



White Paper - ClusterReplica Enterprise, based on CDP technology, combines conventional High Availability solutions to create the next generation of business continuity software.

ClusterReplica Enterprise For Windows 2008/2003/XP/2000

XLink Technology, Inc
www.xlink.com

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Abstract

The fast advancement of internet capabilities sets the foundation on market expansion for small and medium sized businesses. While enjoying the growth in sales, the business owners must also face the reality of managing and protecting the fast increasing data, at the same time, keeping the MS SQL/web server alive 24x7.

This white paper introduces XLink Technology's **ClusterReplica ENT** software which provides solutions on real-time data protection, as well as server high availability for small to medium businesses. Challenges involve these subjects are also discussed.

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Today's Challenges on Continuous Data Protection and Server High Availability for Small-to-Medium Businesses

The automated business transactions by way of internet web in all types of business dealings brought with it the challenges on data management and MS SQL/Web server availability. To small and medium businesses, the major challenges that go along with the business globalization include:

- ***Exploding data increases difficulty in data management***

The paperless office has become the norm of today's business style. Data exchange over high-speed internet, database file processing and internal documentation updates are the major sources in this data exploding trend. This dramatic increase in amount of data amplifies difficulties in data management and data processing.

- ***Keeping MS SQL/Web server alive for global market***

The easy access to internet services made the business globalization possible for small businesses. Customer satisfaction demands 24x7 flawless server services and accurate, fast data processing. Real-time data replication and automatic cluster failover are the keys for this customer satisfaction which in turn ensures the success for the small and medium businesses in this global market competition.

- ***Prevent data loss from natural disasters and human errors***

Files of personal information and business documentations are important business assets that need protection from being damaged or lost caused by natural disasters and human errors. Ability to backup all new data at the time it is created is crucial to prevent data loss.

- ***Affordable solution on both initial cost and maintaining***

Typically to small to medium sized businesses, it is essentially important that the product or service they get for business growth is cost-effective. A good product must be easy to use and reliable. A feasible solution means low initial cost plus low maintenance cost and effort. Without an in-house IT staff, small business owners must be able to manage the product and get help when needed.

Solution: Server Clustering

The most effective solution to satisfy all conditions brought up in above section is server clustering. Server clustering binds two or more computer systems together to server a common purpose. Typically, there are data replication activities between the clustered servers and the failover capability to ensure server availability.

A Speculative Solution: server clustering software for large companies

Most of today's clustering solutions that are currently available to businesses are designed for large companies. Typically, large companies have the well defined management structures, complex product configurations and sales distribution methods. With these characteristics, large companies' needs for server clustering cannot be simplified.

Server clustering, by itself, involves intricate interaction between the clustered servers. Software products designed to create and manage the clustering tend to be complicated and difficult to use. Configuration and managing of this kind of software are typically beyond the capacity of an average small and medium sized businesses.

These products are usually very expensive to buy and require trained IT staff to configure and maintain. They typically meet the needs and budget of large companies, but are impractical for small and medium sized businesses.

The Solution: XLink ClusterReplica for small/medium businesses

ClusterReplica ENT, ***based on CDP technology, combines conventional High Availability solutions*** functions to create the next generation of business continuity software.

ClusterReplica ENT not only handles failover automatically to guarantee server 24x7 availability, it also manages real-time data replication with schemes of one-to-many and many-to-one to local and remote destinations. The data replication function is application specific that maneuvers MS SQL database files and IIS web server files according to their application requirements to ensure data accuracy. ClusterReplica ENT provides a complete data protection and server available solution of corporate standard to the small and medium businesses with simple installation and automatic

setup of data replication path lists. Business owners can now utilize the most up-to-date technology for their business growth without the burden of high overhead.

ClusterReplica ENT is capable of multiple nodes clustering for real-time replication. The scalable one-to-many and many-to-one data replication configurations provide users total control to their needs for continuous data protection. Start with two or three systems in the clustering, more systems can be added with the growth of the business. Besides the one-to-many and many-to-one data replication modeling, ClusterReplica ENT is able to replicate data from one source to multiple destinations.

