# Interview with Dr Mel Ho on the creation of the BackupAssist Zip Engine.

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- Dr. Mel Ho, BackupAssist Development
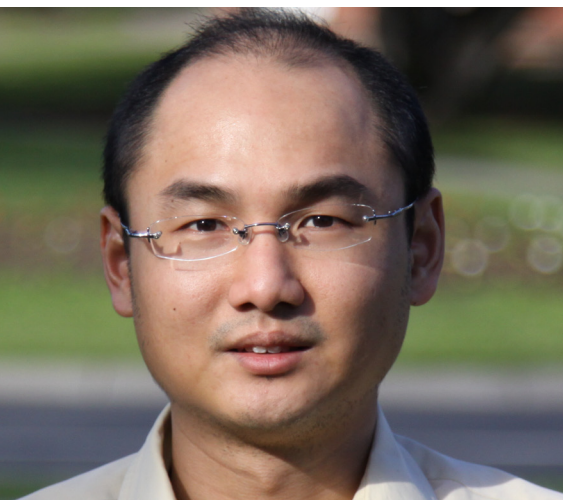
About Dr. Mel Ho

Dr. Mel Ho has a PhD in Electrical Engineering and joined the BackupAssist Development Team at Cortex I.T. in 2008. Dr. Mel is to Windows® what Dr. Phil is to America. It's his mission to analyse and address shortcomings in the software that commonly create issues with backups for everyone. His simple, uncomplicated solutions constantly surprise us all. As cries of "Why didn't I think of that?" and "Why didn't they just make it that way to start with?" reverberate around the Cortex IT Labs, Dr. Mel's modesty restricts him to a small smile and a quiet "I'm glad it's working out for you." Here's what Dr. Mel had to say during a recent interview about the latest product of his genius: The BackupAssist ZIP Engine.

Q: Dr. Mel, why did you create the ZIP Engine? Where did the need come from?

The BackupAssist ZIP Engine was originally conceived as a file-based backup engine with compression and encryption capabilities. When Microsoft retired NTBackup from Windows Server 2008, they also eliminated the tape drive support offered by NTBackup. We decided to create the BackupAssist ZIP Engine to fill the void, offering tape drive backup in Windows Server 2008. In a nutshell, using the ZIP Engine a Windows 2008 user can compress and/or encrypt files onto a single zip archive and store the zip archive on a tape.

Q: What does it do? How does it help save money?

The BackupAssist ZIP Engine provides data backup by zipping files and folders onto a wide range of backup media such as tapes, USB drives, optical discs and FTP servers. Optionally the new ZIP Engine can encrypt the zip archive using the industry-standard AES-256 encryption algorithm. It's a cost-effective backup solution particularly for users migrating to Windows Server 2008. All you need is your existing tape drive, a BackupAssist V5 and a Zip-to-Tape Add-on license. There are not many backup software options supporting tape drives in Windows 2008 at the moment. You will find that the BackupAssist ZIP Engine will save you thousands of dollars compared to any of the other options offered by our competitors. The total BackupAssist package costs just US$378 retail (at time of writing*).

Q: What ZIP programs can you use it with? What hardware do you use it with?

The BackupAssist ZIP Engine produces zip archives that conform to the ZIP64 format. To restore data from the zip backup, you can use BackupAssist V5's own Restore Console, or any zip software that supports the ZIP64 format. You can zip to a tape, a USB hard or flash drive, a REV, an RDX, or an optical disc (Zip-and-burn).

Q: What features does the BackupAssist ZIP Engine include that the others lack?

There are many. The BackupAssist ZIP Engine is powered by a multi-threaded compressor. On a multiple-CPU or multiple-core computer, the ZIP Engine compresses data much faster than most commercial ZIP archive software. We also store additional information about a file or directory in the zip archive, such as alternate data streams, security attributes and high-resolution time stamps. All this information can be easily restored along with the files using BackupAssist V5's Restore Console.

