DATA MANAGEMENT

A report comparing three backup software solutions for data protection and availability

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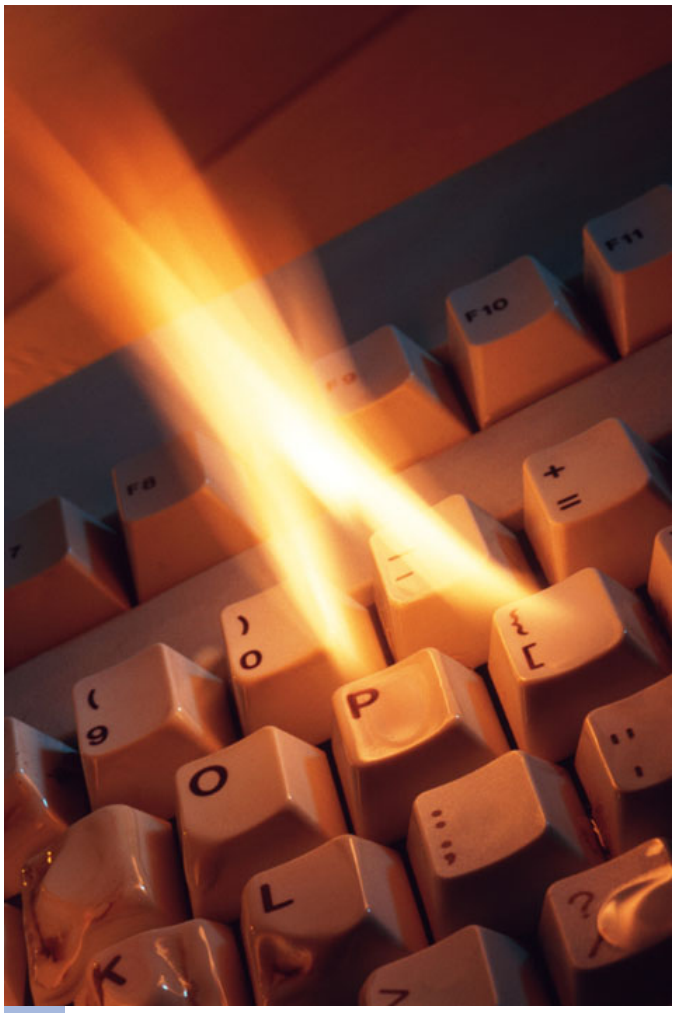
Introduction

One area of IT that has seen unprecedented growth over the past few years is storage as demand is fuelling a data explosion. As average capacities of network servers and storage arrays move from Gigabytes to Terabytes managing this huge amount of data is presenting major challenges to SMBs and enterprises alike. Data protection has never been more important – particularly now that businesses have a legal responsibility to show that confidential data is adequately protected and can be safely restored in the event of a disaster.



Effective data management is the key to not only protecting business data but ensuring it is available at all times and a coherent, achievable strategy is an essential part of the equation. A critical component of this strategy is data backup as without the ability to restore lost or corrupted data, network administrators are putting their company's survival on the line. Reliable access to mission critical data and applications is an essential requirement if businesses are to remain competitive in today's marketplaces. While it's true that the chances of a major disaster occurring are slim this is no excuse for leaving data unprotected. Cash, staff and buildings are easy to view as assets and yet data is rarely seen in this light as well. A company would quickly grind to a halt without these elements but the same applies if data is no longer available. The information held on customers, research, accounts or sales is just as important and yet, in many cases, its value is not realised until it is too late. A key factor in understanding this value is that unlike buildings or equipment, data cannot be replaced once it is lost. In fact, it is realistically the only business asset that is not expendable.

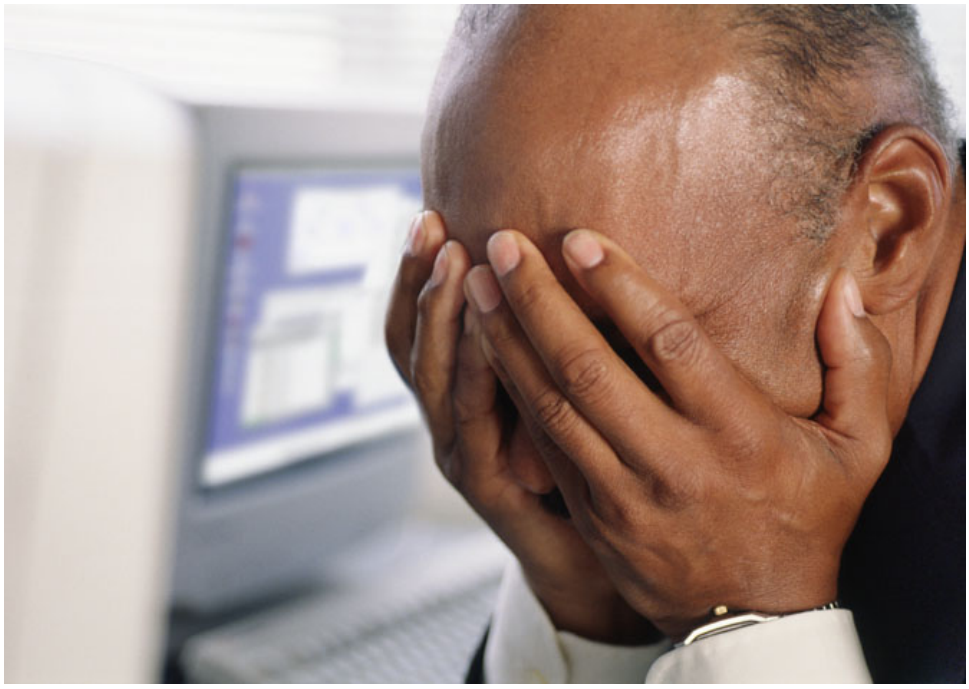
To be effective backup must be manageable, controllable and maintainable and the only way to achieve this is with network backup software which can take over these roles. Not only that but it must provide the facilities to swiftly recover lost or corrupted data and the tools to restore critical systems and services in the event of a hardware failure or major disaster. An easily managed backup strategy is more likely to be a successful one and the software must have the facilities to automatically handle tape rotation systems to relieve the daily burden on administrative and support staff. Furthermore, a sound backup strategy is a simple one - the easier it is to understand and administer the more likely it is to work.