When the automatic Failover feature is desired, one of the “replication stations” can be designated to act as the “failover station”. This server must have the identical system configuration of that on the Primary station. During normal operation, the Primary station will replicate all newly created or modified data to the failover station. This process will keep the data on the failover station matches that on the Primary station at all times so that a smooth failover can be accomplished. The “failover station” can be switched from one “replication station” to the next, but only one “failover station” can be defined at a time.

The Technology And Innovation

ClusterReplica ENT, based on CDP technology, combines conventional High Availability solutions to create the next generation of business continuity software. The Snapshot structure developed in house is the core technology for ClusterReplica ENT software. The point-in-time snapshots make sure modified data of different forms and tables find their way to the correct location while being replicated to the Replica Member stations. This assurance is important for database files because the inter-linkage of database forms and tables requires matching data at all times.

The conventional High Availability software keeps a single data image for a failover event without the ability to bring a successful failover should the data image on the Primary server is corrupted. Failover is thus 100% ensured successful.

XLink's Snapshot Technology supports not only Windows 2008, 2003 and XP systems, but also Windows 2000 systems. This capability allows small companies using the existing computer equipments, without having to spend money on upgrade, to enjoy the up-to-date technology of clustering and further realize server 24x7 availability.

ClusterReplica ENT Feature Highlights

ClusterReplica ENT, based on CDP technology, combines conventional High Availability solutions to create the next generation of business continuity software. Besides providing failover/failback functions for disaster recovery, ClusterReplica ENT offers centralized data management and end-user self restore of multiple versions of files during normal operation.

- **Multiple nodes clustering for continuous data protection and server availability** – ClusterReplica ENT is capable of clustering up to 8 Windows systems of Windows 2008/2003/2000/XP for real-time data replication and automatic server failover.
 - a) The co-existence of one-to-many and many-to-one models of data replication satisfy users needs for flexible system structuring in their data protection scheme. You have the total control over the number of systems to be in the clustering. Add or remove replication stations whenever is needed.
 - b) One of the replication stations can be dedicated to be the failover station and take over server's role in the event the Primary station fails. This failover station does not have to be fixed on one system. Switching to another system at the time as you see fit.

- **Automatic data replication configuration for Microsoft SQL and IIS web server files** – The automatic configuration for MS SQL database file and IIS web server file replication capability of ClusterReplica ENT allows small to medium sized businesses use the data protection and server availability solution without the help from the trained IT professionals. Define data Replication Sets of MS SQL database files and the IIS web server files using the default template included in ClusterReplica Enterprise to not only sets up the data replication paths, but also captures needed IIS web server service files to guarantee smooth web server failover.

- **Scheduled or Real-time data replication for entire VMware guest OS–**

When you are in a virtual environment, you have to look at the virtual machine and make sure that you back it up the same way you do for your physical system. It is always necessary to continuously replicate application data from multiple virtual production servers to another backup server either locally or over the WAN, for fully disaster recovery in the event of an outage.

ClusterReplica can be installed on the host OS or a guest OS of VMware server, replicating from the host OS offers the benefit of replicating all applications running on the virtual machine(e.g. Exchange server, SQL database server, IIS web server, or file server),

- **User-friendly templates for data replication configuration** – When

ClusterReplica ENT is successfully installed on the Primary Master, users are provided choices of configuration templates to setup data replication paths. If replication set is on MS SQL server or Windows IIS web server files, special templates are included to fill in the default file paths for users modify according to their needs. With the Primary master properly configured, ClusterReplica ENT will automatically replicate data to the defined replication stations as soon as the systems are alive.

- **Automatic server failover** – ClusterReplica Enterprise is capable of automatic failover.

ClusterReplica ENT utilizes the DNS server to make it possible to binding of servers in remote location and in different network segments. This feature make possible a strategic server availability plan to ensure data and server available 24x7.

The cause of failover can be:

- a) failure of a normal heartbeat detection
- b) failure of a user-defined monitored service
- c) failure of public connection due to failure of network card
- d) failure of a designated web page connection

The options of failover trigger event offer you the full control on guarantee the server availability.

ClusterReplica Enterprise Benefits

Designed for small to medium sized businesses, ClusterReplica ENT focuses its objectives on reliability, flexibility and efficiency.