What this means is that when you restore a file, you get the exact file back - including security, NTFS streams and timestamps. Other ZIP solutions generally only restore the data, and then lose all the other attributes, so it's not a faithful reproduction of the original file.

Q: What software do you need to restore data through the BackupAssist ZIP Engine?

BackupAssist-created zip backup is most easily restored through our own BackupAssist V5 Restore Console. The Restore Console offers enhanced features such as restoring alternate data streams, NTFS security attributes, and exact time stamps. And it also makes it possible to restore files back to their original location. However, our zip archive conforms to the ZIP64 format, so you can always use Zip software such as TugZip and Winzip to restore data, even if you don't have BackupAssist V5.

Q: What's "multi-threading architecture"? How does it make a difference?

We use a number of specialised threads to perform different tasks simultaneously during the backup process. For instance, there is a thread that pre-processes files and directories. A number of compressor threads perform the actual data compression using the Deflate algorithm. There is also an output thread writing compressed data to a zip archive. The multi-threading architecture definitely makes a marked difference when it comes to backup speed. In a benchmarking test we carried out, the multi-threading zip engine was found to be 3 times faster than Winzip compressing 1GB of data.

Q: Talk us through some of the difficulties you have come across when you developed the ZIP engine.

Well, it's definitely not a smooth ride! When you have a multi-threading architecture, inter-thread communication is always causing you problems. We spent a great deal of time devising inter-thread communication protocols, making sure that all the threads are synchronised.

We also had lots of problems with tape drives. There is surprisingly little information or documentation about tape drive programming in the public domain. We had to experiment with tape drives before we were confident that the tape drives were doing what we wanted them to do. The tape drive was like a mystery to us when we started programming one several years ago. I remember seeing all sorts of tape drive errors when trying to write data to a tape drive. It turns out that on some "variable block size" tape drives, you must fix the tape block size before writing data to tape. The name "variable block size" was misleading us, as we thought that "variable" meant that the tape drive was smart enough to take in data blocks of variable sizes in each write operation.

Q: Why is it so important to keep the ZIP archive as a standard format? How does that simplify the restore process?

We always like open standards here at Cortex IT. Imagine a scenario where your server has broken down and you need to restore data from a zip backup quickly from a USB hard drive or risk losing thousands of dollars. It's so much easier and more convenient if you can simply plug the USB hard drive into another computer and open the zip backup with, say, TugZip. You don't even have to install BackupAssist in that computer! We always tell our customers exactly what our software is doing. We don't keep secrets from customers.

Q: Can you share with us some of the challenges you faced while developing the BackupAssist ZIP Engine?

Yes... I can tell you we are obsessed with speed. When we tested the first prototype of the BackupAssist V5 Restore Console, we found that restoring backup from tape was painfully slow. This is because every tape I/O operation must be done sequentially. Tape drives are not very good at random read/write and seeking. And features such as the tape set mark which would have made seeking faster, are not available in most tape drives. We were left with only tape file marks to play with. With little room for manoeuvre, we designed a tape format into the BackupAssist Zip Engine which minimises the amount of rewinding and seeking required during a backup restore.

Q: How can you see what backups are stored? Can you see your data as a simple

Absolutely. Each backup is associated with a backup catalogue. You can use the backup browser in the BackupAssist V5 Restore Console to go through the backup history, browse files and folders in a backup, search for particular files and retrieve versions that are available in the backup library.

Q: Is it easy to set-up and manage? (Are the wizards 'point and click' like other BackupAssist set-ups?)

The BackupAssist Zip Engine backup method is probably the easiest BackupAssist engine to set up. The backup job wizard guides you through the whole process in just a few steps. All you need to do is to choose the backup scheme and destination! If you are an advanced user, you can tweak the ZIP engine in the zip options. However, the default options work perfectly well for a standard backup job.

Q: Are we going to need a PhD. to operate it, Dr. Mel?

Absolutely not! Even a child can do it, creating a zip backup job to backup their favourite games!

Q: Who would use the BackupAssist ZIP Engine? Why is it better for them?