Many businesses now running 24/7 operations are also finding it difficult to open up a window of opportunity to run full backups without interrupting business. Data backup and restoration performance are fast becoming key criteria and options to back up not only to tape but high-speed near-line storage comprising hard disks are now a requirement. D2D (disk-to-disk) backup has for some time been a feature available in most mid-range backup products but the demands for a managed migration to tape also means D2D2T (disk-to-disk-to-tape) facilities can be a big differentiator between software products.

Executive Summary

Backup is a critical component of data management and availability policies and today's businesses are faced with a wide choice of network backup software products that aim to provide the tools to achieve this. In the mid-range Windows network environments Computer Associates and Symantec have always held a very strong position with their respective BrightStor ARCserve Backup for Windows and Backup Exec products capturing the lion's share of this market. However, with its recent acquisition by enterprise storage vendor EMC, Dantz Retrospect is now being promoted heavily as a strong alternative for backup duties in the small to medium business arena.

The aim of this report is to take an in-depth look at these three products in order to determine their suitability for data availability operations in SMB environments. The basic capabilities of any backup product can be judged by looking at the features on offer but these will be of little use if the software is difficult to install, deploy and manage. Many companies have under-staffed and over-worked support departments and experience has shown that a backup strategy that is complex to implement and maintain is unlikely to be run correctly and may even be abandoned completely. This report will compare installation, configuration, ease of use, features and scalability and run full performance tests using the latest high-speed tape drives. However, as backup windows shrink the facilities to use high-speed hard disks as an alternative target for first stage backup are fast becoming a critical requirement and this report will also look at the facilities provided by each product and run further performance tests to determine D2D (disk-to-disk) capabilities.



Testing Scenario

Tape Drive Performance

To test backup, verification and restore performance of each backup product we used four of the very latest high-speed tape drives and selected Hewlett Packard StorageWorks Ultrium 960 LTO-3, Hewlett Packard StorageWorks Ultrium 460 LTO-2, Tandberg Data SDLT600 and Sony StorStation AIT520 AIT-4 drives. All are capable of high performance but with the HP LTO-3 drive in the equation we needed something special for our test platform as with a quoted native transfer rate of 80MB/sec it is capable of streaming faster than most local server hard disks which would have caused a bottleneck. To this end we selected a testing hardware scenario comprising the very latest IBM eServer xSeries 366 rack server equipped with two 3.6GHz Intel Xeon MP processors and teamed up with 16GB of PC2-3200 memory whilst for local storage it was fitted with six 73.4GB small form factor Serial Attached SCSI hot-swap hard disks. As the server included an IBM ServeRAID-8i ZCR controller card we used two SAS drives to create a high performance RAID-0 stripe which was used for installing Windows Server 2003.

To achieve the greatest throughput from local storage we introduced the server to the lab's resident QLogic 2Gbps storage area network (SAN). We installed a QLogic QLA2310 fibre-channel HBA in the server and linked it to an IBM TotalStorage DS4100 hard disk array containing six 250GB Maxtor SATA/150 drives all configured as a single RAID-0 stripe. Using the open source Iometer test utility we confirmed a raw read throughput of 189MB/sec to the server – more than enough to allow all the tape drives to stream freely.

To ensure there was no contention the tape drives were each connected to a dedicated Adaptec Ultra320 SCSI host adapter on the test server. To represent the average departmental server we placed a typical 15GB mixture of data consisting of 19,225 files in 1,677 directories on the SAN disk array. This is made up of a variety of Word documents, Excel spreadsheets, Access databases and PowerPoint presentations along with HTML files, video clips, bitmaps, sound files and Acrobat .PDF files. Each drive was asked to back up the entire 15GB and then run a verification test. The third task was a full restore of all the test data back to its original location. All runs were timed allowing an average DTR (data transfer rate) to be calculated for each operation. The data used in these tests comprises a wide mixture of compressable and uncompressable files and was specifically selected to allow each tape drive to achieve its native transfer rates. As this is the type of data most likely to be found on a departmental or remote office servers the results from our performance tests give a clear indication of how the backup software and tape drive partnerships will perform in the real world.

D2D Performance

To test D2D performance we created a quad disk RAID-0 striped array on the server, dedicated it to data storage duties and copied the same 15GB of test data from the IBM DS4100 storage system to the new array. Each backup product was configured to use the storage array as a backup destination. The test data was then backed up from the server, verified and restored back to its original location allowing us to test both read and write performance for D2D operations.

