

CENTRALIZED BACKUP SYSTEM AND BACKUP METHOD FOR AN HOMOGENEOUS REAL-TIME SYSTEM AT DIFFERENT LOCATIONS

Field of the present invention

The present invention relates to a banking system, more particularly, to a system for centralized backup of non-local homogeneous real-time systems in the banking system.

Background

Real-time systems are generally used in the banking industry. Backing up the real-time system is essential due to the particularity of the banking industry. Currently, low cost backup solutions of real-time systems are mostly limited in one computer room, due to the data reproduction between the primary and backup system.

A commonly used solution these days is to place each of the systems having the real-time systems with the same structure at different locations. Each of the real-time systems has its own backup system, and there are no connections between backup systems. When a primary system encounters failure, its backup system can be started to replace the primary system and process the transactions. Considering the system architecture, the original primary system needs to be completely separated from the network, and the backup system will be connected to the network after completely inheriting all the parameters of the primary system, without affecting other systems outside this system.

However, it costs too much to build such a system and needs much effort to maintain the system, decreasing the input-output ratio of the backup system. Moreover, since every operator at each location is not always well-trained, accident tends to happen during the switching between the primary system and backup system. Therefore, there is a need for a backup system that can be centralized deployed and managed and can support all the locations.

Summary of the Invention

A technical problem to be solved by the present system is to provide a low-cost, high-availability backup solution for a real-time system.

For the forgoing purpose, the present invention provides a centralized backup system for non-local homogeneous real-time systems, characterized by comprising a switch, and a host and a firewall connected with the switch; the host comprising a server, an optic fiber switch and a disk array, wherein the server controls the reproduction of the data of the non-local systems, ensures the synchronization between the reproduced data and the parent data in the non-local systems, and replaces the application function of a non-local system when the non-local system encounters failure; the disk array stores the reproduced data.

The present invention also provides a centralized backup method for non-local homogeneous real-time systems, characterized by comprising a switching step when a non-local system encounters failure and a restoring step when the failure is eliminated, wherein the switching step comprises: disconnecting the network of the non-local system; switching an application and the network; and starting a centralized backup system; the restoring step comprises: restoring the network of the non-local system; switching to restore the application and the network; and starting the non-local system, wherein the centralized backup system comprises a switch, and a host and a firewall connected with the switch, the host

comprising a server, an optic fiber switch and a disk array; wherein the functions of the server comprising: controlling the reproduction of the data of the non-local systems, ensuring the synchronization between the reproduced data and the parent data in the non-local systems, and replacing the function of applications of a non-local system when the non-local system encounters failure; the disk array stores the reproduced data; and the firewall performs network switching when switching from the non-local system to the backup system, and wherein the server comprises a plurality of logic servers, each having its own databases on the disk array, and the logic servers include a data reproduction server and an application server.

The present invention also provides a non-local homogeneous real-time system, characterized by comprising a centralized backup system, a plurality of non-local systems, and a network, wherein the centralized backup system comprises a switch, and a host and a firewall connected with the switch, the host comprising a server, an optic fiber switch and a disk array, wherein the server controls the reproduction of the data of the non-local systems, ensures the synchronization between the reproduced data and the parent data in the non-local systems, and replaces the function of applications of a non-local system when the non-local system encounters failure; the disk array stores the reproduced data; the firewall performs network switching when switching from the non-local system to the backup system; the centralized backup system is connected to the network through the firewall; and the plurality of the non-local system are connected to the network.

The present invention ensures the reliability of the non-local systems and is able to allocate resources flexibly to meet the requirement of the tasks of system in each location different greatly with each other by centralized deployment and centralized management of backup systems in all locations.

Brief Description of the Drawings

The present invention will be described in more details in conjunction with the following embodiments and drawings.

Fig. 1 illustrates the structure of existing primary and backup systems.

Fig. 2 illustrates the structure of primary and backup systems according to the present invention.

Fig. 3 illustrates a detailed architecture of the backup system according to the present invention.

Fig. 4 illustrates the structure of the host in Fig. 3.

Fig. 5 illustrates the workflow of the backup system according to the present invention.

Detailed description

As shown in Fig. 2, non-local systems A-F are real-time processing systems with the same architecture which are placed at different locations, and share one “centralized backup system”. The backup system is connected to each of the non-local systems by the wide area network for data reproduction. As used herein, the term “homogeneous” refers to the non-local systems having the same architecture, including operating system, database, and application software.

When a system in the systems A-F encounters failure, an administrator only needs to disconnect the connection between the system and the network, and then an administrator of the backup system starts the backup system to take over the failed system to process the transaction.

Fig. 3 illustrates “a centralized backup system”, comprising a host 301, a switch 302, an encryptor 303, a PC monitor 304 and a firewall 305. These devices are in the same local area network environment and are connected by solid lines. The core device associated with the applications is one host for replacing the non-local system. The core device associated with the network is the firewall, mainly used for network switching when

switching from the non-local system to the host backup system. The switch is a basic network device for network data communication. The PC monitor may be used for monitoring each of the hosts of the backup system. The encryptor is a device common used in financial transactions.

When the non-local systems run properly, the non-local systems and other systems in the “network” perform data communication, and perform data reproduction with the backup system at the same time. The dashed lines in Fig. 3 show connectable state between the “centralized backup system” and the other systems in the real-time system.

