REPLICATION PART 1

OVERVIEW

ALTIBASE

OVERVIEW

HIGH AVAILABILITY

❖ **Non-Stop Service System**

➢ Minimizing Downtime and Maintaining the system availability up to 100%

➢ Planed Downtime – Regular inspection & System upgrade/patch

  ▪ Executing Switch-Over : Main modification of normal service

➢ Unplanned Downtime – Failure in some systems

  ▪ Executing Fail-Over : Main modification of urgent service

❖ **High Availability / HA**

➢ Non-stop system or the availability of its contents

  ▪ five 9 (99.999%)

  ▪ Various techniques exist at the level of S/W and H/W

❖ **HA of DBMS**

➢ Activates by synchronizing the databases through nodes

➢ Techniques are different depending on the architecture of parallel database
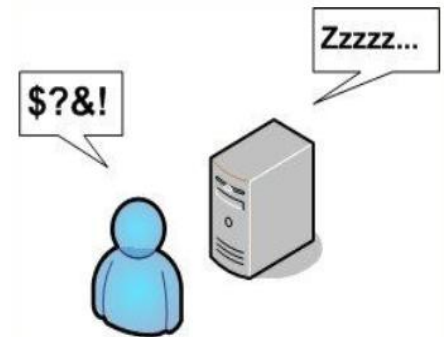
SHARED NOTHING VS. SHARED DISK

Categories	Shared Nothing Architecture	Shared Disk Architecture
Shared resources	There is no shared resources	Disk
Data synchronization	Replication through network	Sharing disk
Performance*	High performance as there is no shared resources	Performance reduced by complicated Processing(2PC/3PC) of shared resources
System costs*	Low costs (Local disk & Network)	High costs(Shared storage facilities)
Distance*	There are not too much harsh in a long distance as the general TCP based network is used	There is a restriction of distance as the dedicated network of high cost for sharing disk is required
Data Consistency*	The extra consideration is required to control the data inconsistency in each node for the features of network replication	The data consistency is guaranteed in each nodes as the data is shared
Appropriate system	**Higher performance is more required than data consistency**	**Data consistency is more required than performance**
Relevant DBMS technique	**Replication**	**RAC (Real Application Cluster)**
Relevant DBMS	ALTIBASE HDB, DB2, MS-SQL, ORACLE, SYBASE	ORACLE

■ **Trade-off between data consistency and performance, system costs and distance.**

ALTIBASE

ALTIBASE REPLICATION

REPLICATION

> **What is Replication?**

  > Replication is a technique for sending information about the changes to the contents of a single database over a network to one or more other databases.

> **The Purpose of Replication**

  ♦ Secures High Availability

  ♦ Improves performance and scalability by Load-balancing

  ♦ Minimizes Data Loss in the Event of a Physical Outage or Disaster

LOCAL SERVER   **REMOTE SERVER**

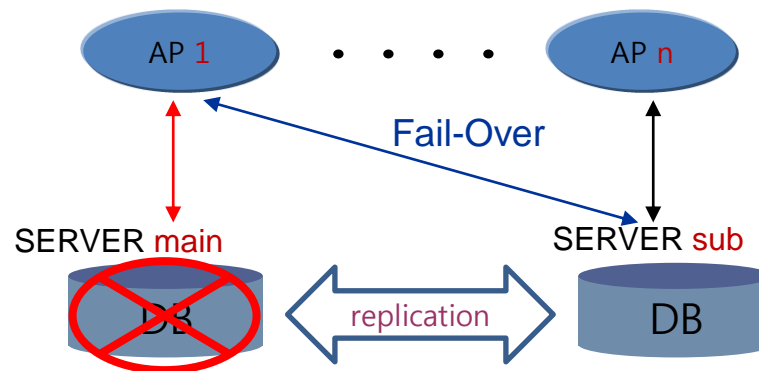DB   ⟵ replication ⟶   DB

Replication

❖ **Using Replication to Secure High Availability**

➢ **Scenario for ensuring availability in the event of DB Failure**

- Stand-Alone System: Service is interrupted
- 2-Way Replication System: Service is still available due to fail-over to another database server containing valid data