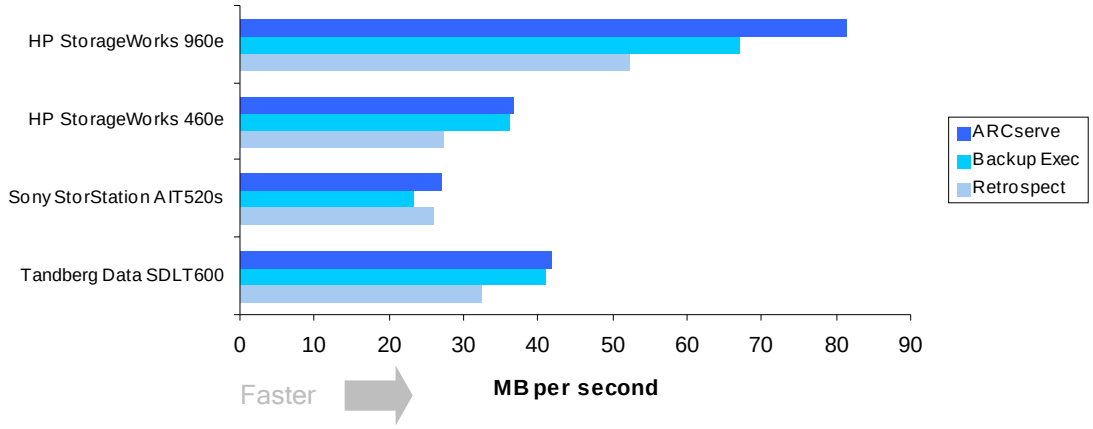
Multiplexing Performance

ARCserve is unique amongst the three products on test as it offers a multiplexing feature allowing it to stream backups of up to four network clients or local volumes to one destination simultaneously using a single job. To test this feature for network clients we used the same backup server with the HP StorageWorks Ultrium 960 tape drive attached and loaded four Intel Pentium-based network clients with each product's respective agent software. All connections were made over Gigabit Ethernet and each client contained a backup target directory with exactly the same 5GB of test data comprising 10,596 files contained in 1,053 folders. Each backup product was configured with a single job that would backup the data to the tape drive from each client sequentially and then ARCserve was reconfigured to run the same job but with multiplexing selected.

To test performance for backup of multiple local volumes, four new volumes were created on the data array on the server each containing the same 5GB of test data as used for the network clients. As with the previous test, each backup product version was asked to secure the data sequentially to the local tape drive and then a final job was created for ARCserve with multiplexing selected.

Tape Drive Test Results

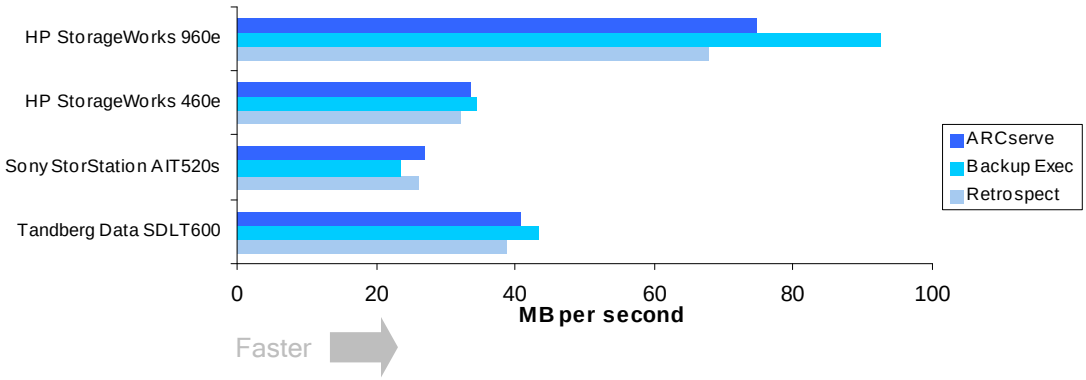
BACKUP



For the backup to tape tests ARCserve came out as the fastest of the three products with all four tape drives. The least significant results came from the HP StorageWorks Ultrium 460 where ARCserve delivered 36.6MB/sec which was only 0.5MB/sec faster than Backup Exec and 9.3MB/sec faster than Retrospect. However, ARCserve gradually drew ahead in the tests with Tandberg Data SDLT600 and Sony StorStation AIT520. It delivered by far the best result with the high-speed HP StorageWorks Ultrium 960 and was the only product that returned the quoted native transfer rate for this drive. At 81.5MB/sec, ARCserve was 21 per cent faster than Backup Exec which delivered 67MB/sec and an impressive 55 per cent faster than Retrospect which only mustered a pedestrian 52.3MB/sec. For the three lower end tape drives Backup Exec wasn't far behind ARCserve but, apart from the Sony StorStation 520, Retrospect was left trailing in all backup tests and in some cases by a significant margin.

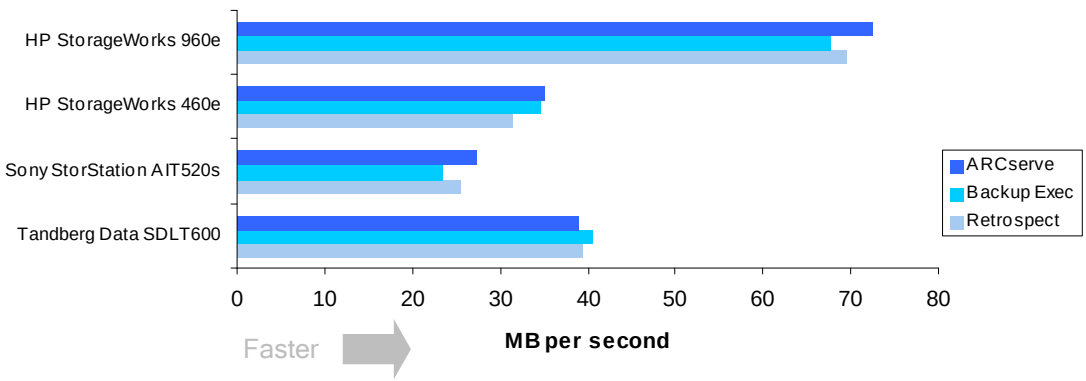
Tape Drive Test Results

VERIFY



We found substantially more variation across the products under test for data verification tasks. In general, Backup Exec returned the best speeds with it only losing out to ARCserve with the Sony StorStation 520s where it actually came in last. The most noticeable difference came with the HP StorageWorks Utlrium 960 where Backup Exec returned 92.4MB/sec as opposed to ARCserve's 74.8MB/sec. However, there is a significant difference to how these two products conduct data verification. ARCserve offers two verification options with the most basic being a simple media scanning test. This is the only level of verification that Backup Exec offers and is less reliable as it merely assumes the tape contents are correct if each file header can be read. For testing purposes we selected the highest level of integrity checking offered by ARCserve. This is a full byte for byte comparison of the tape contents with that of the hard disk to ensure that not only can the tape be read but that the data is actually the same as that selected to be backed up.