When a non-local system falls in a failed state, the administrator of the non-local system disconnects the connection between the system and the network, and the administrator of the backup system starts the switching. After the backup system is switched and started, for the other systems in the “network”, the failed “non-local system” runs properly again, and thus the goal to replace the non-local system with the backup system is achieved.

After the failure of the non-local system is eliminated, the network and applications will be restored from the backup system to the non-local system and the initial state is reached.

The “centralized backup system” needs to experience a switching process from the moment the non-local system runs properly to the moment the non-local system encounters failure, wherein the switching of applications and the switching of the network are two key points. Firstly, reference is made to Fig. 4, which shows the host in Fig. 3 in detail. It can be seen that the host system consists of a server, an optic fiber switch, and a disk array. The server is divided into three logic servers by using the Dynamic Logic Partitioning technology, with each of the logic servers having its own databases on the disk array as following:

data reproduction server, administrating the data reproduction of the non-local systems and keeping the reproduced data and the respective parent data in synchronization;

application server 1, served as backup system 1;

application server 2, served as backup system 2.

When the application switching is performed, a reproduction of the data of the failed non-local system is imported from the data reproduction server into the application server 1, and then application 1 is started.

When the network switching is performed, on the firewall in Fig. 3, the IP address of the application server 1 is mapped outwards (i.e., to the “network”) as the IP address of the failed non-local system, and thus the replacement is completed on the network.

Server can be designed to include a plurality of application servers in order to achieve simultaneous switching of a plurality of non-local systems.

The workflow of switching and restoring is shown in Fig. 5. Under the operation with the workflow of Fig. 5, the operations of the switching are mainly performed by the administrator of the backup system, while the operations of the administrator of the non-local system are easy, thus reducing the cost of training and management.

The implementation of the present invention verifies that the effect of the present invention meets our expectation. Firstly, the data reproduction between the non-local and backup systems will hardly influence the reliability of the non-local system after being optimized. Secondly, the backup system after the switching is able to achieve the peak of the transaction processing capability of the non-local system. Finally, the backup system is able to allocate resources flexibly to meet the requirement of the tasks of system in each location different greatly with each other by the function of dynamically allocating resources.

CLAIMS

1. A centralized backup system for non-local homogeneous real-time systems, characterized by comprising a switch, and a host and a firewall connected with the switch; the host comprising a server, an optic fiber switch and a disk array, wherein
the server is used for controlling the reproduction of the data of the non-local systems, ensures the synchronization between the reproduced data and the parent data in the non-local systems, and replaces a non-local system when the non-local system encounters failure;
the disk array stores the reproduced data; and
the firewall performs network switching when switching from the non-local system to the backup system.
2. The centralized backup system for non-local homogeneous real-time systems of claim 1, wherein the server comprises a plurality of logic servers, each having its own databases on the disk array.
3. The centralized backup system for non-local homogeneous real-time systems of claim 2, wherein the logic server includes a data reproduction server and an application server.
4. The centralized backup system for non-local homogeneous real-time systems of claim 1, further comprising an encryptor.
5. The centralized backup system for non-local homogeneous real-time systems of claim 1, further comprising a PC monitor.
6. A centralized backup method for non-local homogeneous real-time systems, characterized by comprising a switching step when a non-local system encounters failure and a restoring step when the failure is eliminated, wherein
the switching step comprises: disconnecting the network of the non-local system; switching application and the network; and starting a centralized backup system;
the restoring step comprises: restoring the network of the non-local

system; switching to restore the application and the network; and starting the non-local system, wherein

the centralized backup system comprises a switch, and a host and a firewall connected with the switch, the host comprising a server, an optic fiber switch and a disk array; wherein the server is used for controlling the reproduction of the data of the non-local systems and ensures the synchronization between the reproduced data and the parent data in the non-local systems, and replaces a non-local system when the non-local system encounters failure; the disk array stores the reproduced data; and the firewall performs network switching when switching from the non-local system to the backup system, and wherein the server comprises a plurality of logic servers, each having its own databases on the disk array, and the logic servers include a data reproduction server and an application server.

7. The centralized backup method for non-local homogeneous real-time systems of claim 6, wherein the step of switching the application and network comprises:

importing the reproduction of the data of the failed non-local system to the application server from the data reproduction server; starting the application server; and on the firewall, mapping the IP address of the application server as the IP address of the non-local system to the network.

8. A non-local homogeneous real-time system, characterized by comprising a centralized backup system, a plurality of non-local systems, and a network, wherein

the centralized backup system comprises a switch, and a host and a firewall connected with the switch, the host comprising a server, an optic fiber switch and a disk array, wherein the server controls the reproduction of the data of the non-local systems, ensures the synchronization between the reproduced data and the parent data in the non-local systems, and replaces a non-local system when the non-local system encounters failure; the disk array stores the reproduced data;

the firewall is used for network switching when switching from the non-local system to the backup system;

the centralized backup system is connected to the network through the firewall; and

the plurality of the non-local system are connected to the network.

9. The non-local homogeneous real-time system of claim 8, wherein the server comprises a plurality of logic servers, each having its own databases on the disk array.
10. The non-local homogeneous real-time system of claim 9, wherein the logic server includes a data reproduction server and an application server.