

FAULT TOLERANCE IN LIVE VM MIGRATION -A REVIEW

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ABSTRACT - The technology is enhancing day by day. This technology allows users to utilize resources beyond the capacity of the machines they are using. Cloud is one such technology permitting the users to achieve the same. Cloud computing provide physical machines on which multiple virtual machines are supposed to execute. This helps in reducing the need of physical machine in computation environment. As the dependency on the virtual machines increases, the risk factor such as threat to integrity also increases. Fault tolerant capabilities hence are critical in virtual data centres or virtualization. The prime objective of proposed work is to analyse distinct fault tolerant capabilities utilized in virtualization and provide comprehensive comparison of techniques to determine optimal methods.

KEYWORDS

Resources, Cloud Computing, Physical Machine, Virtualization, Fault tolerance capabilities.

1. INTRODUCTION

Today dependency on virtual data centre for computation is increased beyond expected levels. The users can be of distinct categories. The threat to enterprise can adversely affect its performance and operation. The problem is independent of operating system on distinct physical machines. The fault tolerant capabilities hence have to be different to tackle various hazards. This section describes potential hazards and risks that can affect the performance of data centers providing virtual environment. The second section describes various techniques associated with Fault tolerance in VM migration. The third section presents comprehensive comparison between techniques by highlighting pros and cons. Last section presents conclusion indicating optimal strategy.

1.1 Software Crashes

This type of failure is omnipresent. It is common on physical as well as virtualized environment. The operating system present on virtual machine can crashes due to bugs in kernel causing temporary loss of server. This degrades performance of virtual as well as physical machine. Such events cause the server to be down indefinitely.

1.2 Updating Software

Every virtual machine has to be periodically upgraded which includes security fixes, bug fixes etc. During the up gradation both machines are down. This enhances the downtime of virtual as well as physical machines. This also appears within the hazards which degrade the performance of virtualization.

1.3 Start Up failure

This type of failure occurs when VM is migrated to older server. Migration not always assures flawless reliability. Insufficient and inappropriate resources cause the VM to fail immediately. Resources need to be shared and data is needed to be migrated to safe locations provided with the help of fault tolerant capabilities.

1.4 incompatible server hardware

At application level migration, compatibility is necessary. Compatibility is generally defined in terms of hardware. During migration process if hardware is not compatible then application fails to execute. So during migration hardware compatibility needs to be considered.

1.5 Conflicting VM task

Program when executes process formulates. Process run either in front or back end. The process sometimes continues to execute on the server even after finished execution. Such processes are known as daemon processes. These problems are tackled by handling processes through the techniques of concurrency control.

2. FAULT TOLERANT MECHANISMS AS PART OF VM MIGRATION

There exists fault and failures during hardware and software migration processes. Techniques for achieving it are discussed in this section.

2.1 FAULT TOLERANCE THROUGH REPLICATION

This is a common approach for implementing fault tolerant capability using primary and secondary backup system. The secondary backup is always present if the primary server fails. The state of the secondary server should be same as the Primary server.

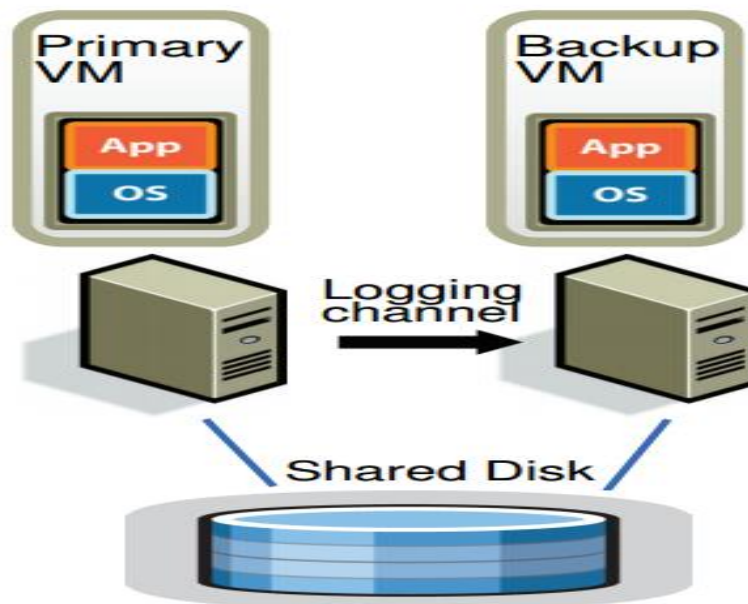


FIG 1: MODEL FOR BACKUP SERVER

The redundant array of independent disks along with parity check mechanism can also rectify faults also. The replication and parity check mechanism enhance the performance of server. The data in case of failure is recovered through RAID along with parity check mechanism. Parity can be even or odd. The even parity has even number of 1s in the data. The odd parity has odd number of 1s. (1)

2.2 FAULT TOLERANCE THROUGH TRANSPARENT VM LEVEL MIGRATION

Virtual cluster supra system is considered in this case. The virtual cluster consists of virtual machines along with multitude of software components which doomed to be failed eventually. The virtual cluster enhances availability, reliability and manageability VMs to reach the stable and consistent state. When fault occur virtual cluster automatically recovers the state

of the VMs to consistent state. The save point and checkpoint is utilized in this case.

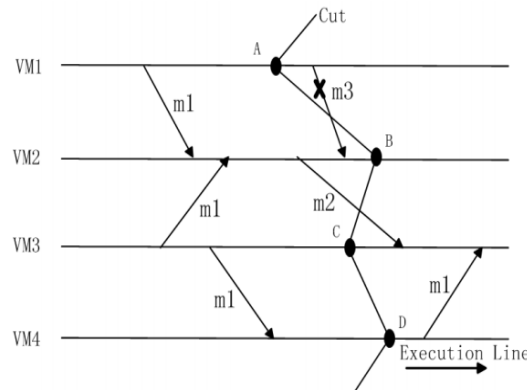


FIG 2: SHOWING TRANSPARENT VM LEVEL MIGRATION (2)

2.3 Survival Control Plane Strategy

This mechanism ensures backup to be taken in elastic optical network. Since network is utilized which is prone to failures hence entire process of elastic network is at stakes. In order to resolve the problem novel mutual backup model is proposed in the studied paper. Number of output lines required to transfer and back up is reduced by the use of WDM. The problem of slow migration appears in this case. in order to resolve the problem optical medium is suggested. The optical medium transfer the data at the speed of light hence overall transfer rate enhances. More data can be transferred hence throughput is also enhanced. (3)

2.4 Burstiness Aware Resource Allocation

The burstiness occurs aperiodically in migration. The spikes occur variantly and for short interval in cloud. VMs are consolidated by minimum number of physical machines utilized. Queue is maintained to store spare resources. These resources are exposed to VMs as and when required to reduce the work load and overhead associated with migration. (4)

2. COMPARISON OF TECHNIQUES UTILIZED FOR MIGRATION

The comparison is presented in terms of tabular structure illustrated as follow

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