RESTORE

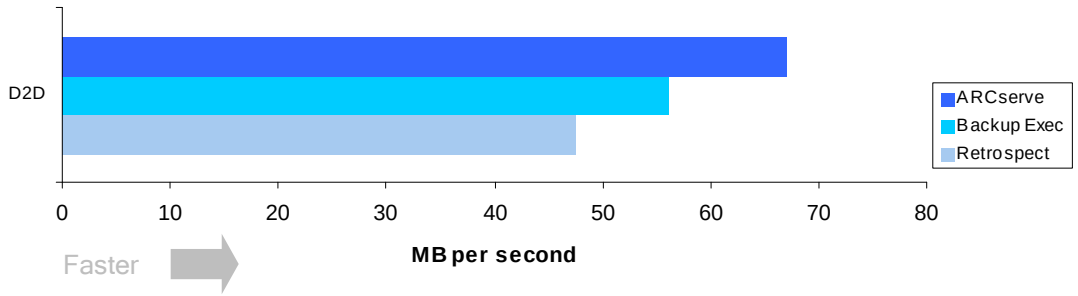


In general, all three products returned similar results for the data restoration tests although ARCserve, once, again proved to be marginally faster that the rest. With the HP StorageWorks Ultrium 960, ARCserve returned 72.4MB/sec which was 4 per cent faster than Retrospect and 7 per cent faster than Backup Exec. The smallest margins came with the Tandberg Data SDLT600 with all three products returning restoration speeds of between 39MB/sec and 40.5MB/sec.

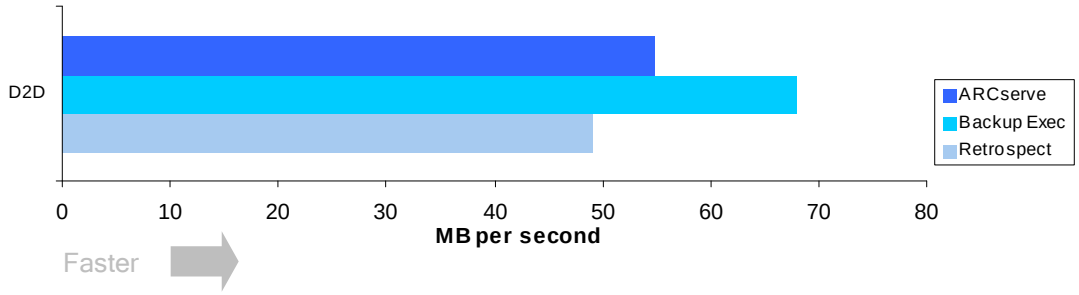
D2D Test Results

As with the tape drive tests ARCserve came out on top with significantly faster backup speeds to disk-based targets. When securing the 15GB of test data to the IBM storage array it returned 67MB/sec – 19.5 per cent faster than Backup Exec and no less than 41 per cent faster than Retrospect which only managed 47.5MB/sec for the same test.
Backup Exec's more basic verification procedures gave it the edge for performance in this test as it reported an average speed of 68MB/sec whilst ARCserve returned 54.9MB/sec and Retrospect a slower 49.2MB/sec. Retrospect took its only first place when restoring the data from the disk array back to the server. Its average speed of 58.9MB/sec was 5 per cent faster than ARCserve and 12.5 per cent better than Backup Exec.

