The on demand world

The move to e-business on demand™ presents companies with both significant opportunities and critical challenges. A whole new world of potential customers, automated and streamlined processes and new revenue streams are being fueled by the on demand business world. Consequently, companies also face increasing requirements for more information to be universally available online, around the clock, every day of the year. Because of these developments, data backup and disaster recovery solutions have become vital to protecting the continuous daily operations and, in some cases, the actual survival of businesses today.

To address the unique requirements of the on demand world, the IBM® TotalStorage® Enterprise Storage Server® (ESS) helps set new standards for performance, automation and integration as well as for capabilities that support continuous data protection.
availability. The Enterprise Storage Server also supports many advanced copy functions, which can be critical for increasing data availability by providing important disaster recovery and backup protection.

Resiliency Family for business continuance

The ESS has a number of Advanced Copy Services which are part of the core technology of the IBM TotalStorage Resiliency Family. These are enterprise-level, leading-edge functions designed to address an organization’s needs for high availability, data duplication, disaster recovery, and data migration.

- FlashCopy V1 and V2
- Peer-to-Peer Remote Copy V1 and V2
- Extended Remote Copy

FlashCopy V1

Planned outages can make critical business applications unavailable for a significant amount of time. FlashCopy can help reduce or eliminate planned outages for critical applications.

FlashCopy V1 is designed to provide an advanced, fast replication facility that can help significantly reduce application outages caused by backups and other copy applications. It is designed to provide point-in-time copy capability for logical volumes on the ESS, and allows access to the source data and the copy almost immediately.

FlashCopy NOCOPY option

FlashCopy’s efficient copy-on-write NOCOPY option allows flexible reuse of disk capacity that would otherwise be dedicated to copy operations. This option is designed to provide a unique optimization for operations with short-term copy requirements, such as backup to tape. With the NOCOPY option, rather than a physical byte-for-byte copy of the source volume, the only data copied to the target is that which is about to be changed or overlaid by the application. This option can be used to copy most or all of the data directly from the source to tape, without the need to copy all of the physical data to an intermediate backup copy first. This helps minimize the impact of internal replication on other work.

FlashCopy V2

The ESS supports FlashCopy V2, which includes all the features of FlashCopy V1 in addition to the following enhancements designed to improve capacity management and utilization.

Data Set FlashCopy

This feature offers a new level of granularity for the z/OS environment, allowing more efficient use of the ESS capacity. It can help reduce background copy completion times because FlashCopy no longer needs to be performed at the volume level when only a data set copy is required. Data Set FlashCopy allows the source and target copy to be different sizes and allows the copied data to reside at a different location in the target volume than it was located in the source volume (see Figure 1).
**Multiple Relationship FlashCopy**

This feature offers increased flexibility and improved capacity management and utilization. Instead of limiting a volume to a one-on-one relationship between FlashCopy sources and targets, this function allows a volume to participate in multiple FlashCopy relationships (up to 12 simultaneous relationships) so that multiple copies of the same data can be made for testing, backup and other applications (see Figure 2).

**Incremental FlashCopy**

This feature offers the ability to track and record changes that are made to the source and target volumes after the establishment of FlashCopy relationships. This provides the capability to refresh a LUN or volume to the point-in-time content of the source or target using only the changed data (see Figure 3). The refresh can occur in either direction.
Consistency Groups
This feature supports the ease of use and application-level implementation of FlashCopy. It enables the creation of a consistent point-in-time copy for an application that uses data which spans multiple volumes or even multiple ESSs, while avoiding host impact. The Consistency Groups feature is designed to prevent initiation or completion of write I/O to the source volumes until FlashCopy completes copying the data for all volumes in a group. No operator intervention is required, which can help improve business efficiency.

Additional features
FlashCopy V2 is designed to help decrease the time required to set up the point-in-time copy for a volume to one second or less. Applications that previously could not tolerate the required initialization time now may become viable candidates for FlashCopy. In addition, FlashCopy V2 provides the ability for the source data and its target copy to reside in different Logical Storage Subsystems (LSSs) within the same ESS, thereby simplifying capacity management and administration.

Peer-to-Peer Remote Copy V1
A large percentage of businesses cannot tolerate downtime. The ESS can help reduce the impact of downtime by allowing businesses to replicate data to a remote site using the Peer-to-Peer Remote Copy (PPRC) option. This feature supports the ability to keep local and remote copies of databases in sync and ready for quick switch-over should disaster occur.

PPRC V1 includes the following:

PPRC Metro Mirror (Synchronous)
a remote data-mirroring technique for z/OS and open systems servers designed to constantly maintain an up to date copy of the local application data at a remote site which is within the metropolitan area (typically up to 300 km away using DWDM). With synchronous mirroring techniques, data currency is maintained between sites, though distance can have some impact on performance. PPRC Metro Mirror is used primarily as part of a business continuance solution for protecting data against disk storage system loss or complete site failure. This 2-site data mirroring function is designed to provide a cost-effective, metropolitan distance high availability data replication and disaster recovery solution.

