



BRU™ Backup and Recovery Solutions

Multi-Drive Libraries, Virtual Tape Libraries (VTL), and Disk Staging Expand Backup Options

For as long as there has been data stored on computers, the people responsible for managing those computers have been aware that backup copies of the data were important. Magnetic tape has always been the defacto standard for making and storing those copies. Relative high capacity, removability, and long data retention all have kept magnetic tape media as the primary media for data backups and storage. From early 1/2" Reel to Reel, Quarter Inch Cartridge, Cassette, and 8mm, to newer 4mm, DLT, AIT, VXA, LTO, and other types of media, tape development has continued to evolve. In each case, discounting the business reasons, the goal was to achieve a combination of reliability, capacity, and performance in an attempt to keep up with the ever growing system storage needs.

However, as computer networking has become more commonplace, even the speediest tape drives available are not capable of keeping up with the data streams that can be sent from the client systems to the backup server when you take into account advancements in networking topologies such as Gigabit Ethernet (GbE) and Fibre-Channel. Because a tape drive is only capable of writing a single stream of data, each client machine has to wait for the previous system's data to be written before its data is processed.

Some backup application vendors have attempted to overcome this limitation by using an interleaving process which combines the streams of data from multiple clients into the single data stream written to the tape drive (some refer to this as multiplexing or multi-streaming). While this procedure was successful for improving backup performance in 100bT environments where the network performance of a single client system was limited, the potential failures and tape management requirements for restore operations became a major concern to many users. Depending on the amount of data and number of client systems interleaved into a single stream, restoring the data for a single system could require many tapes - the loss of any one resulting in a complete restore failure. Also, the loss of any one tape loses data from the backup of other systems whose data has been interleaved onto the tape.

Multiple Drive Tape Libraries

One more reasonable solution to the problem of one client per tape drive I/O stream is to procure a tape library with multiple tape drives. If your backup application has the ability to support multiple simultaneous backup jobs to different devices, it may be possible to divide your client systems up into the number of tape drives available and run the backups using the available tape drives. With appropriate network bandwidth and I/O (SCSI, Fibre-Channel, or otherwise), you can potentially reduce your backup window by the number of tape drives available.

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The only issue with this is that your backup application must be capable of separating the data streams out to the multiple tape drives and managing the tapes without allowing one backup job stream to interfere with the drive and tapes used by the other streams.

Virtual Tape Libraries (VTL)

Over the past few years, a new breed of backup device has appeared in the storage marketplace - the Virtual Tape Library, or VTL. A number of storage vendors ship devices that appear to a backup application as a tape library. In actuality, these devices are disk-based storage mechanisms that have an operating system and filesystem that allow the disk volume(s) to emulate tape drives and libraries right down to the SCSI commands used to control the devices.

Because the emulation is true to the manner in which a tape mechanism operates, these devices tend to be compatible with existing backup applications requiring no changes in drivers or licensing. However, for this same reason, you are still limited to a single I/O data stream per emulated tape drive. The main improvement provided by these devices is that your backup and restore operations gain the performance provided by disk over tape. This one difference can reduce your backup window respectably and improve restore times since the data is being processed at disk speed rather than tape speed. Additionally, some of the devices provide licenses that emulate a multi-drive library, providing even better performance by allowing multiple clients to backup simultaneously as with the multi-drive tape library discussed above.

These devices do have one very serious limitation if they are used as your only backup device - you cannot easily locate your backup data offsite. Certainly, if your selected device uses removable disks you can remove the disks and transport them to another location, but the care with which such a move must be made can be potentially hazardous to the health of the disk drives. Another potential hard disk drive offsite storage pitfall is "stiction," the inability of the HDD to spin-up after power has been reapplied to it. Recovery of the data then becomes an expensive procedure performed by companies specializing in recovering data from damaged hard drives. Magnetic tapes are much more forgiving of potholes, rough handling, and environmental variations. Therefore, if your backup needs require the offsite storage of your backup data, a VTL alone may not be a complete solution.

To help with the problem of offsite storage, some vendors provide a physical tape drive or a connection that allows you to connect a tape drive for the purposes of archive removal and relocation.

Therefore, while a VTL can provide a performance boost, be sure that you weigh your retention and storage requirements before making a VTL your only backup device.

Disk Staging

Another disk-based backup option is called Staging. Some backup applications offer an option that writes the actual data streams to a disk volume as separate archive streams instead of to tape. This difference from VTL will provide the performance gains of disk, while allowing as many clients as your network bandwidth will support to perform their backups simultaneously. In a high speed network environment such as GbE or Fibre-Channel, the result could be a change in backup times from hours to minutes - even for hundreds of client systems.

However, as with a VTL, you are still left with backups residing on a disk volume that is not easily transported offsite. The obvious option to remove this limitation is to copy the staged archives onto tape media. This method will allow you to take advantage of the performance that disk-based backup provides while still providing offsite storage of the archived data.

BRU Server Supports All Three Technology Options

As mentioned in the discussions above, quite often, the successful use of any of these technologies in your backup plan requires that your backup application support the technologies involved. With BRU Server, you are able to take advantage of all three options with one backup application.

Multi-Drive Libraries

BRU Server allows you to define jobs that will utilize 2 or more tape drives simultaneously with no special driver or licensing requirements. By simply creating the appropriate number of destinations within your library, the BRU Server jobs can be assigned to take full advantage of multiple tape drives simultaneously.

Virtual Tape Libraries (VTL)

BRU Server will use a VTL system as easily and as readily as a real tape library. No special configuration, license, or driver is required. If the VTL device offers multiple tape drive emulation, BRU Server is configured the same as using real multi-drive libraries. Plus, with BRU Server's low system overhead, 6 or more client streams can easily be driven on a single mid-range single processor server system.

Disk Staging

BRU Server's Disk Staging operation is a built-in feature rather than an add-in or option. BRU Server provides one distinctive difference when it comes to handling the movement of the data from the Stage disk to tape - the Staged archives are re-written to tape as true BRU tape archives. This means that from an administration standpoint, the restore of data is the same regardless of the data being located on the Stage disk or moved onto tape in a library. BRU Server keeps track of where all archived files are currently located and will restore the data in one step from either the disk or tape archive. There's no need to first restore the staged archive from the tape to the stage disk volume before restoring the data to the client system.

BRU Server supports the widest range of devices of any client/server backup application available. As BRU has done for over 29 years, from disk files, standalone tape drives, and low end autoloaders to multi-drive tape libraries, VTL devices, and disk farms, BRU Server will meet your backup and restore needs today and into the future.