

HP OpenView Storage Data Protector Zero Downtime Backup and Instant Recovery

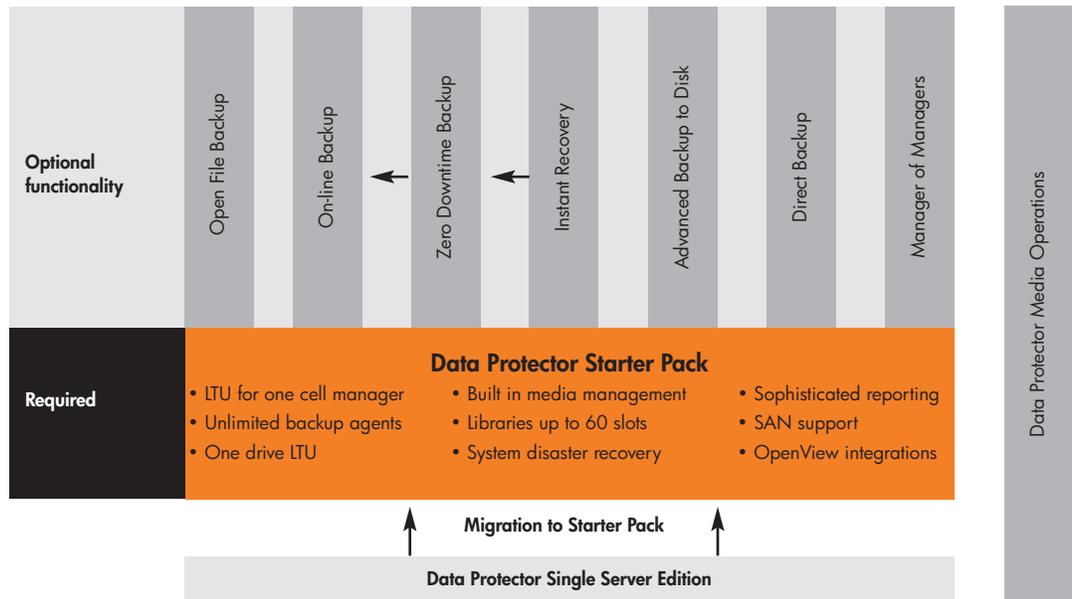
Product brief



One of the most difficult problems for IT managers has always been how to back up production servers while they are still processing I/Os. Since backup windows are luxuries that simply do not exist in 24x7 operations, backing up open files and databases is a constant issue. HP Data Protector delivers the solution for high-availability protection by integrating a variety of techniques to exclude backup windows.

Figure 1. HP OpenView Storage Data Protector Suite

Note: Zero Downtime Backup requires an on-line LTU, and Instant Recovery requires a matching quantity of Zero Downtime Backup LTUs



One of the most difficult problems for IT managers has always been how to back up production servers while they are still processing I/Os. Since backup windows are luxuries that simply do not exist in 24x7 operations, backing up open files and databases is a constant issue. HP Data Protector delivers the solution for high-availability protection by integrating a variety of techniques to exclude backup windows. These range from Online Backup, Open File Backup, to Zero Downtime Backup (ZDB) that enable data is both protected and available.

Instant Recovery takes Zero Downtime Backup a step further, meeting the demands of the most complex enterprises for specific recovery time and recovery point objectives, and enables critical data to be recovered within minutes.

HP OpenView Storage Data Protector allows you to reduce backup windows and secures high availability of data and systems. Backups are performed on the copy of the production data; with the option to copy it or move it to tape. This solution, totally integrated into Data Protector, is called Zero Downtime Backup and provides continuity of business operations also in 24x7 mission-critical environments. Data Protector fully automates this process, and makes it easy to manage replicated data via a simple GUI. Unlike other solutions on the market, no additional scripts are required to perform the operations.

A vendor has yet to match Data Protector's ability to control hardware-based replication across the range of operating environments, applications and storage arrays that HP currently supports.

