

# **StorTrends Whitepaper**

## **“Continuous Data Technology”**

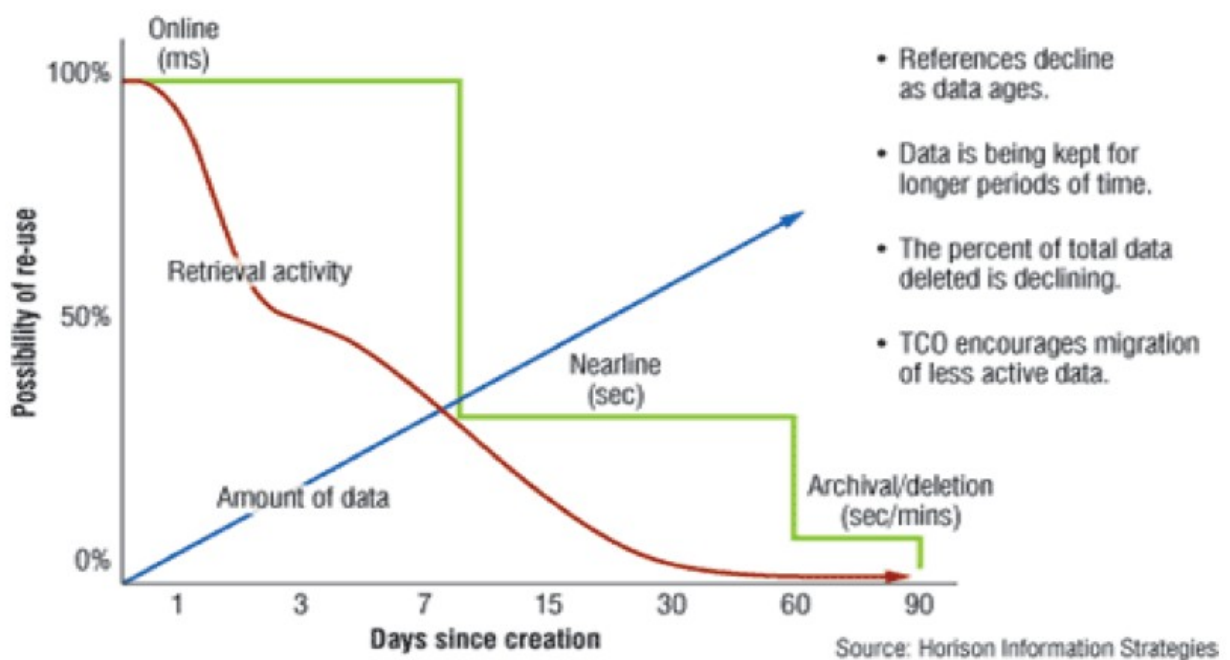
American Megatrends International GmbH  
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# 1. Continuous Data Technology

These days, the paper-less revolution, corporate governance, business ethics and regulatory compliance have all led to a tremendous influx of digital data. Safekeeping and management of stored data has, therefore, assumed supreme importance. Various new technologies are emerging in an attempt to offer an appropriate solution to address these requirements. Statistics show that data growth is almost doubling every year, yet the Recovery Time Objective (RTO) has remained the same, if not tighter. From the anatomy of data re-usage, it is clear that in overwhelming situations most recent data is recalled.



