

Data Protection

We frequently need to preserve data as it existed at some past point in time, for example, to recover from a ransomware attack, a hardware failure, an outage, to repair data we accidentally erased or damaged, to audit changes, or simply to archive historical information for regulatory purposes.

Traditional Approaches

Most solutions rely on backups, snapshots, or journals to preserve copies of data at various points in time. This data can then be restored or reconstructed when needed. Many users implement replication on top of backups and snapshots to recover more quickly from serious failures and major outages. To protect backed-up data from subsequent alteration, some data may also be stored on immutable storage. In all cases, servers and/or external databases are often required to track each of the various copies that were made and to manage restores, which themselves become vulnerable infrastructure.

COSNIM Technology

COSNIM Time-Travel transparently tracks and protects every single update in real-time. It seamlessly integrates live storage, backups, snapshots, and archival into a simple, unified, continuous data protection system, without the use of any servers or external databases.

With Time-Travel, users are free to go back in time and examine any piece of data at any past point in time, instantly, as if it were in live storage. Data can be examined at the Continuum/filesystem-level as if continuous snapshots were taken of the entire storage system; at the directory and file level as if they were individually backed up, and at the data fragment level as if detailed journals or ledgers were tracking the most minute changes to data.

Time-Travel is fully integrated into the storage system, giving easy and instantaneous access to all past data, without backups, snapshots or journals.

Continuous Data Protection

Time-Travel works continuously and automatically as data is added, updated, and deleted. It does not behave like traditional technologies; for example, there is no explicit action such as a backup or snapshot event, it does not occur at fixed intervals, nor does it have any minimal frequency. Instead, it works internally and transparently at the deepest level of data structures, tracking each and every single data

fragment and metadata as they are updated and integrated into the Continuum, live and continuously, at infinite resolution.

Time-Travel is truly continuous, tracking the most minute changes, instantly.

To be more useful, COSNIM normally exposes only the Time-Travel points that correspond to significant events such as when files are closed or filesystem flushes occur. At this more practical level, Time-Travel is still often able to describe events as small as .04 seconds (equivalent to 25 traditional “backups/snapshots” per second), delivering extremely low Recovery Point Objectives (RPO).

Zero Processing Overhead

Time-Travel does not incur any additional overhead, either when data is produced or when past Time-Travel points are explored. This is because Time-Travel leverages the unique way COSNIM already organizes data to provide services such as serverless sharing, hybrid/multi-cloud storage, and asymmetric replication. As long as storage is not reclaimed (garbage collected) aggressively, Time-Travel has free access to all past data and storage states, without any reconstruction or additional processing.

Low Storage Overhead

Contrary to traditional technologies, Cosnim Time-Travel is extremely space-efficient due to its unique design and metadata organization. For example, when Time-Travel is compared to Btrfs snapshots, COSNIM can consume between 60% to 80% *less* storage to track the exact same data and updates.

Instant Exploration

Accessing past Time-Travel data is instantaneous and as easy as browsing directories. There are no special interfaces, no servers to contact, no restores to request, everything is accessible immediately to all authorized users, directly from the filesystem. Since Time-Travel also uses the same capsules that were used to store and retrieve data at that time, past data can be explored instantaneously with exactly the same convenience and speed as live storage.

Immutable Protection

Since all Time-Travel information is wholly contained in capsules, whenever capsules are stored on immutable storage, the entire Time-Travel history and data are automatically protected against all unauthorized alterations, including by ransomware or internal tampering, ensuring its full integrity.

Auditing

Time-Travel is fully integrated into the storage system; it has immediate access to all metadata and other related internal information. Auditors can therefore use Time-Travel to perform extremely deep-level audits of every single change that occurred, down to the most minute details, without the use of any logs or journals. Because it's driven by Time-Travel, auditors also have simultaneous access to the content of all individual files and data fragments, as they existed before and after they were modified, plus the full view of the entire filesystem as it existed during each of these occurrences, giving auditors unprecedented insights into their data and update activity.

Time-Travel gives auditors unprecedented access to all update activity, including the contents of individual data fragments, directly from the filesystem.

Storage Cost Optimizations

COSNIM capsules containing past Time-Travel information may be freely moved to cheaper storage or cloud services to optimize costs, without affecting their availability. For example, instead of being reclaimed and destroyed, capsules that contain Time-Travel information can simply be kept longer in less-costly storage, increasing the quality of past data and remaining fully accessible by Time-Travel.

Integrated Replication

Time-Travel works hand in hand with COSNIM asymmetric replication to ensure current and past data is always available, even after hardware failures and major outages. Since COSNIM's asymmetric replication technology can also use any type or size of storage for replication, costs can be tightly controlled by choosing the right type of storage for the right use. For example, longer-term Time-Travel capsules can be replicated to lower-cost storage, or simply excluded from replication, without losing any capabilities.

Traditional backups, snapshots, and journaled filesystems require complex software and infrastructure to operate and usually require time-consuming restores or reconstruction to recover data. In COSNIM, everything is continuously protected by Time-Travel, fully integrated into the filesystem, giving users and auditors immediate and seamless access to all past data, as easily as browsing live storage.