The unique features and benefits that HP Data Protector Zero Downtime Backup provides are:

- No performance degradation due to backup—delivers the highest level of application performance during backup.
- HP Data Protector fully automates the protection process, including creation and rotation of mirrors or snapshots.
- All application data gets into a consistent state before the backup is performed.
- Administrators can choose disk protection, tape protection, or scheduled combinations to meet their protection requirements.
- Easily implement backup jobs without custom script development.
- Reliable disk operations permit non-disruptive, application-aware protection as frequently as once an hour, as necessary.
- All options can be easily configured using simple selections.
- The HP Data Protector GUI permits complete control of the mirror specification.
- Administrators can choose the schedule of the backup to tape.

HP OpenView Storage Data Protector provides Instant Recovery, removing the occurrence of unplanned downtime by offering continuous information availability during disasters and other potential data loss situations. This reduces cost by decreasing downtime associated with backup and recovery and as a result, increases revenue as business continuity is guaranteed. Data Protector allows Instant Recovery by retrieving data directly from the replicated images on disk. It also allows you to keep multiple data replicas (called mirrors or snapshots) available at the same time. You benefit from the ability to recover critical data within minutes, not hours.

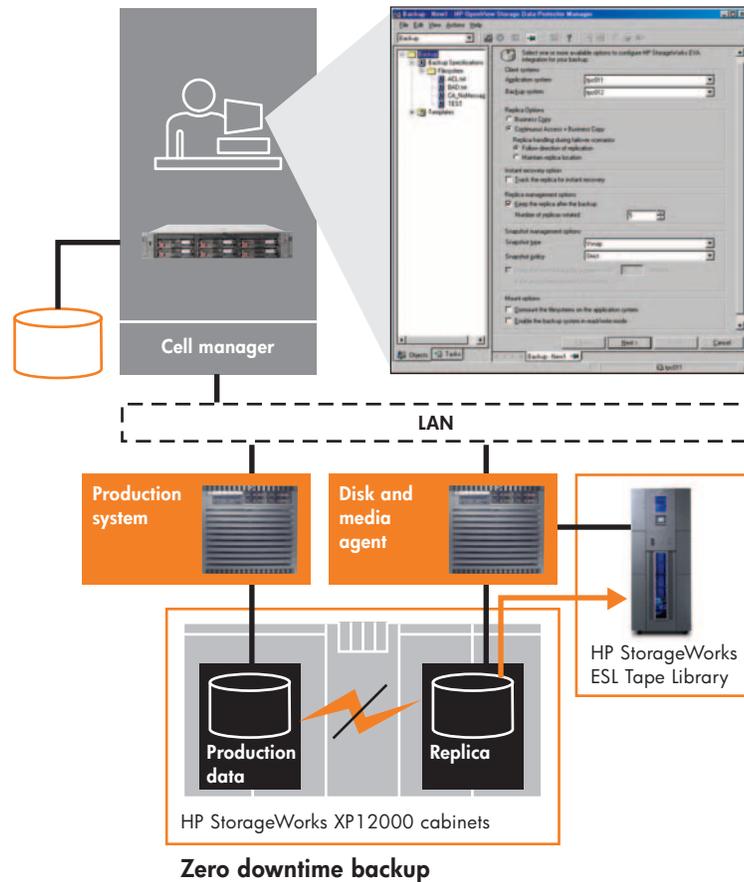
The unique features and benefits that HP Data Protector Instant Recovery provides are:

- Instant Recovery capabilities based on mirroring and snapshot technologies, which use disk as a recovery media rather than tape.
- Operational efficiencies and cost savings, including consolidation of servers and applications.
- Instant Recovery of terabytes of data in minutes, not hours, by switching the application to a backup on disk instead of copying the backup data back to the original location.
- Recovery to the last minute/second through full automation of the recovery process, including roll forward of transaction logs, provides a consistent application recovery to every meaningful point in time.