➢ **Availability = $1 - p^n$ (p = probability of downtime, n = number of replication nodes)**

➢ Measurement of availability if probability of downtime (p) is 5%

- Availability of stand-alone system = 95 %
- Availability of 2-way replication system = 99.75 %

[Figure 1, High Availability secured in a 2-Way Replication System]

Replication

❖ **Improving scalability using replication**

➤ **Using load balancing to improve system performance**

  ▪ Stand-alone System: the performance of the entire system suffers because a single server must bear the entire service load

  ▪ 2-way Replication System: because the load is distributed among the individual servers, the performance of the entire system is improved

➤ **Improved Scalability**

  ▪ Improved response time

  ▪ Improved throughput
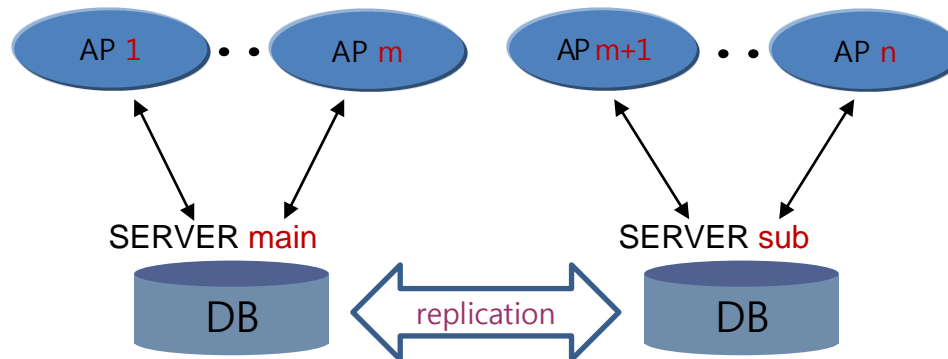
[Figure 2, Scalability improved in a 2-Way Replication System]

ALTIBASE REPLICATION FEATURES

Main Features	Description
TCP/IP Network-Based	Because the only facility that is required for replication is a network connection, no additional expenses are incurred. Replication over long distances is possible, depending on network performance (a Gigabit LAN is recommended)
Heterogeneous OS Support	Replication is possible between heterogeneous operating systems, and regardless of the number of OS bits (32 or 64) or CPU endian
Modularized	High Performance as the replication module is completely integrated with DBMS No additional ALTIBASE HDB packages are required for replication ALTIBASE HDB can be flexibly used depending on the user's requirements
Redo Log-based	Redo logs are sent in real time by records
Table-Based Management	Replication is managed by table Table can be added to replication or deleted from replication while database is running
Two Modes: LAZY and EAGER	Supports both LAZY(Async) and EAGER(Sync) replication modes
Parallel Thread Supported	The replication performance is improved when using eager mode by using it parallel as the number of sender threads
Up to 32-Way Replication	A single ALTIBASE HDB node can have up to 32 replication objects Load distribution across heterogeneous systems is supported
Point-To-Point Replication	Replicating 1:1 only between nodes that does not transfer to other nodes

ALTIBASE REPLICATION FEATURES

Main Features	Description
Network Fault Detection	ALTIBASE HDB provides dedicated threads to detect physical network faults
Support for Multiple IPs	If two or more IP addresses are assigned to a single replication, replication can automatically switch to the other IP address in the event of a network fault, thus increasing the availability of replication.
Automatic Recovery	The time point at which replication was most recently performed is recorded. In the event of network failure, replication resumes automatically once the network connection is restored.
Control via SQL Interface	All commands required in order to use and manage replication have an SQL interface thus it is convenient to use.
Data Conflict Resolution Methods	Three (3) schemes and one (1) utility are provided to resolve data conflicts.

Thank you!

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