PPRC Global Copy (Extended Distance) is an asynchronous remote copy function for z/OS and open systems. With PPRC Global Copy, write operations complete on the primary storage system before they are received by the secondary storage system. This capability is designed to prevent primary performance from being affected by wait-time from writes on the secondary system. Therefore, the primary and secondary copies can be separated by any distance. This function is appropriate for remote data migration, offsite backups and transmission of inactive database logs at virtually unlimited distances.

Peer-to-Peer Remote Copy V2
PPRC V2 includes all of the functionality of PPRC V1 in addition to the following:

PPRC Global Mirror (Asynchronous), a 2-site remote data mirroring function of the ESS Model 800 for z/OS and open systems servers. It is designed to maintain a complete and consistent
remote mirror of data asynchronously at virtually unlimited distances with next to no application response time degradation. Separating data centers by longer distances helps to provide protection from regional outages. This asynchronous technique provides better performance at unlimited distances, by allowing the secondary site to trail in currency a few seconds behind the primary site. With PPRC Global Mirror, currency can be configured to be as little as 3 to 5 seconds with respect to host I/O. PPRC Global Mirror consistency groups can contain a mix of IBM zSeries® and open data and can be created across up to eight ESSs, allowing scalability for customer application growth. This 2-site data mirroring function is designed to provide a high-performance, cost-effective global distance data replication and disaster recovery solution.

**PPRC Metro/Global Copy (Asynchronous cascading)**

For all supported ESS servers, z/OS and open systems, PPRC Metro/Global Copy provides a disk mirroring function which combines high availability Metro Mirror with Global Copy for a long distance data replication and disaster recovery/backup solution. This function is designed to provide a 3-site, global distance data mirroring solution, with a complete and consistent copy of data at the long distance remote site. PPRC Metro/Global Copy uses synchronous PPRC to an ESS at a second site and then asynchronous PPRC Global Copy out to a remote site (see Figure 4). This configuration can also be flexibly used in a two site configuration using synchronous PPRC Metro Mirror with primary and intermediate copies within the same local ESS, and asynchronous PPRC Global Copy out to the remote site.

**Extended Remote Copy (XRC)** supports the following functions:

- **zSeries Global Mirror**, a remote data mirroring function available for the z/OS and OS/390® operating systems. It maintains a copy of the data asynchronously at a remote location over unlimited distances, and is designed to provide a premium level of throughput and data integrity regardless of the distance to the secondary site. zSeries Global Mirror is well suited for large zSeries server workloads and can be used for business continuance solutions, workload movement and data migration.

- **zSeries Metro/Global Mirror (3-site XRC and PPRC Metro Mirror)**, a mirroring capability which utilizes zSeries Global Mirror (XRC) to mirror primary site data to a location long distances away for disaster recovery and also uses PPRC Metro Mirror to mirror primary site data to a location within the metropolitan area for a high-availability implementation. This enables a 3-site high availability and disaster recovery zSeries solution for even greater protection from unplanned outages.
**TotalStorage Resiliency Automation for ESS**

The IBM TotalStorage Resiliency Family, also includes automation solutions for a number of different operating systems and application environments. Some examples for the ESS include:

**IBM GDPS® Solution for IBM @server zSeries®**

The business continuance capabilities of the IBM TotalStorage Enterprise Storage Server are further integrated with zSeries Geographically Dispersed Parallel Sysplex™ (GDPS®) environments. GDPS is one of the leading availability solutions for zSeries server installations. It is a multi-site solution designed to provide the capability to manage the storage and server remote copy configurations to help enable near transparent disaster recovery and continuous operations. The new GDPS Open LUN Management capability, exclusive to the ESS, can provide a true cross-platform disaster recovery capability across both zSeries and open-systems data.

**IBM HACMP/XD for IBM @server pSeries®**

The HACMP/XD Extended Distance is an optional feature of IBM High Availability Cluster Multi-Processing (HACMP) for AIX 5L, Version 5.1.0. It supports automatic failover of disks that are ESS PPRC pairs, and creates a powerful disaster recovery solution for ESS AIX customers. HACMP/XD automates the management of PPRC Metro Mirror in an AIX environment, minimizes recovery time after an outage, and monitors AIX clustered environments to ensure mirroring of critical data is maintained at all times.

**A comprehensive disaster recovery solution from IBM**

Although storage components are important to a coordinated disaster recovery plan, a complete solution with servers, storage, software, automation, networking and integration services is necessary. IBM TotalStorage products can help provide customers with reliable data protection, and IBM can help customers choose the components necessary to design a cost-effective solution to help address their individual requirements.
For more information
To learn more about the IBM TotalStorage ESS Advanced Copy Services, contact your IBM marketing representative or IBM Business Partner, or visit

ibm.com/totalstorage/ess.