- HP's Data Protector was first to market with Instant Recovery in November 2001 (v4.1), and has continued to extend this capability to broader platforms, applications and storage arrays.
- Mirrors, snapshots and snapclones are rotated based on a pre-defined schedule.
- For recovery, the administrator selects a specific recovery image from the graphical user interface.
- Data Protector fully automates the protection process, including creation and rotation of mirrors or snapshots.
- Disk operations permit non-disruptive, application-aware protection as frequently as once an hour.
- Administrators can choose disk protection, tape protection, or scheduled combinations to meet their protection requirements
- Uniquely positioned to enable both tape- and disk-based backup and recovery from a central console.

HP Data Protector has provided unique Zero Downtime Backup capabilities for more than five years and Instant Recovery functionality for more than three years.

Figure 2. Zero Downtime Backup



What Are Zero Downtime Backup and Instant Recovery?

Zero Downtime Backup and Instant Recovery are two of the most important backup and restore techniques available for applications using disk arrays. They are especially important for high availability applications. Zero downtime backup is the term used within Data Protector to describe a backup approach in which replication techniques (e.g. split-mirror, snapshot or snapclone) are used to reduce the impact of backup operations on an application database or file system; create, at high speed on the array, a copy of the data to be backed up; and then perform backup operations on the copy, rather than on the original data. ZDB enables customers to instantly copy data to disk and then, at their convenience, back up that disk copy to tape. This “staged backup” process enables business applications to stay online 24x7, maintain business-critical application performance, and protect critical data.

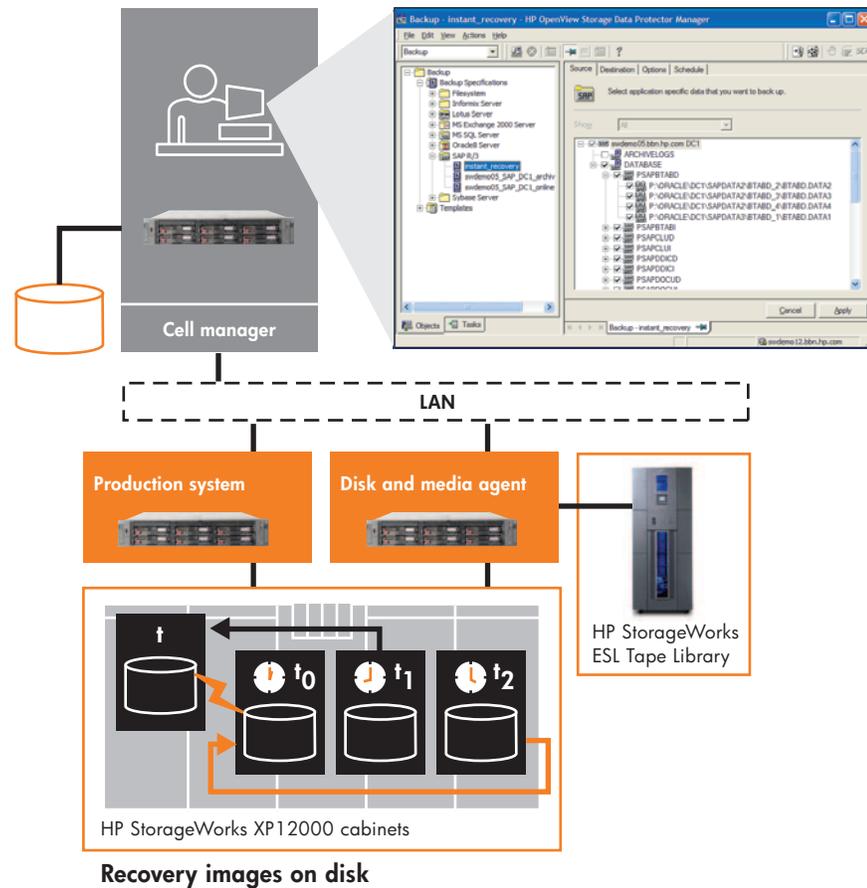
Instant Recovery is a process of restoring the backup copy of data, held on the array, to its original location on the array to facilitate high speed recovery; thereby avoiding the need to perform a restore from tape. Depending on the application/database concerned, this may be all that is required, or other steps—such as the application of transaction log files—may be required for full recovery. See figure 3 for details.