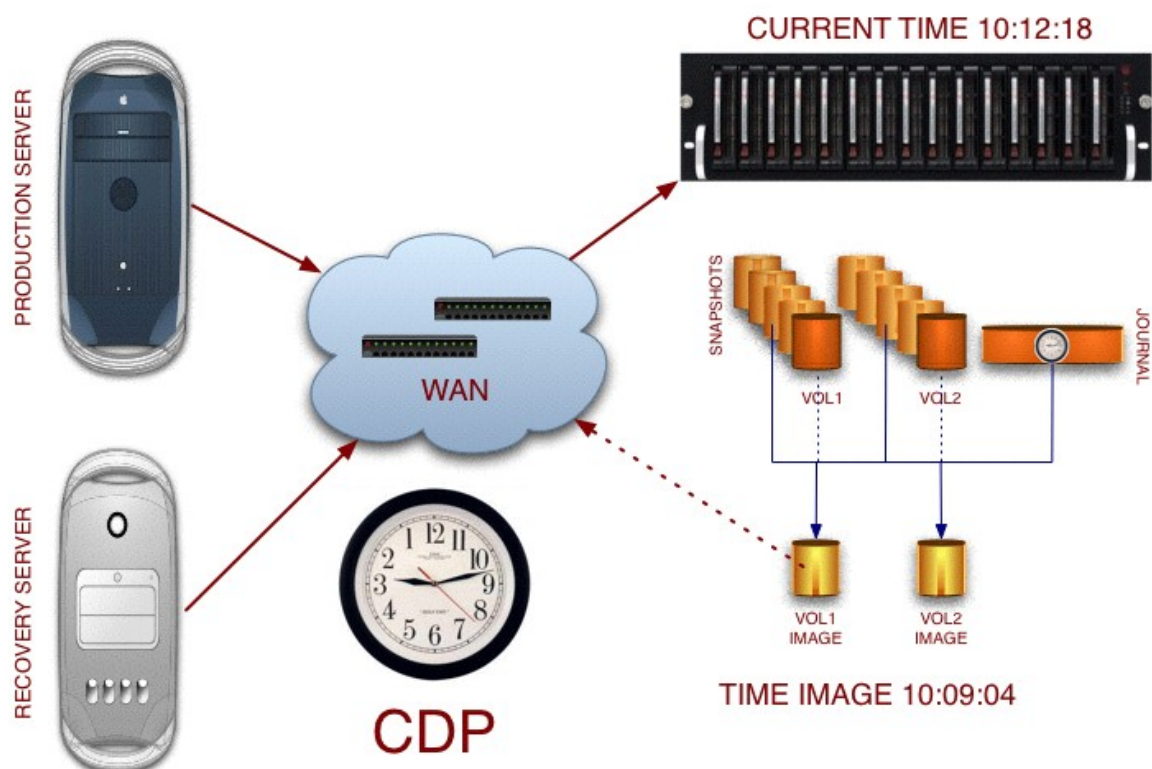
**Figure 1: Possibility of reuse as a function of age**

This immediacy of need and the corresponding instances to data reference steadily decline as the data ages. Continuous Data Protection (CDP) is now assuming utmost importance and is no longer an industry buzzword. CDP, which deals with backup and restore, is probably the most important aspect of "Continuous Data Technology" (CDT). More than just recovery, CDT virtually handles any act of granular copy-

creation in the enterprise. With this technology, granular instances of chronologically ordered data can be used to serve potentially a wide range of applications and not merely backup and recovery. Some of these are CDR (CDT for Replication) and CDI (CDT for Data Images). According to the Taneja Group: "...an emerging umbrella category, that we term Continuous Data Technologies (CDT), is poised to play a profound role in the coming three years."

StorTrends iTX 2.7, with up to 2,000 snapshots per volume (Near-CDP recoverability) and an efficient I/O journaling architecture (Full CDT), offers the solution, providing a snug hand-and-glove fit for the business need.