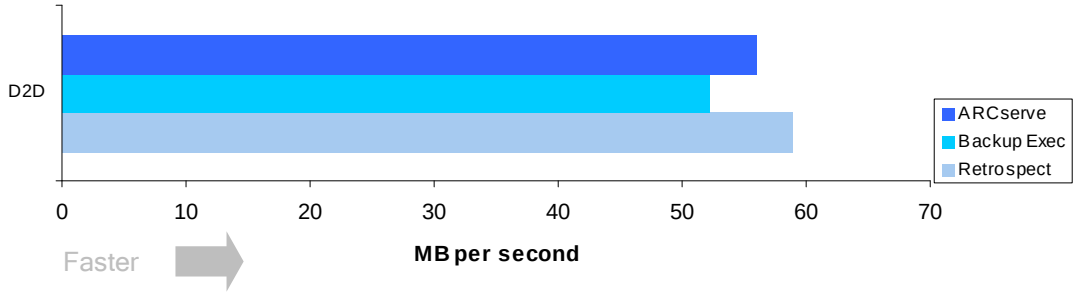
Backup



Verify



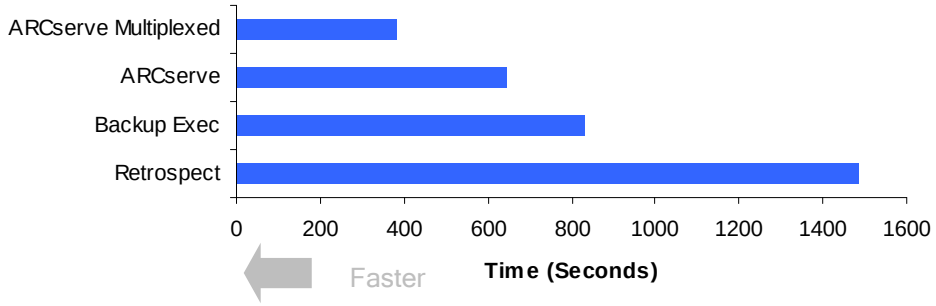
Restore



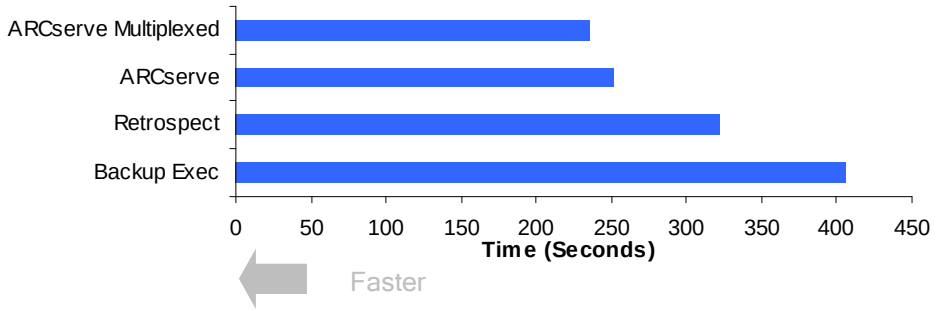
Multiplexing Test Results

The multiplexing feature offered by ARCserve can have a very significant impact on the time taken to run backup tasks. By allowing up to four targets to be copied to a backup device simultaneously with a single job it can reduce the time required to run network backup allowing administrators more opportunities for scheduling these tasks. The latest high-speed tape drives will also see benefits as multiplexing can supply data fast enough to allow them to stream properly.

Backup of four network clients



Backup of four local volumes



As can be seen from the test results ARCserve's multiplexing feature delivers clear performance advantages when backing up clients over the network. Comparing results from the sequential backup and multiplexed tasks for ARCserve alone show a 41 per cent improvement with the tasks taking 646 seconds and 382 seconds respectively.
Even without multiplexing ARCserve showed a distinct improvement over Backup Exec with it completing the backup task 187 seconds quicker for a 22.5 per cent improvement. This increased to no less than 54 per cent with multiplexing selected. The biggest differences were seen when comparisons were made to Retrospect whose remote client was clearly the least efficient. An ARCserve sequential backup was 56.5 per cent faster whilst a multiplexed backup saw more than a 75 per cent improvement over Retrospect.

BrightStor ARCserve Backup for Windows r11.5

ARCserve offers one of the smoothest installation procedures as you can select multiple components and the local and remote installs are accompanied by an option to create a response file for deployment on multiple servers. During testing we found it is possible to install the base components of ARCserve in as little as five minutes. Licensing procedures have also been simplified and where multiple components have been selected, a simple questionnaire steps through configuring each one so they are ready for immediate use. No options are offered during installation for checking the CA web site for patches and new version downloads but we felt that this was not an issue as we found it much easier to install the product first, check that it was functioning correctly and then upgrade it.

Deploying processes are very straightforward as client agents can be remotely installed directly from the CD-ROM. The remote install option allows you to browse the network, select multiple systems and add them to a list. You choose the components you want to install on each one and leave ARCserve to run the entire process automatically where it will provide a status report on completion. During testing we had no problems deploying agents to test systems with the XP SP2 Windows Firewall enabled. Multiple backup servers along with optional features and remote administrative consoles can also be loaded easily using the same process. A useful feature is that ARCserve does not require the backup server to be rebooted after installation of the base product so it can be scheduled during working hours. A key feature over Backup Exec is that tape drive installation has always been simple as ARCserve doesn't require any device drivers installed beforehand as it uses its own embedded drivers.

Symantec Backup Exec 10.0

Installation procedures for Backup Exec are very similar to those offered by ARCserve and the optional environment check is useful as it scans the backup server to ensure that it meets the minimum hardware and software requirements for the Backup Exec media services. Backup Exec now requires SQL Server and the routine automatically loads MSDE 2000 on the same system. The base product and multiple components can be selected at the same time and you can also remotely deploy extra media servers and remote agents during this phase as well.

Licensing is also dealt with at this stage by entering each code purchased in the same screen. Note that backup servers require rebooting afterwards so installation must be scheduled for out-of-hours operations.

Prior to installing Backup Exec you are offered an opportunity to check the Symantec web site for updates, patches and new builds. However, this can be confusing as it merely takes you to the general support download page where you need to sift through all available updates and manually select those you want. Furthermore, Symantec doesn't offer cumulative updates to the core Backup Exec product and we found that the latest revision required a 525MB download which added nearly two hours to the installation process.

Device driver installation is another consideration as three options are provided where you can use the manufacturer's own versions, allow Backup Exec to use its own drivers developed by Symantec if the former hasn't been loaded or force the use of the Backup Exec drivers. As recommended by Symantec, we chose the latter course but were surprised to see that the drivers supplied by Symantec for some of our tape drives were flagged as not having passed the Windows Logo verification testing.

EMC Dantz Retrospect 7

Loading Retrospect on a single backup server is a very swift process but even at this early stage it becomes clear that the software is still not geared up to handle multiple installations in the same way that ARCserve and Backup Exec are. For each backup server the software must be installed locally from the product CD-ROM and no options are provided for searching the network and selecting other systems to deploy Retrospect components to. However, for a single backup server we found Retrospect can be loaded well inside five minutes. Unlike ARCserve and Backup Exec, licensing is not handled during this phase and there are no options for selecting additional optional features that may already have been purchased. It is only after the software has been installed and loaded for the first time that the license can be entered and additional components activated by entering their relevant codes.