- **Protect valuable business assets** – The automatic, real-time replication of SQL database files, IIS web server files and all other types of Windows files prevents file loss due to human error and natural disasters. The multi-nodes clustering of local and remote stations significantly diversifies the risk of file loss. This continuous, 24x7 data replication sets another layer for data protection to safeguard your most valuable business asset that backs an incessant business growth.
- **Open up opportunity for business globalization** – The two levels failure detection capability ensures your web server and SQL database server available 24x7. This continuous server available scheme allows you to open up your business to the global customers without restrictions on time zones and server downtime. The increased customer traffic speeds up business growth.
- **Cost-effective** – ClusterReplica ENT does not require trained IT professionals to install, configure and manage. Its user-friendly design allows small and medium businesses to use within their technology capability. Without additional burden of high initial cost and subsequent maintenance cost, small to medium businesses can afford the advantages of the high technology for their business growth.

How ClusterReplica ENT Works

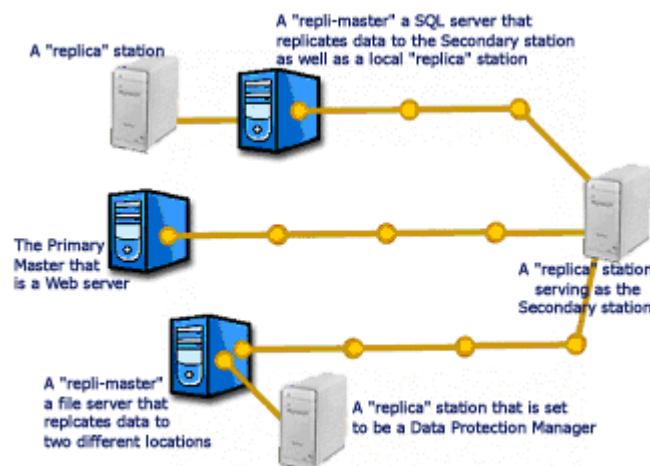
ClusterReplica ENT is a computer systems clustering software with flexibility in scaling and modeling. Not only users can decide on how many systems to be in the clustering (for 8 or less), they can also choose the data replication model of one-to-many or many-to-one or many-to-many. Starting from one or two servers, more systems can be added into the clustering without affecting the existing arrangement. This total control users have over the application configuration ensures cost-effectiveness while boosting productivity for business growth.

There are two types of servers defined in the ClusterReplica environment: the “**master**” and “**replica**”. While the “master” is a server that contains the data replication source, the “replica” is the one used as data replication destination.

Some terminologies involved using ClusterReplica ENT are introduced here.

1. **The Primary master** – this is a data replication source server that is also the manager of the configuration of the entire clustering structure. It defines other data replication source servers and the replication destination servers. It is the only server that can be failed over to a Secondary station for server-availability needs.
2. **The repli-master** – this is a data replication source server that needs to backup some of the data files on it to other servers in local or remote locations.
3. **The replica** – this is a data replication destination server. It takes in data from the master servers and manages the data in MS DPM style for easy data distribution and recovery.
4. **The Secondary station** – this is a **replica station** that besides function as the data replication destination, is also defined as the Secondary station which is ready to take over the server services of the Primary masters should it fails at any time. There can be only one Secondary station defined in a ClusterReplica environment. For a smooth failover, this system is expected to have the similar system capacity of the **Primary master** and with identical application and file structure.

The picture below illustrates the basic structure and general functions of the servers bind in the ClusterReplica clustering.



In this example, there are three “master” stations: one Primary master, two repli-master(s) and three “replica” stations. One of them is set as the Secondary station for failover/failback purposes. The “replica” stations receive and manage new data in the manner of Microsoft’s DPM system when user so configures, so that multiple versions of replicated data can be saved and end user self-service file restore is possible.

With this arrangement, server 24x7 availability is guaranteed and user files are protected and maintained for self-restore:

- a) In normal condition, the three “master” stations copy changed data to the “replica” stations in real time.
- b) When the Primary master fails, the Secondary station takes up the active server role to continue serving the network clients
- c) If working files on the master stations are corrupted or lost, a previous version of the file can be retrieved from the “replica” stations.