## 2. StorTrends CDT – a true Event Addressable Storage

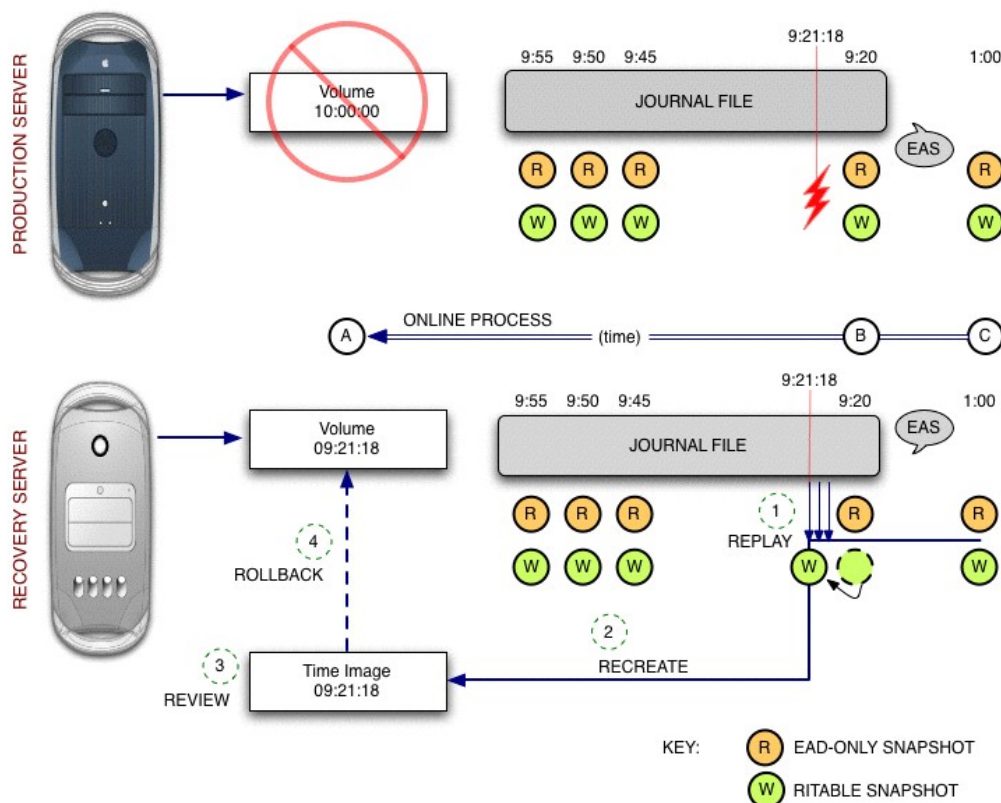


**Figure 2: Continuous Data Technology in StorTrends iTX**

Today there are various implementations of CDP. A vast majority of vendors implement it on the Host that is serving as the File or Application Server. In Host based CDP, there is a filter driver or "Data-Tap" residing in the Host Operating Systems that replicates every I/O on the Production Server to the CDP Server. This chews up Host bandwidth and also makes the offering OS specific. In fabric based CDP products, the intervening intelligent switches like MDS 9000 SANtap from Cisco take on this responsibility to replicate I/Os. Though this imparts OS agnostic-ness to the solution, handling transport failures become very messy. On the other hand, StorTrends offer complete target side CDT both at the production and/or recovery sites obliterating the need for any host side agents.

Figure 2 above depicts an iTX box configured to serve Production Server I/Os and at the same time offering EAS. Here two production volumes V0 and V1 are continuously protected by the EAS journal. In the event of disaster or for other data processing needs, a frozen image to any specific point can be recalled, reviewed and rolled back.

AMI StorTrends innovatively combines its low-latency snapshot technology with I/O journaling to offer most efficient CDT repository. Journal files can be configured from up to eight logical drives of any sizes to serve as the event-addressable-storage. To offer the utmost in performance, StorTrends allows configuring separate journal files for different consistency groups. In a typical environment where an average of 10GB production data is changed or generated per hour, a journal file of 1TB can hold four days worth of continuous chronological data. In addition, with eight levels of scheduled snapshots and up to 2000 snapshots per volume StorTrends can deliver any historic data across a very wide time spectrum.



**Figure 3: Data recovery process as a part of Continuous Data Protection**

Figure 3 above shows a volume detected to be corrupted at 10:00 AM due to some disruptive event just after 9:21:18 AM, which is quickly recovered to a consistent state using CDP. Here, a writable snapshot is generated from the EAS journal and a read-only snapshot at 9:20 AM. Once this temporary writable image is reviewed for correctness, it can be quickly rolled back to the production volume.

### 3. Under the hood: StorTrends CDT

The Advanced Caching Module of iTX stack serves as the central repository of in-flight data. In addition to many advanced caching functions, this module also implements a “N-Way” data router that allows incoming data to be multiplexed out to various data handling and transporting modules. This helps in effectively channeling data with Zero-Memory-Copy. Therefore, incoming data can be routed out to a remote recovery site (2A) as well as captured by the Journal Module (2B), as shown in Figure 4 below.

