FAKULTÄT FÜR !NFORMATIK
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Use Cases for a Heterogeneous SQL-Database Cluster via Virtual Shared Memory, its limits and alternative Solutions

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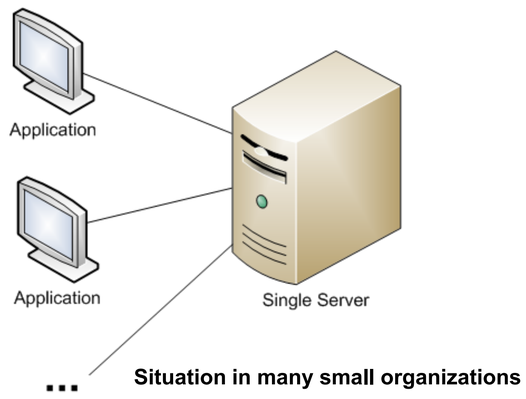
Problem



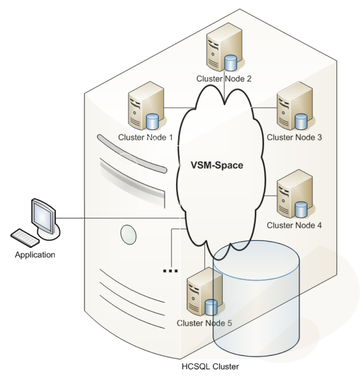
Situation in many small organizations

Software solutions constitute an essential part of business infrastructures. Almost all companies use at least one such solution, which is indispensable for the daily business. Therefore reliable solutions are needed, which are both highly available and ensure data consistency. There are many solutions providing these characteristics, but they target large enterprises. So, there is a need for inexpensive, simple solutions, which small companies can afford. Unavailability of large cloud computing services and massive data thefts emphasized the need for turning to affordable alternatives which keep the data within the company.

High Availability (HA) Techniques

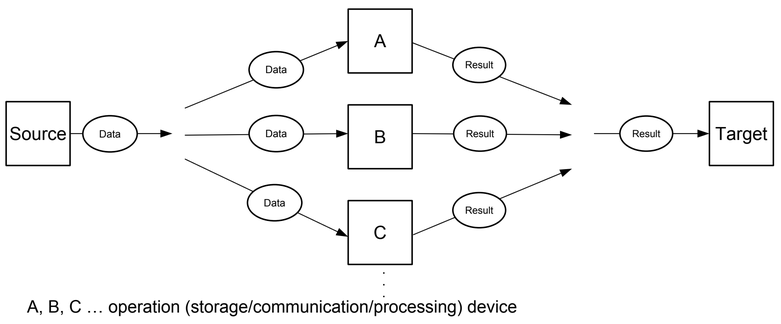
Heterogeneous Clustered SQL* – Database Management System (HCSQL)

A bunch of independent DBMS** reacts as a single DBMS. This cluster has the advantage that it is highly available and reliable. The DBMSs used within HCSQL can be from different vendors (heterogeneous). This way the advantages of each system add up and make the whole cluster stronger.



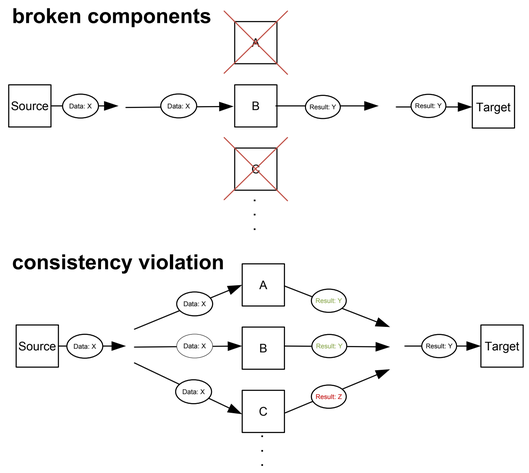
- is a **clustered** database management system
- is a **distributed** software solution
- implements a **middleware** approach
- provides **high availability** and **reliability**
- detects and **corrects consistency violations**
- uses existing DBMS** as data storage, which should be **heterogeneous**
- is **completely transparent** to the user and application programmer
- needs **no special hardware** (e.g. shared storage)

Parallel Consistency Checked Operations (PCCO)



A, B, C … operation (storage/communication/processing) device

Any operation, whether storage, communication or processing, is executed in parallel on a defined number of independent devices. The results of these parallel operations are compared and a consistency leveled approach decides what the correct result is. Depending on the consistency level a certain number of identical results is needed to accept a result as valid.