Examples On Using ClusterReplica ENT

ClusterReplica ENT is a computer systems clustering software with flexibility in scaling and modeling. Not only users can decide on how many systems to be in the clustering (for 8 or less), they can also choose the data replication model of one-to-many or many-to-one or many-to-many. More systems can be added into the clustering without affecting the existing arrangement. Some examples are created below to show how the arrangements of the replication stations using ClusterReplica ENT.

Example One: SQL/IIS web server data replication and failover

Highlight: a small auto part shop needs to backup database and web server files to off site location and keep the web server running 24x7

Tom and Kay are partners of a successful auto parts distribution business: ABC Auto Parts. They use a Windows 2003 server to run SQL database for keeping customers’ and products’ information. This Windows 2003 server also hosts their web site for online advertising and sales.

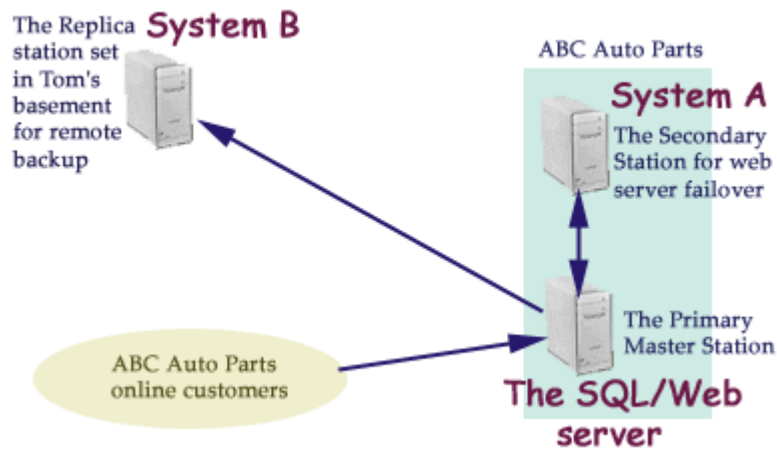
With the online business going global and sales growing exponentially, they decided that it is important to keep the web server up 24x7. They learned that server failover is the way to go. Along the way, they also learned that it is equally important to prevent the loss of customer and products information stored on the computers. So, they set out to find a data protection and failover product.

They found Xlink's ClusterReplica ENT. From reading the online documentation, they learned that ClusterReplica ENT could replicate data to multiple systems in different locations whenever a new piece of data is entered into the computer. It can also carry out automatic failover of both SQL database and IIS web server services. The cost for the software is within their budget range. Xlink's ClusterReplica ENT is what Tom and Kay looking for.

They bought Xlink's ClusterReplica software and bought two additional Windows systems, one Windows 2003 server and one Windows XP professional for the arrangement. The Windows 2003 server is used as the Secondary station for failover. It is to be placed in the shop to be ready to take over the server functions. The Windows XP system is to be used as a remote backup set in Tom's house in the basement. Tom's house is about 30 miles away from ABC Auto Parts.

Downloaded the software from Xlink's web site, Tom and Kay installed the software by themselves in following steps:

1. Install ClusterReplica ENT on the Windows 2003 system currently running in the store and set it as the Primary station.
2. The newly purchased Windows 2003 server is labeled as system A, and the Windows XP system B. On both systems, the MS SQL server 2005 and IIS web server are installed and configured.
3. ClusterReplica ENT is then installed on both systems as Replica Member stations. Tome takes system B to his house and set it up in the basement, and leaves system A in the store.
4. From the Primary station, Kay first defines system A as the Secondary station, and then defines system B to be a remote Replica Member for real-time data replication.



With this setting:

1. Whenever there is a piece of new data entered into the Primary station, it is immediately replicated to system A and system B. This process protects data from accidental deletion and data corruption.
2. Should there is a fire or flood or power off in the store, system A, sitting in the basement of Tom's house, will take over the server role to keep the IIS web server on for network client connection.
3. System A will keep in sync with the Primary station at all times of the applications and data files. So, if a file is removed from the Primary station, it will also be removed on system A.
4. System B, on the other hand, does not work the same way. It keeps all file received but never remove any of them. Older records of customers and parts can be found here.