Client deployment automation is virtually non-existent as the manual focuses mainly on locally installing the agent from the product CD-ROM. On loading, the AutoRun menu offers choices either for installing the Retrospect backup server or the client utility. This is highly impractical for a large user base as support staff cannot be expected to personally visit each workstation to load the client utility. It is possible to run the client setup program from a network share but this still means extra work that could be avoided if a remote install feature was offered during the installation routine. The on-line FAQs also suggest copying the client installation executable to a shared location and leaving users to copy it down and run it themselves. Again this is not practical in a large user environment as the utility requires a password to be entered during installation which is a function that should be controlled by the support staff and not the user. However, users running Windows XP SP2 will be impressed as the Retrospect Client automatically adds an exception to the Windows Firewall during installation.

BrightStor ARCserve Backup for Windows r11.5

A key feature of ARCserve is its browser based management interface as although this was introduced over four years ago CA has maintained a consistent look and feel to it even through multiple product updates. This has big benefits for existing users as they won't require any additional training to use new versions. Newcomers to ARCserve will find the management interface particularly intuitive and on first contact it opens a 'My First Backup' tutorial to help non-technical users perform a full backup straight after installation. A tool-tip feature also provides instant help and access to web support, upgrades and certified device lists.
On each backup server ARCserve loads multiple services that handle tape drive communications, database management and job processing. The management interface can be run from the same server or used on another system for remote management. There's nothing to do for tape drive installation as ARCserve uses its own embedded drivers and doesn't require any device drivers installed beforehand. New drives do require certification but we have found that CA is one of the fastest for placing device support updates on its web site.
Backup job creation has always been kept to a simple three-step process where you select the source data, choose your backup target device and decide on how the backup is to be run and when to schedule it for. All systems that have the client agent installed can be viewed from a single screen and the contents of their hard disks browsed for folders and files to be selected for backup.
Custom backup strategies are also particularly easy to create especially as ARCserve is one of very few backup products that provide pre-defined strategies. These range from a simple five-day system to a full seven-day GFS (grandfather, father, son) tape rotation scheme with a choice of incremental or differential backups.

Symantec Backup Exec 10.0

Backup Exec's new management interface is particularly easy to use with a row of tabbed folders offering easy access to each function and plenty of wizard based help is provided along the way. A useful Overview option provides an at-a-glance status report on jobs, devices, alerts and media, making it easy to keep track of backup operations. Usefully, client agents can be deployed directly from the main console but note that push installs to systems running Windows XP SP2 will fail as the Windows Firewall blocks access and the only workaround for v10.0 is to manually install them locally.
A wizard assisted routine handles further configuration and starts the first time Backup Exec is loaded. It sets overwrite protection levels to stop media in a rotation strategy from being accidentally overwritten and allows you to select backup-to-disk destinations while other selected options such as disaster recovery will run wizards to help with configuration. The process of manual backup job creation is very similar to ARCserve as you select your source locations, choose a backup device or media pool and decide when to run the job.
A unique feature is policy based backup - sets of options that can be saved and applied to different backup jobs. These contain a wide range of details such as the type of backup, job repeat intervals and media handling making backup job creation much simpler as you only need to supply a job and media name, select the source and target device and pick a policy to be used. Symantec still doesn't provide any predefined backup strategies but an Assistant offers to help create custom rotation schemes which are now much easier to create and manage as a single job is required for tape rotation schemes. Another features that streamlines the backup process is that drive, directory and file selections on servers and workstations can be saved in a list and applied to multiple backup jobs so you don't need to browse the network each time a job is created.

EMC Dantz Retrospect 7

Retrospect was originally ported over from the Macintosh environment over four years ago and as such uses a substantially different methodology for backup operations. The biggest difference with conventional backup software is that Retrospect doesn't use a file's archive bit to determine whether it needs to be secured. It compares the files it has already backed up to those on the source hard disk and if the exact same file is already listed it will not copy it again. It uses Snaphots to allow hard disks to be restored to their original condition in the event of a failure. These contain a list of the directory structures and all files and are taken every time a backup is run.
The backup process does take a while to get used to and manually creating jobs is not quite as simple as with ARCserve and Backup Exec although plenty of wizard based help is provided. Selecting source data from local and remote systems is more complex as Retrospect assumes you want to back up the entire volume and only allows you to make file and folder selections after a drive has been added to the backup set. A criticism has always been that earlier versions of Retrospect defaulted to using any tape drive so if your backup server has more than one drive the only way to force it to use a particular device is to unload all the others. A binding feature that only appeared as recently as v6.5 allows you to tie a backup job to a specific drive but the catch is you'll have to buy the Advanced Tape Support add-on first.
Retrospect doesn't come with predefined backup strategies but offers a scripting facility for automating different operations. Manually creating scripts isn't so easy but Retrospect does provide more wizard assistance for scripting common tasks such as automated backup jobs.

BrightStor ARCserve Backup for Windows r11.5

The latest release of ARCserve brings into play a number of valuable new features with the D2D2T option at the top of the list. However, the core product also offers support for 64-bit platforms and more WORM devices, integration with Microsoft's SharePoint and a smart restore feature that in the event of media failing will try and find another piece of media with the same file on it.
Standard backup options extend to full, incremental and differential backups along with tough security as ARCserve offers session passwords and can implement 168-bit DES encryption to data as it is being backed up over insecure WAN connections. Anti-virus measures are another valuable feature as ARCserve includes the scanning and curing elements of CA's eTrust Antivirus software allowing it to check files accessed during backup, copy or restoration jobs and attempt to cure any infections. Data restoration tools are extensive as a wizard is provided and users can also manually search the ARCserve database for files by directory tree, session, query and backup media.
ARCserve scales extremely well with demand as CA offers an extensive range of optional features including client agents for all popular operating systems. More agents are available for a wide range of databases and messaging systems along with optional modules for disaster recovery, image based backup and SAN environments. All popular optical device and multi-drive tape libraries can be supported when required and ARCserve even offers unique tape RAID capabilities.
NAS (network attached storage) appliances are rapidly becoming a popular choice for SMBs looking to easily implement network storage on demand and ARCserve stands out with its support for NDMP (network data management protocol). With this option installed compliant NAS appliances appear in the main backup selection window as another remote system. Furthermore, ARCserve offers a three-way NDMP backup where it can secure one appliance via NDMP to another appliance with a local tape drive installed.

