TimeMark™ – At a Glance

What is it?
The TimeMark Option enables IPStor® software to create periodic, scheduled or on-demand point-in-time delta snapshot copies of data volumes. These delta snapshots contain only data changes and therefore do not take up a significant amount of disk storage space. Up to 256 delta snapshots can be maintained per volume.

How is it used?
The TimeMark Option provides administrators the ability to instantly recover a single file or an entire volume back to a known good point in time. Working in conjunction with FalconStor's Accelerated Backup solutions (Zero-Impact Backup and HyperTrac Backup), the TimeMark Option allows third-party backup software to perform full, incremental, and differential backup/restore, something that "image" (block-level) backup software cannot offer alone. The TimeMark Option also integrates with the IPStor application-aware Snapshot Agents to enable online, incremental backups of databases and message stores with transactional integrity and point-in-time consistency.

The TimeMark Option includes the TimeView™ feature which creates an accessible, mountable delta snapshot image that provides administrators with a tool to freely create multiple and instantaneous virtual copies of an active data set or a replica (created using the IPStor Replication Option). The data set and/or replica copies can then be assigned to multiple application servers with read/write access for concurrent, independent processing, all while the original data set is still actively being accessed/updated by the primary application server. This is great for instant recovery, testing, development, etc.

The TimeMark Option is also the foundation for FalconStor's Continuous Online Backup and Continuous Nearline Backup solutions. Both methods deliver full, incremental, or differential automated instant backup to low-cost disk, without backup software. There is no impact to application servers, making backups during peak hours possible—altogether eliminating the issue of the backup window. Both solutions protect from "soft errors" and deliver immediate, easy recovery of individual files/records or volumes. For maximum data redundancy and business continuity both solutions complement each other by maintaining delta snapshots on local storage (Continuous Online Backup) as well as delta snapshots of replica data at a remote site (Continuous Nearline Backup), providing an extra layer of protection.

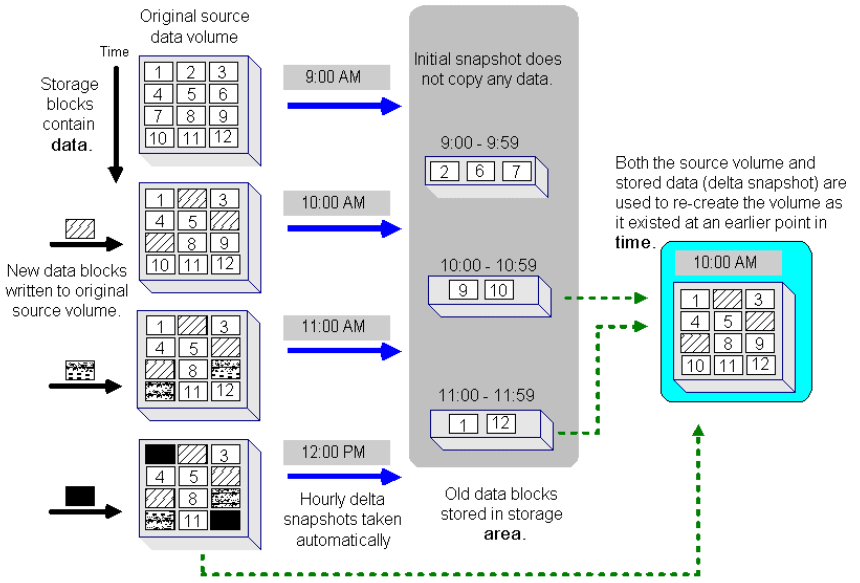
As part of FalconStor's HyperTrac Backup solution, the TimeMark Option allows an existing dedicated backup server to obtain an accessible delta snapshot image of a volume that can be concurrently in use by a host server and back it up to tape. The HyperTrac Backup Accelerator automates the whole process whereby the dedicated backup server backs up/restores each application server's disk managed by IPStor via the TimeMark option at the speed of SAN.

Alternatively, as part of FalconStor's Zero-Impact Backup solution, the TimeMark option works with the Zero-Impact Backup Enabler to allow certified third-party backup software – such as that from BakBone and Veritas – to perform full, incremental, and differential backup/restore at the block level. Without the TimeMark option, only full backups of databases and message stores can be performed.

