A Brief Analysis of the Disaster Recovery Backup Technology in Oracle Database DataGuard

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Abstract: This paper has discussed the data to accommodate the disaster backup the concept as well as the DataGuard outline.From DataGuard key technologies , principle of work and so on, it analyzed the Oracle DataGuard disaster recovery technology with high reliability and high security.

key words: Database; DataGuard; Backup Oracle

I.   INTRODUCTION

As we all know, the data is very valuable corporate asset, the data is very important for enterprises, especially highly dependent on the data of enterprises is very important. The data backup is more important than all, and we need to know that almost any computer data backup system is absolutely essential component of unexpected power failure, system or server crashes, user errors, disk damage and even catastrophic loss of data center may caused the damage or loss of database files, and these documents often contain valuable data, not by any loss. "9.11" incident of data resulting from the World Trade Center disaster revealed the deeper truth. Before the disaster, about 250 companies working in the World Trade Center, one year after the accident, return to the World Trade Center into a 150 companies. 200 companies since the destruction of important information systems, critical data loss and permanent closure, disappeared. But also in the World Trade Center's financial giant Morgan Stanley in a few hours after the incident, the Department announced the world's business as usual in the second day of work, reason is that the company set up remote data backup and disaster recovery system, enables the company important data can be saved. From this we can see a modern enterprise for the Information Age, when disaster comes, doing disaster backup is essential.

II.   DATA DISASTER RECOVERY

Disaster Recovery in different places through the establishment and maintenance of a backup storage system uses geographic separation to ensure system and data on the resilience of catastrophic events. Disaster disaster recovery system according to the degree of resistance can be divided into data disaster recovery and disaster recovery applications. [1] data off-site disaster recovery is a data system that can be critical applications on the local system of real-time data replication, when there is a disaster, the remote system can be quickly replaced the local system and to ensure business continuity. Application disaster recovery data disaster recovery at a higher level than that in other places to establish a complete system with substantial local data backup applications, the disaster occurs, the remote application system will quickly take over or assume the business of local applications to run.

III.   DATAGUARD OUTLINE

DataGuard the most original version is implemented in Oracle 7, then known as the Standby Database, but this version has an automatic transmission log file can not be achieved, but the need to hand-write a script or program to achieve the transfer archived logs have not been widely used. After Oracle 8i improved, DataGuard technology really a lot of use, is the Oracle 9i database, and it is now through the Oracle 9i R2, Oracle 10g version of the DataGuard technology to improve and strengthen already close to perfect, not only to achieve real-time backup of physical standby database query , but also to support the physical standby database to read and write operations, but also to achieve high-speed backup and recovery and other advanced features.

In many disaster recovery solutions, DataGuard Technology is a powerhouse among. DataGuard is built on the Oracle database, a functional module is the management, monitoring, automation software infrastructure that create, maintain and monitor one or more standby databases to protect enterprise data structure without failure, disaster, error, and the collapse of impact. DataGuard standby database to maintain the production database with a copy of the same issues, these standby databases may be located thousands of miles away from the production data center for remote disaster recovery site, it may be in the same city, same school and even the same building. When the production database or unexpected interruption due to planned interruptions become unavailable, Data-Guard can switch any standby database to the production role, thus interrupt-related downtime and minimize and prevent any data loss.

IV.   DATAGUARD KEY TECHNOLOGIES

If you want to use DataGuard Oracle database technology to achieve a reliable disaster recovery, Oracle database on the need for some of the important concepts

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related to technology and a more clear awareness.

A. redo mechanism (Redo)

Oracle database redo mechanism is to prevent data errors and to achieve disaster recovery foundation. Redo mechanism implementation is divided into non-archive mode and archive mode. Non-archive mode, the database only from non-normal shutdown, power failure and other errors common stock to recover data; in archive mode, the data inventory allows time-based recovery, recovery, based on changes in all cases to restore lost data to achieve the eating "regret it later" effect.

B. The online redo log (Online Redo Log)

Both in non-archive mode or in archive mode, online redo logs are to be there. It records all the way circulation database changes. It is at least two online redo log file group composition. DataGuard standby database in there another type of online redo logs, known as the Standby Redo Log, is mainly used for data synchronization.

C. archived redo log (Ar chive Redo Log)

Only systems running in archive mode, archived redo log files will be generated. When online redo log switch to the next online redo log group, the system would generate a redo log an offline copy of the file, this file is an archived redo log. Archived redo log is to achieve "regret it later," one of the necessary conditions, if you want to completely restore the database, but also a full backup of the database, Oracle 10g's FlashBack technology to achieve the purpose of data rollback.

D. database backup of the database used

Oracle database backup into: logical backup, which means using IMP tool to export a backup, but will lose some of that back up the physical structure, such as indexes, views, etc.; the other is the physical backup, it is used, such as RMAN, OS Copy production data such as inventory tools lossless backup, the establishment of such a physical backup is to be used in Data-Guard technology. DataGuard to achieve disaster recovery and backup, through the physical standby database and logical standby database to achieve, if the production database fails, it can be physical or logical standby database to switch to the production database; If, to the production database, hardware upgrades, on the need to switch the current production database physical or logical standby database.