Symantec Backup Exec 10.0

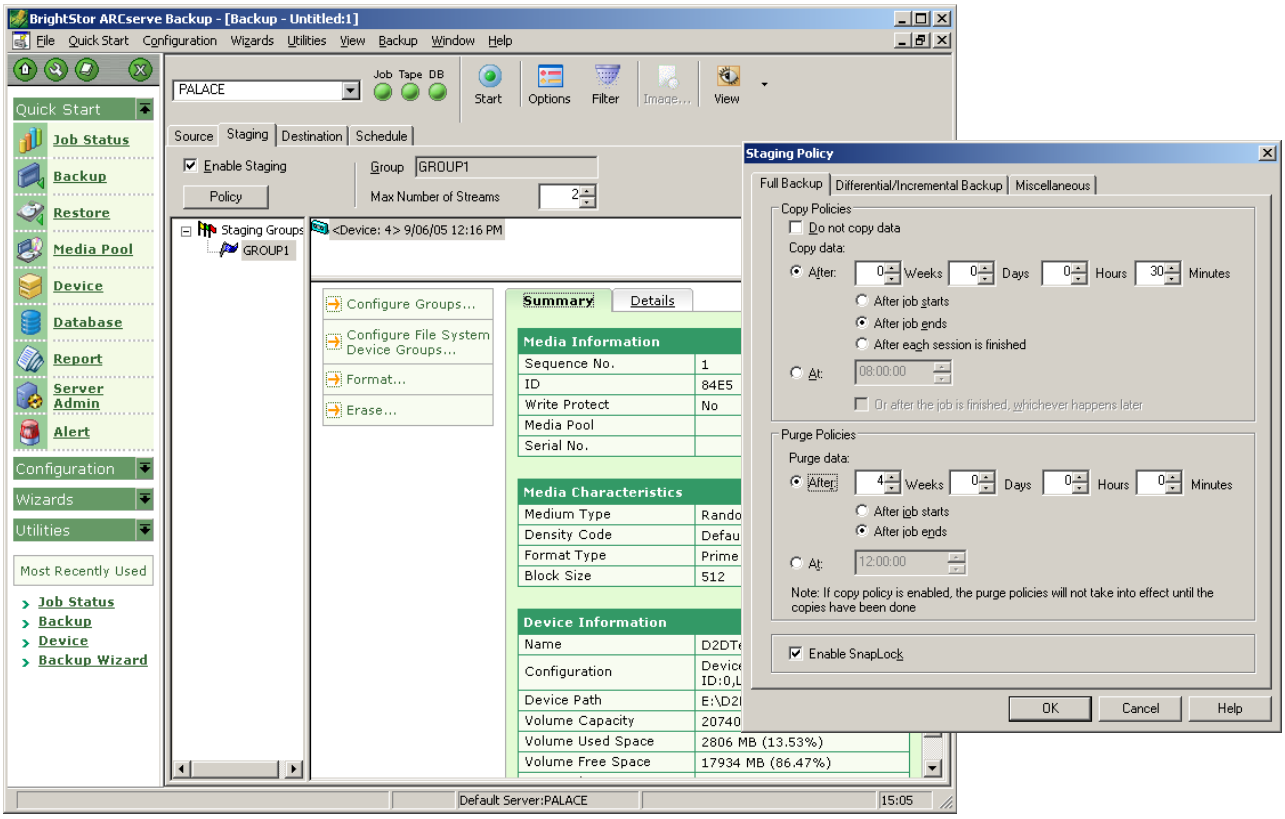
It has always been a close run race between ARCserve and Backup Exec as to which product delivers the latest and greatest features although Symantec has on a number of occasions been first past the post. It was first to support Windows Server 2003 and the Volume Shadow Copy Service and provide options for backing up to disk volumes and removable media.
Standard full, incremental and differential backup types are supported but security is weaker as Backup Exec can only apply a password to the media which only controls access to the data. Anti-virus options are also absent as although earlier versions of Backup Exec provided this feature it was removed when v9 was released a couple of years ago.
Backup Exec also has the ability to grow easily with demand as its optional features are almost as extensive as those offered by ARCserve. It can be expanded to support tape libraries, offers advanced D2D backup and provides agents for all key databases and messaging systems. Client support is very extensive and, as with ARCserve, an option specifically for backing up desktops and laptops can be integrated into the core product.
Due for imminent release, Backup Exec 10d introduces Symantec's Continuous Protection Server (CPS). It uses a combination of hard disk vault and block level capture allowing it to secure data and modifications in real time. Systems require a new agent installed but CPS only provides protection to servers and not client workstations. It also introduces a new browser based file retrieval service allowing users to restore data from the CPS vault without the need for extensive training. However, it's worth noting that this concept is far from new as it was first introduced in Symantec's TeleBackup which provided continuous client protection to a hard disk vault. It was re-launched as NetBackup Professional a number of years ago but has since been put on end of life notice.