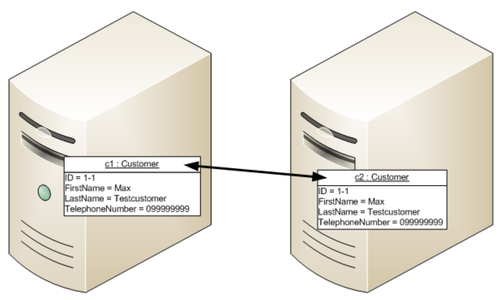


The target node receives information if at least one of the processing components works.

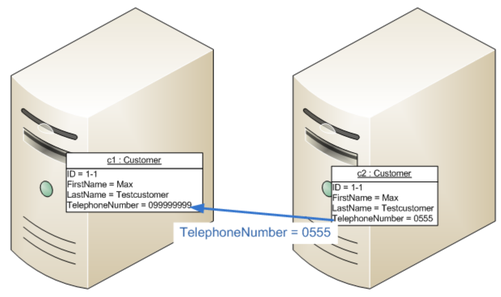
A limited number of faulty results can be compensated and corrected.

Asynchronous Lightweight Replication at Object-Level (ALR)

An alternative to the replication at the persistency/database level is the replication at the object level. This approach has to be implemented to the object model within the application. The advantages are excellent performance and no dependencies on other products. The knowledge of the object model allows exactly fitting lightweight implementations.

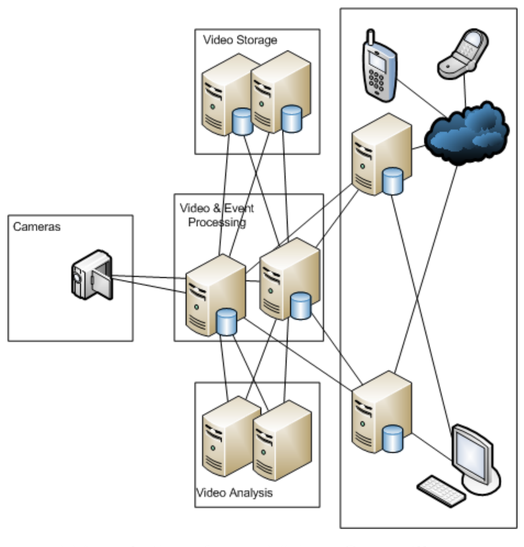


Every object and its replica are connected.



Independent properties are sent exactly when and only if chanced.

Use Cases and Solutions

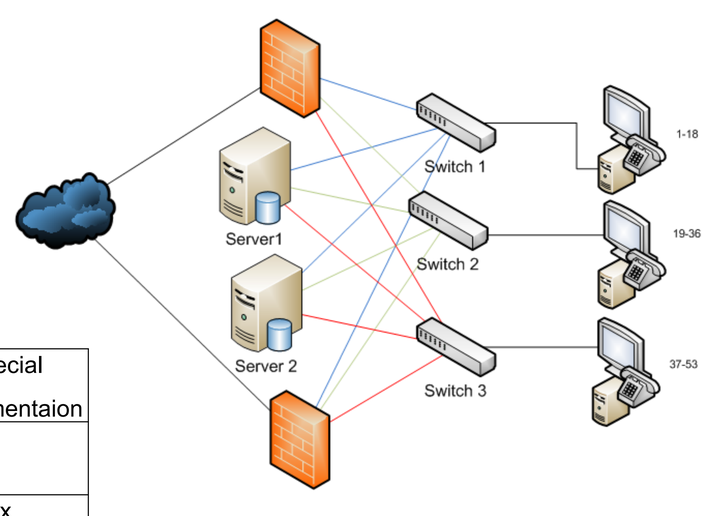


HA solution for a Video Surveillance system using PCCO.

For Video Surveillance, Fitness Center and Customer Support Center solutions eliminating all single points of failure HCSQL, PCCO and ALR are provided.

use case	solution		PCCO			network	special
		HCSQL	communication	processing	**ALR**	splitted lines	implementaion
Video Surveillance	two lines					x	
	fully redundant		x	x			
Fitness Centers	singel location	x					x
	multi location				x		x
Customer Support Center		x	x		x	x	

techniques used for the solutions



HA solution for a Customer Support Center using HCSQL and ALR.

* **SQL** **S**tructured **Q**uery **L**anguage
** **DBMS** **D**atabase **M**anagement **S**ystem

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