COST EFFECTIVE FAILOVER CLUSTERING

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Abstract

Every company or organization has to use a database for storing information. But what if this database fails? So it behooves the company to use another database for backup purpose. This is called as failover clustering. For making this clustering manageable and lucid the corporat people spend more money on buying a licensed copy for both, the core database and the redundant database. This overhead can be avoided using a database with non-similar platform in which one database is licensed and other may be freeware. If platforms are similar then the transactions between those databases become simpler. But it won't be the case with non-similar platforms. Hence to overcome this problem in both cases cost effective failover clustering is proposed. For designing such system a common interfacing technique between two non-similar database platforms has to be developed. This will make provision for using any two database platforms for failover clustering.

Keywords: *CEFC (Cost Effective Failover Clustering), DAL (Data Access Layer), DB (Database), HA (High Availability)*

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1. INTRODUCTION

In a High Availability Cluster or Failover Clustering environment the proposed system will allow the user to use multiple types of Database Management System for whole cluster. This service will make a provision for organizations which depend on database cluster to deploy a Database Management System Independent Failover Cluster.

In a failover cluster, there are two computers (or occasionally several computers). One (Primary) provides the service in normal situations. A second (failover) computer is present in order to run the service when the primary system fails. The primary system is monitored, with active checks every few seconds to ensure that the primary system is operating correctly. The system performing the monitoring may be either the failover computer or an independent system (called the cluster controller). In the event of the active system failing, or failure of components associated with the active system such as network hardware, the monitoring system will detect the failure and the failover system will take over operation of the service. Every company or an organization has to use a database for storing information. But what if this database fails? So it behooves the company to use another database for backup purpose. This is called ad failover clustering. For making this clustering manageable and lucid the corporate people spend more money on buying a licensed copy for both, the core database and the redundant database.

This overhead can be avoided using a database with non-similar platform in which one database is licensed and the other may be freeware. If platforms are similar then the transaction between those databases becomes simpler. But it won't be the case with non-similar platforms. Hence, to overcome this problem in both cases, cost effective failover clustering is proposed. For designing such system a common interfacing technique between two non-similar database platforms has to be developed. This will make provision for using any two database management system platforms for the failover clustering. If the clustering is implemented using this technique it will provide the same minimum downtime service to the user at minimum cost.

1.1 Scope

In a HA cluster multiple servers are used to provide a continuous service to the clients. If some activity internal or external to the system interrupts the normal working of an active server then all the clients are switched to the backup server. If it a database clusters the organization has to maintain multiple databases in case of failure of active server. These databases should be of same platform, but it becomes expensive to buy licensed database. To overcome a difficulty in HA clusters for providing platform independent DBMS within same cluster, we will be designing a service which will be deployed in this cluster. In this way same database cluster can have multiple types of database management systems.

2. SYSTEM DESIGN

The Cluster system will work in THREE TIER ARCHITECTURE where a SERVICE acts as a mediator between the client and the server. Hare the server is in the HA cluster and Clients are accessing database in cluster. The job of the service is to monitor the databases and accordingly directs the clients to the ONLINE database. This service provides a real time monitoring of the databases. If the service finds the main database is not active it immediately redirects all the clients to the redundant backup database. This switching should take as minimum as possible delay i.e. the

client show face minimum downtime. This system will only work if there is something between the client and the server.

2.1 Modules

The CEFC service as a whole is only one process which will be running in the background. This service will be monitoring the servers in real-time. The working of the service can be divided into 3 modules as follows-

2.1.1 Tracing the Queries

First job of the CEFC service is to maintain a real time backup of the CORE database. As soon as a query is fired from the application it should be backed up on the redundant database. For doing this the service will keep a trace of all the queries on a temporary file which will be stored on the server. This trace file will contain all queries which modify the OCRE database and this information will be used to update the redundant database. In this way a real-time backup is done by tracing the queries.

2.2.2 Switching the Database

Under the normal operation the system i.e. when the CORE database is working properly without any issues, the queries are serviced by the database and the response is given to the user, alongside the redundant database is backed up. A failover situation is encountered when by some internal or external activity the CORE database is shutdown or fails temporarily. Under such circumstances the users should be switched to the backup database, this will be done by the CEFC service with downtime as minimum as possible. This will be the most critical module of the service as the Information of the organization is at stake.