EMC Dantz Retrospect 7

A key feature of Retrospect is that the core server can run on any version of Windows so isn't tied to Server systems only making it a worthy choice for smaller businesses. Support for removable media such as hard disks, REV, CD and DVD has always been far superior to much of the competition as has its ability to use FireWire and USB devices – if the local Windows Explorer can see it then Retrospect can use it.
Backup options are more limited due to the method used by Retrospect but this can make it easier to use as strategies only involve one type of backup. Along with ARCserve, Retrospect also offers password protection for backup sets and can apply three different types of encryption for even greater security.
EMC claims full support for NAS appliances but this doesn't include NDMP. It can only access remote systems for backup if the Retrospect client is installed first so can only copy data from Windows powered NAS appliances. Life gets easier if you to want to use a NAS appliance as a backup destination as Retrospect treats it the same as any other network volume. One feature that has been missing from Retrospect for far too long is support for Novell NetWare and only with v7 has this been finally remedied with a free update that allows NetWare 5.0, 6.1 and 6.5 servers to be included in the backup strategy.
Add-ons are less plentiful than those offered by ARCserve and Backup Exec but disaster recovery features are available, multi-drive tape library and autoloader support can be added, agents are provided for open file backup whilst Exchange and SQL Server databases can also be secured. The Small Business Server edition looks good value as it supports unlimited remote systems and includes the Exchange and SQL Server agents.
EMC usefully also offers an Add-On Value Package which includes all the above components plus the open file agent and looks particularly good value.

BrightStor ARCserve Backup for Windows r11.5

With the introduction of its Disk Staging option ARCserve becomes the first backup software company to offer the SMB market a viable and cost-effective D2D2T (disk-to-disk-to-tape) backup solution. It merges seamlessly with the core ARCserve product and simply adds an extra tab to the backup window for specifying a disk location where data is to be backed up to first. After a specific period, data is automatically migrated to tape and the copy on the disk stage can be removed to free up more space if required. Alternatively, it can be left in residence to facilitate faster restore operations.
Staging policies are used by ARCserve D2D2T jobs to determine how data is migrated from near-line disk to removable media. There are plenty of controls provided as you can request data to be copied to tape so many weeks, days, hours or minutes after the staging job has finished or at a specific time. Purging policies are used to manage storage on the disk stage so you can opt to have the data automatically removed a set time after it has been migrated to tape.
During testing we found D2D2T jobs simple enough to create and manage and in the job monitor window a disk staging job will have a sub-entry for each phase making it easy to monitor progress. However, before you can use this option you will need to create a new file system device using the configuration wizard and then add it to a staging group. Once a D2D2T job has been created the entire process is fully automated so there is no further intervention required.
There are plenty more options provided as a threshold can be applied to available disk space which if breached can cause a new makeup job to be automatically created that will send the backup data directly to tape. You can also stop data being purged or overwritten until after a retention period has expired using the additional SnapLock feature. Data restoration also comes into the equation as any backups resident on the disk stage will be searched first whenever a user requests a file to be reinstated. If ARCserve cannot locate it here it will then request the relevant tape be loaded instead.



Conclusion

With network storage growing at an unprecedented rate, businesses large and small must implement a solid data management strategy in order to protect this most valuable of assets. Availability of data is a key requirement if businesses are to remain competitive and reliable backup and restoration processes are critical to achieving this.

Whilst there are plenty of backup software choices on the market the fast moving pace of technological advances in today's IT environments requires a solution that can not only keep pace with these but also grow as a business expands. For many year's tape was the only medium suited to backup and restoration functions but the demands not only for higher performance and also swifter data retrieval means other technologies such as D2D backup must also be supported.

The software must be easy to use and be able to simplify management regardless of the size of the environment it is being used in. However, as a business grows and backup and recovery demands increase it must be able to provide a solid, cost-effective upgrade path to allow investment to be maximised.

Product stability is also important as the vendor should have a strong commitment to developing the product. In the Windows market both Backup Exec and ARCserve have a very long history although the former has been though a number of different owners. Starting life with Arcada, Backup Exec was first acquired by the hard disk manufacturer Seagate in the early 90's. It then came under the wing of Veritas which took it over after acquiring Seagate's Storage Management Group at the beginning of 1999. This year sees Veritas merging with Symantec with the aim of providing a complete security and data management product portfolio.

Originally developed by Cheyenne Software, ARCserve was taken over by Computer Associates in 1999 where it has become the foundation of this company's data availability solution and has benefited from a committed development program. Developed by Dantz initially for the Macintosh market, Retrospect has also now been acquired this year by storage giants EMC to become part of this company's attack on the SME market. EMC also acquired Legato's NetWorker software last year with the aim of offering backup solutions covering home users through to enterprises.

Each product scores highly for ease of use as all offer intuitive management interfaces along with plenty of wizard based assistance. However, we found ARCserve the easiest of all three to get to grips as CA has made a committed move to getting new users up and running with the minimum of training. If you're used to conventional backups methods then Retrospect's unique methodology may take a while to get used to.

Backup Exec is also very well designed but it's worth noting that CA has standardized across the entire ARCserve product range so its NetWare version uses an identical administrative interface and can be managed simultaneously from the same console. Furthermore, CA's Enterprise Backup product allows all instances of ARCserve for Windows, NetWare, UNIX and Linux to be integrated into a single management interface making ARCserve an excellent choice for heterogeneous networks.

Performance can't be ignored either and our tests showed ARCserve was able to get the best backup speeds from the latest high-speed tape drives. Backup Exec wasn't far behind but from our experience performance has always been Retrospect's main weakness.

ARCserve and Backup Exec scale extremely well with demand as both products offer an impressive range of optional feature allowing them to grow into the enterprise space as business demands increase. Retrospect also offers a good range of add-on modules although not as extensive showing that its primary target is the SMB network.

Overall, we found that CA's BrightStor ARCserve Backup for Windows r11.5 offers the best software solution for implementing a manageable data availability strategy. It has benefited from a consistent development program, offers top performance and features, scales extremely well with demand and the latest D2D2T option caters for a phased migration of data from high speed near-line disk storage through to removable media for secure off-site storage.