Basic principles of Zero Downtime Backup and Instant Recovery

The use of conventional backup to tape techniques for large database applications, can be very problematic. To produce a backup of a consistent database, the database concerned either has to be taken offline or, if the application allows it, has to be put into a “hot-backup mode” while data in it is streamed to tape.

The first option can cause major disruption to the application’s operation. The second option can produce a lot of large transaction log files, and can put extra load on the application system. However, if an application database is installed on a disk array that can be integrated with Data Protector, it is possible to reduce the time in which the database is taken offline or placed in hot-backup mode. This can be done by first creating a point-in-time copy of the database on the array and then streaming data from the copy to tape. The copy concerned can be created very quickly and, afterwards, the database can be returned to normal operation before any streaming of data to tape is started. As an extension of this approach, it is not actually necessary to stream data from the copy to tape to produce a backup. The copy itself can be kept on the array as the backup and a restore can be performed directly from it (Instant Recovery).

Figure 3. Instant Recovery



For database applications, such as Oracle®, it is possible for Data Protector to ask the application to place the database into hot-backup mode prior to performing a backup. In this mode, the database is placed into a state in which the database files can be copied and increased information is written to the transaction logs (required to make the database consistent afterwards). This allows the database to be operated upon without stopping the application. The copy concerned can be created very quickly and, afterwards, the database can be returned to normal operation before any streaming of data to disk or tape is started. These are the basic principles of Zero Downtime Backup and Instant Recovery.

What is a Replica?

A common approach of producing replicas on large arrays has been to maintain an exact copy (a so-called “mirror”) of application data that has to be operated upon. With mirror technology, during normal operation, each time the application data is updated, an identical update is made to the mirrored data and the two are kept synchronized. In this way, two identical sets of data are constantly maintained. When an administrative task (such as performing a backup) has to be performed on the data, the synchronization can be stopped (the mirror can be split) and the mirrored data can be used for the task, leaving the application to continue virtually unaffected, using the original data. If necessary, after the work on the mirrored data is complete, the synchronization of the two sets of data can be resumed until mirrored data is required for another administrative task.

This technology moves Zero Downtime Backup a step further, allowing you to keep multiple replicas available. This is key for critical data that has to be recovered within minutes, instead of hours.

“HP OpenView Storage Data Protector provides instant recovery, eliminating unplanned downtime by maximizing data availability. This reduces cost by minimizing downtime associated with backup and recovery and as a result, increases revenue as business continuity is guaranteed.”

—Rich Bermudez

Group Leader Information Technology

Asten Johnson

Replication techniques (creation of an identical copy)

Currently, there are two basic replication techniques:

Split-mirror

This type of replica is produced using mirroring technology, provided by array hardware such as the HP StorageWorks Disk Array XP. Mirroring technology allows a duplicate of filesystem/application data to be created and maintained during normal application use. This duplicate is called a “mirror” of the source (or original) data. During normal application usage, the mirrored data can be kept synchronized with the source data, that is, any data updates to the source data are also applied to the duplicate. If a permanent replica of the data at a fixed point in time is required, the synchronization is stopped (the mirror is split), leaving an independent split mirror replica of the source data.

Snapshot

This type of replica is produced using snapshot technology, provided by array hardware such as HP StorageWorks Enterprise Virtual Array (EVA). A snapshot replica can also be regarded as a copy, or image of filesystem/application data. However, depending upon the type of array, it may not be a data duplicate, such as a split mirror replica, but rather a virtual copy, with pointers to the original data rather than to copied data in separate storage locations. From an application point of view, a snapshot replica can be considered as being created at one particular point in time, but generally, background replication processes continue for some time afterwards. However, pre-configuration, such as setting up a synchronized mirror, is not required.