E. DataGuard protection mode

Oracle DataGuard to provide three high-level modes of data protection to Pingheng cost, availability, performance and transaction protection. [2]

(1) Maximize Protection (maximum protection): refers to the master database provides the highest level of data protection, ensuring a comprehensive zero-data loss disaster recovery solutions. When the maximum protection mode, the redo log records written by the synchronization process to transfer from the primary database to the standby database, and transaction data until confirmed at least one backup server disk is available, submit only the main database affairs. This model must be configured at least two standby databases, thus providing double fault protection. When the last participating standby database is unavailable, the master database processing will stop. This ensures that all the standby database when it lost contact, it will not lose services; but if the network is not smooth, it will cause LGWR can not transmit data, will cause serious performance problems.

(2)Maximize Performance (maximum performance): is the default protection mode, compared with the highest availability, provides slightly less protection of the primary database data, but provides higher performance. In this mode, when the master database processing transactions, redo data from the log write process and the asynchronous transfer to a standby database. In any case, are first to complete the write operation on the primary database, submitted to the primary database backup operation does not wait for the database to confirm reception. If the goal of any standby database becomes unavailable, then the process will continue in the main database, which only a small impact on the performance or no effect. When the primary database availability and performance than the risk of losing a small amount of data is more important, you should use the highest performance mode

(3) Maximize Availabilit (maximum availability): also known as no data loss mode, which allows data differences, allows asynchronous transmission. Normally run in maximum protection mode, the primary database and standby database disconnect or connect the network abnormal, it will automatically switch to maximum performance mode, the primary database operations can still continue. In the case of poor network performance has a greater impact.

If the realization of DataGuard technology disaster recovery and backup, the above technology is essential, business-related managers must master.

V. WORK PRINCIPLES OF DATAGUARD

A. DataGuard process structure

In the main database, Oracle DataGuard using the log writer (LGWR) or archive process (ARCH) to collect transaction redo data and its transfer to the standby database; use for archive log process (FAL) provides a client-server mechanism for the primary database and standby database communications between the interruption, he will send archive logs to the standby database to automatically fill and re-sync interval. [3]

The standby database, Oracle DataGuard Remote file server (RFS) process receives redo records from the primary database; use and management of the recovery process (MRP) will be applied to physical standby redo information in the database; using logical standby process will be through the SQL conversion redo information applied to the database.

B. The working principle of the physical standby databases

If the production database is running in the Maximize Protection mode, then the LGWR process on it

very frequently not only to the changes in the redo logs written to online redo log at the same time, it will be through the physical standby database, the RFS process writes standby redo log. Then, if the production database redo log switch occurs logs, archived redo logs generated, it also triggers the physical standby database, standby redo logs on the log switch occurs and archived redo logs generated, if the physical standby time database recovery mode is set to manage, then the physical standby database using the MRP process will simultaneously generate archive logs to restore them to the database in order to complete the database on the health of non-real-time backup of data loss. However, in this mode, each data change is always submitted to two databases at the same time, the physical standby database, so if there is any failure, the production has a huge database, such as physical standby database crashes, the database will be generated At the same time hang.

If the production database is running in the Maximize Performance mode, DataGuard's default, the production database will occur in the online redo log archive log and generate a log switch at the same time, the data passed by the ARCH process to a physical standby database, and through its on RFS process directly generates archived redo logs, eventually, MRP process will archive the log back to the physical standby database, thus completing the data backup. Can be seen, this model, the physical standby database is not synchronized with the production database, even in normal circumstances, there will still be a gap between the current online redo log, so this way the loss of data backup will occur . [4]

If the production database is running in the Maximize Availability mode, then the database under normal circumstances, work and Maximize Protection mode is the same, but if the physical standby database fails, then the production database will automatically switch to Maximize Performance Mode.

Suggest that if only one physical standby database, run by the third best; if there are more servers, it can also add a third by the first operating mode, so that the maximum availability of the data protection .

C. The working principle of logical standby databases

DataGuard standby database if the deployment is logical, then the production database can only work Maximize Performance and Maximize Availability in two modes, and the logical standby database does not support this standby redo log structure, therefore, will appear this way the loss of data .

When the production database running in Maximize Availability mode, the LGWR process on the logical standby database connected to the RFS process, and ways to synchronize the data in the redo log buffer is written to the logical standby database archived redo log. When the production database online redo log switch occurs, you will also trigger the logical standby database archive log switch, then LSP process (using Logmnr technology) to resolve these archive logs to restore to the SQL statement and the logical standby database, the complete the backup job. Although the logical standby database as the physical

standby database can not be achieved without loss of data as a backup, but it can achieve asynchronous search function, so it can share some of the production database query task.

Logical standby database Maximize Performance model and the physical standby database model similar to Maximize Performance.

VI. CONCLUSION

Oracle DataGuard technology has the advantage of disaster recovery, very clear, it has good reliability, high security, very little impact on performance. When the database machine fails, only a few minutes to run the database as usual, the data loss rate is almost zero. The practicality of this disaster recovery method development to determine its future prospects are very broad.

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