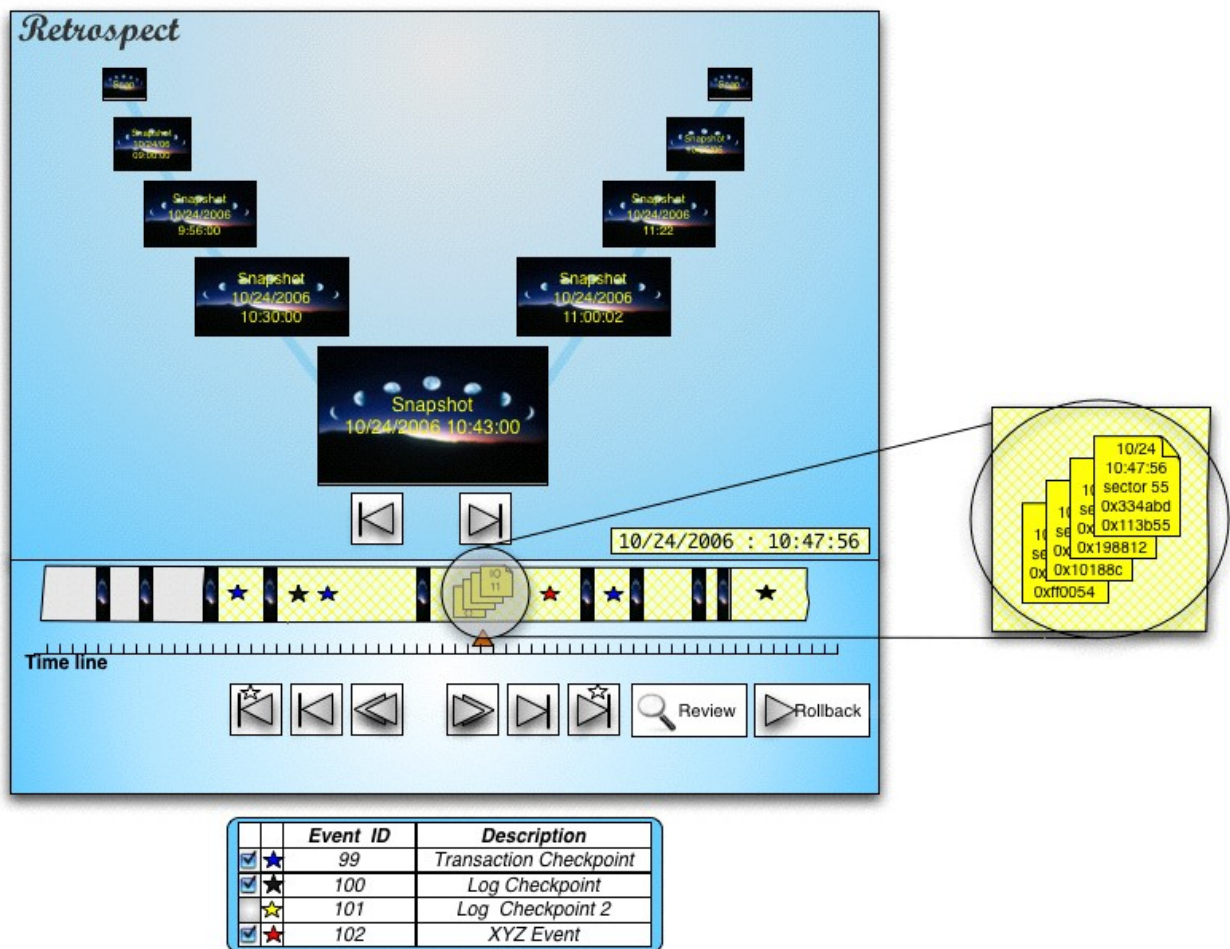
The Journalling module timestamps the arriving data and stores them in the journal files giving it the essence of Time-Addressable-Storage (TAS). This module also exposes an event registration interface through which relevant events can be tagged and stored. The figure shows snapshot events (C) generated by Distributed Volume Manager (DVM) And other application specific events e.g. database checkpoints (D) are recorded in the Event-Addressable journal.

At the heart of the technology resides the CDT engine. This works as the client of the Journal and snapshot modules. When historic data is requested, it gives a very fast access to the data using a very dense and efficient in-core index table. Powerful APIs and CLIs are offered to locate, review and rollback the requested image.



## 4. Flashback – the visual interface to CDT

With potentially unlimited 'frozen' images it becomes a steep challenge to locate the right instance of image. What makes matters worse is that more often than not, there is no precise knowledge about the exact point for recovery. There is always a stretched gray zone of uncertainty about the exact time of disaster. So without an intuitive guiding tool it is almost impossible to zero in on the instant. StorTrends offers an elegant interactive and animated visual interface to navigate and locate the right image instance. The Wizard guides the user through the selection of consistency group, time filter and event filter to bring the window of interest under the scope of navigation.



**Figure 4: Flashback, the StorTrends Continuous Data Technology UI**

Thereafter, back and forth navigation can be done by snapshots, events, seconds or I/Os. This 'frozen' image set can then be reviewed and rolled back instantaneously.

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