar. You re-use these sets every month for full backups each week on the day (normally Friday) on which you do not do a daily incremental backup.

Full monthly backup (grandfather)

There are three monthly sets of tapes, labelled 'Month 1', 'Month 2' and 'Month 3' or something similar. You use these sets for full backups on the last school day of each month, and every quarter you re-use the sets.

The following table shows a possible grandfather-father-son tape rotation scenario for a single month.

Month 1				
Monday	Tuesday	Wednesday	Thursday	Friday
				Week 1
				Week 2
				Week 3
		Wednesday	Thursday	Week 4
Monday	Tuesday	Month1		

The shaded areas represent previous backups, while the white areas represent the most recent backups. In this single month scenario, only the weekly backup tapes have been reused.

The GFS method as described allows for a data history of two or three months, which for many schools is adequate. If you need data archiving, you may pull tapes from the rotation, store those off site and replace the stored set with new tapes.

Grandfather–father–son (GFS) – Example

Month 1				
Monday	Tuesday	Wednesday	Thursday	Friday
				Week 1
				Week 2
				Week 3
		Wednesday	Thursday	Week 4
Monday	Tuesday	Month1		

Tower of Hanoi

This is another tape rotation method that is also widely used. The name is derived from an ancient Chinese game of the same name that uses recursive techniques. In the game, you move a stack of discs from one peg to another, with the restriction that you can place a smaller disc only on a larger disc.

With this method, you need more media sets than with the GFS method. This method therefore provides more assurance that you can recover your data because every time you add a media set to this schedule, your backup history doubles.

You can use this schedule with either a daily or weekly rotation. The following table illustrates the method (using media sets labelled from A to E) and an explanation follows.

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Media set	A		A		A		A		A		A		A		A	
		B				B				B				B		
				C								C				
								D								

For this method you start the backup schedule with one media set (in the example, set A) and re-use this set every other backup session. The next media set (set B) you use on the first non-A day and then re-use it every fourth backup session. You use the next media set (set C) on the first non-A or non-B day and repeat every eighth session. Media set D starts on the first non-A, non-B and non-C day and repeats every sixteenth session. And, finally, media set E alternates with every media set D.

You can use an estimate of data traffic to determine the frequency of rotation. You will need a minimum of five media sets for a weekly rotation or eight sets for a daily rotation. Again, you should periodically remove (and replace) sets from the rotation for data archive purposes.

