Peregrine Computer Consultants Corporation (PCCC) Presents:

A Whitepaper on Data Backup & Redundancy Plan using PCCC's "Drive Rotation Backup" Technique

By Kevin A. McGrail (KMcGrail@PCCC.com) *with many thanks to the Staff and Customers who have helped develop, test and implement this in the real world.*

As an IT firm founded in 1993, we are intimately familiar with how important backups and data redundancy are to our customers. Unfortunately, too many users still shirk their backup duties but at least they know that backups are important.

What users typically don't know is how much more important it is to test the restoration of backup data. There is an old joke in the industry that Backups are Important but Restores are Critical. Anyone who has been put in the situation where a server has crashed but the backups don't contain any data can attest to the jokes complete lack of humor.

A user can also be surprised that the amount of time it takes to restore a single server from scratch can easily exceed 40 hours! This amount of labor makes testing traditional backups extremely expensive to consider, disruptive to the network and untenable to repeat.

To minimize and remove these concerns, PCCC invented a technique we call a Drive Rotation Backup. This backup technique is not theoretical! It has been in use on production servers since 2003 for quite a number of our customers.

And, the use of a PCCC Drive Rotation Backup as described in this whitepaper has been a crucial part of customer business continuity plan requirements which has passed several audits by the Securities and Exchange Commission.

This document will discuss a Technical Overview of the PCCC Drive Rotation Backup as well as the Pros and Cons of the solution.

Technical Overview:

The technical overview of the PCCC Drive Rotation Backup is as follows:

1. The primary Online Server utilizes mirrored hard disk drives in an array. This technology is called a RAID 1 Array.

2. Periodically, the mirrored array on the Online Server is purposefully broken by removing a drive from the array. NOTE: A Hot Spare is installed in the array ahead of time to allow the Online Server to immediately begin rebuilding the mirrored array.

3. The drive from the broken mirrored array is placed into an secondary and identical server that is not plugged into the network. We refer to this as the Hot Offline Server.

4. The Hot Offline Server is booted and spot-checked for data integrity.

5. The Hot Offline Server's mirrored array is rebuilt to a Hot Spare.

6. After the rebuild is completed on the Hot Offline Server, the mirrored array is purposefully broken again on the Hot Offline Server by removing a drive from the mirrored array.

7. The drive removed from the Hot Offline Server's mirror is taken offsite.

8. This drive removed from the Hot Offline Server is then installed in a tertiary and identical server at the offsite location. We refer to this as the Cold Offline Server.

9. The Cold Offline Server is booted and spot-checked for data-integrity.

10. The primary Online Server is also backed up using technologies such as CrashPlan, Retrospect or BackupExec to provide incremental backups of data in between the Drive Rotation Backup.

11. CrashPlan can also be implemented as an offsite backup for business continuity (see http://www.pccc.com/crashplan). Traditional backups, such as BackupExec or Retrospect, should include periodic rotation to an offsite location.

Pros & Cons:

The Pros of this backup technique are:

1. The Online Server backup occurs instantaneously when the mirrored array is broken.

2. The backups are tested each and every time a rotation is performed.

3. The time to restore is very low. In the event the primary Online Server fails, the Hot Offline Server can be up and running as the Primary Server in mere minutes.

4. While a traditional restoration requires the installation of an operating system, backup software, patches and then restoring the data, we already have a running operating system configured and ready to start restoring missing data.

5. Off-site backups are not an afterthought nor onerous.

6. In the event the primary and secondary servers fail or are unavailable, the offsite tertiary server can be brought online very quickly.

7. This technique works very well with high-performance commercially available SATA interface hard disk drives.

The Cons of this backup technique are:

1. The technique is technically advanced and requires careful attention to detail by a skilled administrator.
2. When the primary servers array is broken, there is a risk that an actual drive could fail before the server has finished rebuilding the array. This risk is substantially mitigated by the secondary server having a copy of the primary server.
3. The use of RAID 1 limits the size of your array. This issue is mitigated by the size of drives available and the low-cost of high-performance SATA drives.
4. Hardware should be identical and matching. Ideally, this includes BIOS revisions on motherboards and firmware revisions on RAID controllers.

Why isn't this D2D?

D2D, or disk to disk, is a backup technology where instead of using Tapes, you use hard drives. In this scenario, drives become a replacement for tapes. While our solution doesn't use tapes, it isn't D2D. We do recommend that if you are using tapes to immediately upgrade to disk to disk backups!

More Information

If you are intrigued by this concept and would like more technical information, we will publish more detailed implementation plans including hardware specifications, drive rotation checklists, plans for various outage scenarios and business continuity plan documentation.

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