We designed the BackupAssist Zip Engine so customers wanting to backup data to tape in Windows Server 2008 would have an easy method of completing their backup tasks. . They get extras such as fast compression and AES-256 encryption. Having said that, the ZIP engine is quite versatile, we'd like to see people using it with media such as the USB flash drive...it's so inexpensive and easy to use that it would be suitable for just about anyone, from home users to large businesses.

Q: Will it cost an arm and a leg?

The retail price for a BackupAssist V5 base licence with the Zip-To-Tape Add-on (which includes the new BackupAssist Zip Engine) is just US$378. You can't get better value for money than that in any backup software out there.

Q: Can you illustrate how it's used with a case study or set-up scenario?

Case Study 1: Tape Drive Support, including Server 2008.

The BackupAssist ZIP Engine is perfect for backing up to tape, especially on Server 2008 where NTBackup is no longer included with the operating system.

The ZIP64 standard and tape form the perfect combination for long term data archival backup and data retention. Media rotation – the process of swapping media offsite – is built into BackupAssist.

We recommend using BackupAssist V5 with the BackupAssist Zip-To-Tape Add-on* to combine tape backups on Server 2008 with drive imaging to provide fast server recovery as well as long term data archival backups.

*Note: The BackupAssist ZIP Engine is included in the BackupAssist Zip-To-Tape Add-on.

Case Study 2: ZIP-to-flash - an inexpensive data backup strategy

USB flash drives are becoming an increasingly popular backup medium, due to constant improvements in capacities and their increasingly reasonable pricing. Flash drives have the advantage of being small, portable and amazingly robust.

BackupAssist makes it easy to backup to Flash and take the data offsite. And now, thanks to the compression capabilities of the BackupAssist ZIP Engine, it's possible to backup 100GB onto a 64GB Flash drive – enough capacity for most organizations.

On Server 2008, we recommend using the ZIP to USB Flash drive as your offsite data protection strategy, and combining it with drive imaging for fast server recovery. All the facilities you need can be obtained from BackupAssist V5 with the BackupAssist Zip-To-Tape Add-on for just US$378 (at time of writing*).

* For the latest pricing, please visit www.BackupAssist.com

Dr. Mel's favourite points of interest in the new BackupAssist ZIP Engine.

- Multi-threading architecture.

- Optimizations with different block sizes.

- Open .ZIP format - backups are stored as .ZIP files, which is an open format that can be accessed on any Windows-based machine.

- Extracts a ZIP from tape to disk.

- Restoring from ZIP:

    - Users can make it easy by using the BackupAssist V5 Restore Console.

        - Retain NTFS attributes, ADS, security, etc. Perfect restore, including timestamps.
        - All the benefits of our Restore Console – simple library, easy searching and selection of what to restore, finding & restoring different versions of files and more.

    - Alternatively, users can use any ZIP-64 program, like TugZIP, WinZIP and many others.

        That means you don't even need BackupAssist installed to restore the data!
        (However, these alternative methods don't restore NTFS streams and can't restore data back to its original location.)

- Support for tape drives - users can now backup to a standalone tape drive on Windows Vista, Server 2008 and SBS 2008 where NTBackup is not available.

- Real-time software compression - data selected for backup is compressed in real time (on-the-fly) even to tape, which saves storage space and makes it possible to store more backups on each backup device.

- AES encryption: backups can be protected with a password using 256-bit AES encryption.

The **BackupAssist Zip Engine** is part of the BackupAssist suite of business backup products. All ZIP archives created by BackupAssist can be restored using the BackupAssist Restore Console, which will restore NTFS security attributes, alternate data streams and exact time stamps, and more, for a faithful reproduction of the original file.

To backup to Disk, NAS, Flash, Optical Disc:

To backup to tape:

Purchase:
   BackupAssist - US$249.

Purchase:
   BackupAssist - US$249
   BackupAssist Zip-To-Tape Add-on - US$129
   (Total package: $378)

To download your free 30 day trial, or to purchase BackupAssist, please visit www.backupassist.com