S.O.S. Standby Server

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Technical White Paper

S.O.S. Standby Server is a high availability solution that provides automatic fail-over capability for Microsoft NT/2000 file servers. In the event of main server failure, the standby server can take over file serving functions for the main server, allowing users to continue working uninterrupted until the main server is repaired.

The standby server maintains an up-to-the-minute mirror of data on the main server. Whenever a change is made to data on the main server, that change is replicated to the standby server. The rsync algorithm is used to copy only differences in files, thus bandwidth is inconsequential after the initial data sync. Rsync is the Internet-standard protocol for reliable cross-platform replication and mirroring.

S.O.S. Standby Server uses several innovations that positions it an evolutionary step ahead of competing standby server solutions. For example, S.O.S. Standby Server is a '*software only*' solution. No special hardware is required, nor is identical hardware necessary. S.O.S. can be installed on practically any PC. No special connection is required between the main server and the standby server. The standby server is simply connected to the network as any other server or workstation.

An additional advantage of the S.O.S Solution is that it performs a series of tests to determine if the main server is functioning. Many of the competing solutions merely ping the main server to determine if it is up. This is not a reliable check, as it is possible for an NT server to be sitting with the 'blue screen of death', unable to serve files; yet still have its IP address alive on the network card. Therefore, S.O.S. not only does a TCP ping of the main server, but it also tests that it can receive files from the main server via the SMB protocol.

The engineers at SSI have also managed to overcome an obstacle that has traditionally plagued fail-over systems. That is the problem of IP address conflict. When a standby server goes into fail-over mode and takes over the IP address of the main server, if the IP is still alive on the main server, there can be an IP address conflict, which prevents users from reliably getting to their data on the standby server.

S.O.S doesn't have this problem. When the S.O.S Standby Server goes into fail-over mode it sends a unique ARP broadcast to all switches and PCs on the network that changes their ARP tables such that the MAC address of the standby server corresponds to the IP address held by the main server. This accomplishes two purposes: First, network traffic is effectively and *immediately* redirected from the primary server to the standby server, and second, there is no IP address conflict. Even though there are actually two identical IP addresses alive on the network, no devices on the network can 'see' the main server IP, because their ARP tables have been adjusted to point to the standby server.

The aforementioned immediate redirection is another breakthrough of this approach. Traditionally, workstations might require a minute or so to re-establish their connection to a standby server, or in some cases require a re-boot to establish a connection. With immediate ARP redirection this is no longer a problem and users immediately have a connection to the standby server. This is another pioneering advantage that the competition has been unable to achieve.

Simplicity is another attractive feature. In the past, fail-over systems have been notoriously complicated to set up and required software (and sometimes hardware) installed on both the standby and the main server. Not so with S.O.S. Installation and setup can be accomplished in a matter of minutes. Nothing has to be installed on the main server – no hardware, no software.

The S.O.S. software package is installed on the standby server. The installation is as simple as typing 'install' and pressing enter. Sixty seconds later the install is finished. An icon is created on the desktop. Launch the GUI interface and type in the name and IP address of the main server, enter a username and password, click 'Refresh' and the available shares on that server are listed in the 'Available Shares' window. Select which shares you want mirrored, click 'Save Configuration' and then click 'Start Sync'. That's all there is to it.

The initial data sync will copy all the data designated to be mirrored to the standby server. The transfer takes place via the local area network. After that first sync, only differences in files are transmitted, thus network bandwidth usage is insignificant.

When the standby server goes into fail-over mode, it emails the administrator advising them that the network is running on the standby server. After the main server is repaired, restoring the network to its original configuration is quick and easy: Click on 'Recover IP', boot up the main server, and then click on 'Restore Files'. This reverts the standby server back to its original IP address and then sends the new data back to the main server. Data that was modified while the standby server was functioning as the file server is sent back to the main server, so that it will then have the most recent data. Again, only the changes in files are sent over the network. A check is also made to automatically insure that the no newer files are overwritten, so that there is no chance of accidentally overwriting new data with older data. Then just click on "Start Sync' and you are again operating off the main server with S.O.S. running as standby.

The auto fail-over mode is optional. It can be set for manual fail-over. With manual fail-over, the data is mirrored and constant checking is done to make sure the main server is up. If the main goes down, an email is sent to the administrator, but the standby server
Doesn't take over automatically. This way the network administrator can make the determination if it is desirable and necessary to operate on standby, and if he so decides, he can simply click on 'Force Actions' and have the standby server take over. The manual function is a handy feature and can be used to facilitate scheduled maintenance of a main server without interrupting the work of end-users.