Three methods make up the Data Protector ZDB family

- Data can be streamed from the replica to a tape backup device. In this case, the total backup process is called ZDB to tape. Data is normally restored using standard restore from tape, so no information about the replica is stored and it can be discarded after the backup process is complete.
- The replica can be kept on the array and used as the backup. In this case, the total backup process is called ZDB to disk. Data backed up using this method can be restored directly from the replica using instant recovery functionality. If replicas are created for this purpose, important array related information about the replica must be recorded, to allow the data to be restored. With ZDB to disk, one or more replicas of the data backed up can be kept on an array. In fact, a time-based series can be set up, with each replica corresponding to a particular point in time.
- Data can be streamed from the replica to a tape backup device and, afterwards, the replica can be kept on the array and used as a backup. In this case, the total backup process is called ZDB to disk+tape. This provides extra flexibility: data can be restored both using standard Data Protector restore from tape (allowing restore of individual backup objects) and directly from the replica using instant recovery functionality (allowing recovery of the complete replica).

Array Basics

The replication techniques available are dependent on the type of disk array and the firmware/software installed.

HP Data Protector supports replication on the following disk arrays:

- HP StorageWorks Disk Array XP
- HP StorageWorks Enterprise Virtual Array
- EMC Symmetrix Disk Array/DMX

For details on supported configurations, please see the HP Data Protector support matrixes under www.hp.com/go/dataprotector and click specifications.

Instant Recovery

With today's increasing emphasis on mission-critical systems, from messaging to resource planning, to our online web presence, application downtime for any reason has become increasingly unacceptable. To measure the quality of data recovery strategies, two metrics have emerged: the Recovery Time Objective (RTO), or the maximum available time the business can afford for a recovery operation; and the Recovery Point Objective (RPO), or the measure of the maximum age of data your business can afford to lose. When measured against these metrics, traditional tape backup—particularly for large datasets in mission-critical environments—no longer meets the business needs.

Fortunately, HP has created a capability called Instant Recovery that protects information on disk, rather than on tape, and can restore that information in minutes, rather than hours, even for the largest environments. When used appropriately, Instant Recovery can provide an image of data that was taken within the past hour (the recovery point objective), reducing the amount of data lost or needing to be recovered from logs. By shifting the focus from backup to recovery, HP can help IT organizations look at protection in a new light and take advantage of a new set of tools to improve the quality of their recovery strategies.

Under normal circumstances, backups are performed regularly and restores are performed infrequently. So, in many cases, users may be content to perform ZDB to tape and accept the time required to perform a restore from tape, if necessary. However, particularly with high availability systems, the ability to perform a high-speed restore as well as high-speed backups may be essential. In such cases, it is better to perform ZDB to disk or ZDB to disk + tape, so that high speed restore is possible, using instant recovery functionality. When restoring data with instant recovery, the application and backup systems are disabled and the contents of a replica are restored directly to their original locations. Because the restore is performed internally within the array, it is very high speed. Once the restore has been completed, the sections of the database/file system concerned have been returned to their states at the time the replica was created and the application system can be re-enabled.

Database Recovery

Note that to fully recover a database and make it consistent, it may also be necessary to apply any archived transaction logs, backed up separately, following a restore using instant recovery functionality. Instant recovery is performed without the need to first restore data from tape.

NOTE: To be available for restore using instant recovery, replicas must have been produced using ZDB to disk or ZDB to disk + tape. Otherwise, information about the replicas, required for the restore, is not tracked by Data Protector.

What's new with Data Protector 6.0

HP Data Protector 6.0 provides the following new functionality related to Zero Downtime Backup and Instant Recovery:

- Instant Recovery of Microsoft® Exchange can now be combined with on-going mail services during backup based on Microsoft VSS (Volume Shadow copy Service) in combination with HP EVA disk arrays.
- Incremental Zero Downtime Backup—provides file level incremental Zero Downtime Backup from the replica to tape. Only changed files are copied to tape reducing the backup volume on tape.
- Overcomes local data loss by performing backup on the copy of the production data in the remote site (Continuous Access) now also with HP StorageWorks Enterprise Virtual Array. Business Copy is available today.
- Support for new configurations—please see the HP Data Protector support matrixes under www.hp.com/go/dataprotector and click specifications for the latest information and details.

For more information

For more information on HP OpenView Storage Data Protector, please contact your HP representative or visit www.hp.com/go/dataprotector

Please see QuickSpecs for ordering information.

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To learn more, visit: www.hp.com/go/dataprotector

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