How does it work?
A small amount of storage is pre-defined by the administrator to hold the incremental changes to the disk (block level, not file level). When a delta snapshot is created (automatically per the schedule, or on demand using the IPStor Console or command line interface), only the changed data is held in this area. Therefore, it is not necessary to have 100% of the amount of disk space in order to create a delta snapshot of the entire data volume. In fact, the typical amount of space needed is only around 1% to 5% of the original volume size, though this depends on the amount of

125 Baylis Road
Melville, NY 11747
631.777.5188
www.falconstor.com

activity (number of new writes) to the disk. The snapshot operation is performed in the background, totally transparent to the application server.



The TimeMark procedure: As data blocks change, the original data is moved into the TimeMark space. By combining the TimeMark storage with information from the source volume, older versions of data can be recreated for file retrieval, recovery from deletion, etc.

How does this benefit me?

Instant, and more granular recovery of data

IT managers normally have to worry about two types of data loss problems: hardware (disk) failure and "soft errors," which include accidental deletions, disk partition or file system corruptions, application level software glitches, or virus attacks. While RAID, Mirroring, and Replication can take care of most hardware problems, performing effective and frequent backups is the only defense against “soft errors.” But how frequently are disks backed up to tape? Typically, there is a weekend full image backup, supplemented with Monday, Tuesday, Wednesday, etc. incremental backups. For large databases, even incremental backups (file based) are not effective because the data is changing continuously throughout each day. With the IPStor TimeMark option, you can simply schedule an hourly delta snapshot (5 days per week, 24 TimeMarks per day = 120 TimeMarks per week) and can even automatically recycle the space on a weekly basis.

Suppose that on Thursday at 5:32 PM, you discovered that a massive virus attack has corrupted your entire disk, and a virus scan/repair tool for that particular virus isn't yet available. You trace the problem to an infected program that you ran at 5:02 PM. Using the IPStor Console, you can simply right-click on that infected drive, select 'TimeMark -> RollBack' and select the "Thursday 5:00PM" TimeMark. Instantly, the contents of the entire drive are rolled back to the exact contents as of 5:00PM, like a time machine. This effectively reverses the mishap (running the infected program) that occurred at 5:02 PM.

Without the IPStor TimeMark Option, the above scenario would require restoring the entire disk from tape. If a file-level based restore is performed from tape using third party backup software with a restore rate of 20GB/hour, the

125 Baylis Road
Melville, NY 11747
631.777.5188
www.falconstor.com

restore of a 100GB drive would take five hours; the restore of a 500GB drive would take more than one day. Using the IPStor TimeMark Option, the restore of the drive can be completed in minutes!

Furthermore, a delta snapshot can be instantly assigned to all IPStor-supported application server platforms just like a disk volume. This enables the administrator to get back the entire contents of the disk as of that particular point in time, thereby allowing recovery of a few files instantly, without the need to duplicate the entire volume.

Eliminates backup window by enabling no-impact file-by-file and full image backup using existing backup server

The TimeMark Option is the driving force behind FalconStor's HyperTrac Backup solution, which enables administrators to continue to use the backup application they know and like on their existing dedicated backup server while eliminating the backup window and dramatically accelerating backup performance. Using the TimeMark Option with this tape backup scenario, the IPStor software delivers *on*-peak, accelerated full, incremental, or differential file-by-file backup of live data that does not impact application servers' memory or CPU. The ability to perform file-by-file and incremental and differential zero-impact backups is unprecedented—before the TimeMark Option , only *full* zero-impact full disk image backups were possible.

Provides backup software a way to identify the block-level changes of a large database file for incremental backup

Because each delta snapshot represents the changes of the disk, an incremental backup is effectively done by backing up the delta snapshots (which are small in size). Without the IPStor TimeMark Option, it is not possible for typical backup software to go 'inside' a large database file to identify the changes for incremental backup. Some backup software offers database agents that use the API of the database management system (DBMS) to identify changed records, but such methods are highly dependent on the database API and are slow (having to go through the API, the OS, the network, etc.).

IPStor software's enhanced Zero-Impact Backup interface gives data center managers an unprecedented level of choice and flexibility in designing backup scenarios that fit within their backup window. As with all of the IPStor backup-accelerating features, this option integrates with the IPStor Snapshot Agents and Group Snapshot feature to ensure full transactional integrity—particularly crucial when copying databases.. This allows IT managers to perform incremental and differential online backups of databases (Exchange, Oracle, MS-SQL 2000, etc…). Without the IPStor TimeMark Option, third-party backup software can only perform full database backups.

125 Baylis Road
Melville, NY 11747
631.777.5188
www.falconstor.com