In addition to dynamic continual mirroring of data, S.O.S also does data archiving. In many instances it is desirable to have an older copy of data. For example, when a user deletes a file and then decides later he wants that file. Another case is when a database file becomes damaged

beyond repair. In events such as these an archived copy of data from the day or week before can be invaluable.

The data archiving features of S.OS. provide this very useful capability. Any single file, directory, or set of directories can be set to archive at any interval that the administrator wishes to select. A typical setup would be to constantly mirror all server shares, and also archive those shares daily and /or weekly, as well as archiving all database files daily to seven different locations, so that one could go back to any day of the week if desired. The benefits of both constant up-to-the-minute mirroring, along with archiving provide an unparalleled level of data protection.

The Enterprise Edition of S.O.S Standby Server allows for off-site data backup via the Internet. Any broadband (cable or DSL) connection is sufficient. It will even work with a dial-up connection. The Enterprise solution consists of an on-site standby server that mirrors the main server, with an off-site standby server mirroring the on-site standby server. The off-site standby server connects to the on-site standby server and replicates its data via the Internet. For the initial data sync, the off-site server may be located on-site and connected to the on-site standby server via the local area network. Once it has received all the data, it can be moved offsite where it then only needs to receive changes in files. Internet bandwidth is insignificant since only changes in files are transmitted in compressed form. Thus, many gigabytes of data can be successfully kept in sync, without impacting Internet traffic.

A major plus with the S.O.S. backup solution, is that it is not necessary to buy another copy of Microsoft Windows 2000 Server and client licenses, which reduces the dollar cost of the implementation by a factor of thousands. This is possible because the standby server runs on Linux.

Linux is a mature, stable, Unix type of operating system that makes an ideal server platform. Dependability, security, scalability and power have made Linux the fastest growing server operating system in today's ‘On Demand’ world. That’s why IBM is now shipping its servers with Linux pre-installed. For more information on the stability and industry recognition of Linux, see IBM’s web site at:

http://www-1.ibm.com/linux/

For technical test and study results on Linux performance and reliability in comparison to Microsoft Windows, see:

http://www.spotswood-computer.net/present/linuxvswindows.html

Linux is available with S.O.S Standby Server at no extra cost. This not only reduces the software cost, but also the hardware cost, as Linux performs very well on even older lower end hardware. Consequently the standby server can often be run on a less expensive PC. Often a ‘retired’ file server or workstation works perfectly as a standby server. This fact, along with the low competitive price of S.O.S., makes it possible for a vendor to implement the S.O.S solution for about eight thousand dollars less than with competing products than run on a Microsoft platform.

Knowledge or previous experience with Linux is not required to install and run S.O.S Standby Server. Insert the Linux install CD, reboot, and then follow the simple on screen instructions. If you can install Windows 95 or 98, you have the expertise to install Linux. Linux configuration (setting up directories and shares to hold data, etc) is handled automatically by the S.O.S software.

Recently Version 2.1 has been released. Enhancements over Version 1.0 are as follows:

1. No software is necessary on the main server.
2. Install and configuration is much easier and simpler, taking only minutes.
3. 'Available Shares' window on gui interface lists shares from main server
4. Major portions of code rewritten in C, allowing for faster execution and increased stability.
5. Reverting to original configuration after fail-over is much simpler. Sending new data back to main server is just the click of a button.
6. Proprietary network redirection incorporated to work seamlessly in a switched environment.
7. A revolutionary solution to resolve potential IP address conflicts is implemented in fail-over mode, resulting in 100 % success in fail-over
8. There is now no processor overhead on the main server. Only the resources of the standby server are used.
9. A unique solution for ARP broadcast is used to cause workstations and switches to immediately direct all traffic to the standby server in fail-over mode - thus connection of workstations to data shares is completely uninterrupted in the event of main server failure.
10. The email notification feature now works reliably.

The retail price of S.O.S Standby Server is thousands of dollars less than any competing standby solutions. In fact, it can be implemented for no more than the cost of a standard tape backup system. When you consider the problems associated with tape backup, such as its vulnerability to human error, its need for constant human intervention and maintenance, and the fragile nature of tape media itself, the choice of a standby server becomes very attractive. The option of being able to select a high availability solution that runs automatically, and provides immediate access to backed up data that can allow users to continue working uninterrupted while repairs are done, provides a level of data protection that is unprecedented.