2.2.3 Updating CORE Database after Restart

After switching the user to the main database the redundant database becomes the core for the time instance. But the CORE database is still resolving from the issues, after this server is online all the information need to be updated to the CORE database. This module is handled by the CEFC service by keeping a log of all the queries that take are fired after the CORE server went down. The CORE database gets updated as soon as it comes online and the users switched back to the CORE server. In this way the normal operation of the whole system is put back to place.

3. PROPOSED SYSTEM

Once the service is deployed in the system it will start monitoring the status (online/offline) of the database. On the current status of the database the service will work in two distinct ways as mentioned below-

- **Under Normal Circumstances:** This is when the CORE database will be active.
- **Under Failover:** This is when the CORE database will encounter failure.

- **Under Normal Circumstances –**
  Before failover the main database will be in use by the client application, at this instance the service will keep trace of every query in a trace file and update the respective information in the backup database. In this way all the information will be replicated in the redundant database. Consider the following diagram where SQL is the main database and MYSQL is the backup database.

When SQL server is active all the queries will be directly communicating with the main database via DAL (Data Access Layer) the trace of these queries will be kept in the 'trace file' which will be used to backup these queries on the MYSQL database. The service by considering that MYSQL is offline will wait till MYSQL awakes and be online. Once MYSQL is activated SERVICE will process traced queries on MYSQL.

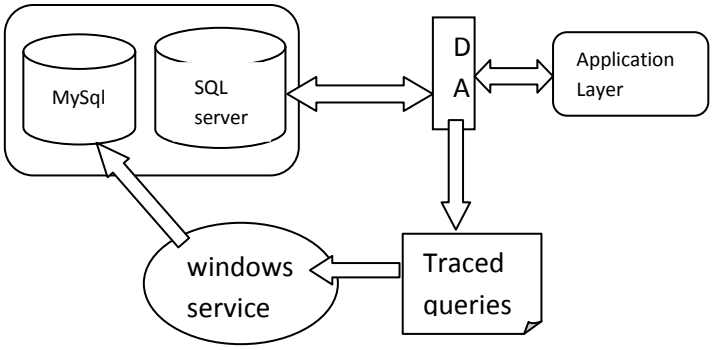

Fig1 When SQL Server is active

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- **Under Failover-**
  When the main database is disconnected by any means the job of the service in HA clustering is to switch the client application to the backup database, in this case it is MYSQL. Queries are now directed to backup database but all the information which is processed after the main database failed till the time it again comes online has to be updated in the main database. Consider the given diagram-

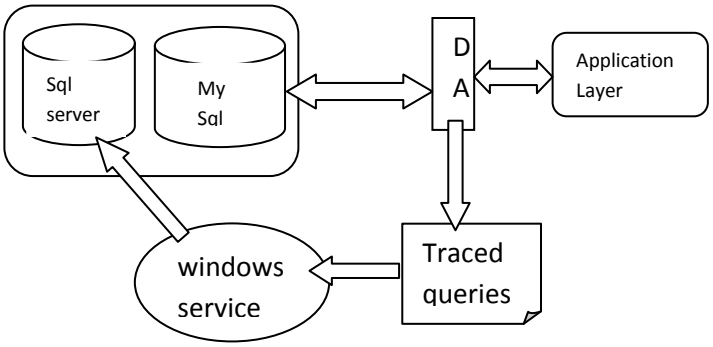

Fig 2 When MySql Server is active

Here again the traced files will be used to update the information once the main database awakes and comes online again. After updating the queries the client application will again be switched to the main database.

4. CONCLUSIONS

CEFC Service has enabled us to use multiple types of database management system(DBMS) in the same cluster. The main feature of the failover cluster or HA cluster is minimum downtime is also maintain by the service. If an organization or company uses expensively licensed database as their core database and a freeware or cheaper backup database, they will be saving bulks of cash. This provision is possible only the use of CEFC Service.

This service also checks the load on a specific server and if needed the load is balanced by service itself. This is possible because a cluster consist multiple servers which acts as backup servers in case of failure of core server. Under normal operation of the core server if the high load situation is encountered, the traffic is divided among other redundant servers in the cluster.

In this age of expensive high end computing our CEFC service allows even a small organization to deploy Cost Effective and Efficient Failover Cluster.

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