Tom and Kay got it all setup in one afternoon. The cost of the new system is also within their expectations. From now on, they will not worry about losing customers due to natural disasters or human errors.

Example Two: Real-time data replication plus DPM functions

Highlight: A software development company needs real-time data backup of multiple versions for roll back. The individual programmers self-managing of their working files are also required.

The **XYZ Corporation** is a software development company which sells its products through OEM channels as well as online retail. They keep a web server in the office for the web site hosting. There are also some file servers for programmers to keep their working files. Because the software development source files are the most valuable assets to the company, they take file backup seriously. Allowing each programmer to self-manage their own working files and go back to a previous version at the time needed is also important.

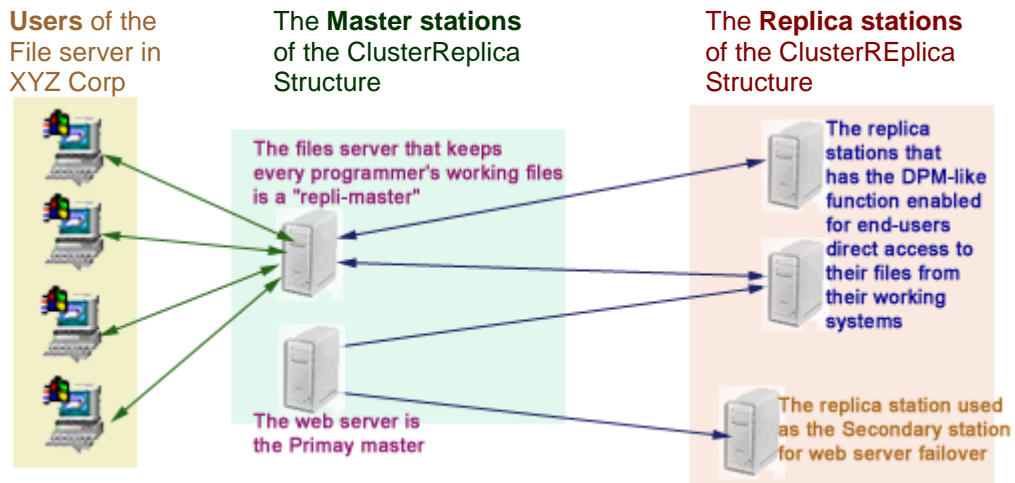
In their research for the data protection product, they found Xlink ClusterReplica ENT to be most compatible to their requirements.

The key points that are needed by the XYZ Corporation are as following:

- **Real-time data replication and IIS web server auto-configuration for data replication** – Modified portion of a file are replicated to a defined target location in real time with multiple version options. The predefined Replication Set template for IIS web server with configuration options support auto-configuration of the IIS web server web site structure to ensure accurate data replication.
- **The automatic failover with technology backed guarantee** – The conventional High Availability software keeps a single data image for a failover event without the ability to bring a successful failover should the data image on the Primary server is corrupted. ClusterReplica ENT keeps up to 64 versions of data image so that if the current data image is corrupted, it will look into the previous versions until a good data image is found. Failover is thus 100% ensured successful.

With strict technical analysis and careful consideration, the **XYZ Corporation** decides to use Xlink's ClusterReplica ENT for their data protection and server availability environment. Their system configuration is presented in following picture.

Three additional Windows systems are purchased to be used as the Replica Members in the ClusterReplica Structure. The original web server is configured as the Primary Master station. The original files servers that keep all working files are set as the Repli-Master stations. They are the source of data replication.



In this cluster environment, the Primary master is the host of the company's web server which is also connected to a "replica" in a remote site for automatic failover. This arrangement guarantees the web server 24x7 available to public connection.

The four file servers in the office are set as the Repli-masters. They are connected to different "replica" stations on the remote site for real-time data replications purposes.

Summary

The ClusterReplica ENT is an enterprise solution of Continuous Data Protection and server high availability for small to medium businesses. Designed to be run on Windows 2008/2003/XP/2000 systems, ClusterReplica ENT creates a flexible environment for business owners who need the web server online 24x7 at the same time the data protection plan for the products and customers database. XLink places high quality, low cost and easy to use as the top priorities for product design strategy.