


An Automated Self-Healing Cloud Computing Framework for Resource Scheduling

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ABSTRACT

In cloud computing, applications, administrations, and assets have a place with various associations with various goals. Elements in the cloud are self-sufficient and self-adjusting. In such a collaborative environment, the scheduling decision on available resources is a challenge given the decentralized nature of the environment. Fault tolerance is an utmost challenge in the task scheduling of available resources. In this paper, self-healing fault tolerance techniques have been introducing to detect the faulty resources and measured the best resource value through CPU, RAM, and bandwidth utilization of each resource. Through the self-healing method, less than threshold values have been considering as a faulty resource and separate from the resource pool. The workloads submitted by the user have been assigned to the available best resource. The proposed method has been simulated in cloudsim and compared the multi-objective performance metrics with existing methods, and it is observed that the proposed method performs utmost.

KEYWORDS

Cloud Computing, Cluster Computing, Fault Tolerance, Fuzzy Logic, Machine Learning, Self-Healing, Task Scheduling, Virtual Machine, Work Load

INTRODUCTION

Distributed computing depicts numerous registering ideas that involves a huge bunch of PCs organized together through constant web association. An on-request office offers processing administrations to clients on pay-per-utilize design. It likewise can execute programs on numerous interconnected frameworks concurrently. The cloud idea largely relies upon the innovation of apportioning of assets for accomplishing proficiency and economies of scale like pervasive figuring worldview. On one hand, the Cloud suppliers introduce distinctive services to the customers like SaaS, PaaS, IaaS, and XaaS

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(Latiff, 2017). On the other hand, in late circumstances, new issues with respect to high-performance computing concept and usage are starting to rise. Aside from the prominent cloud issues in the regions of booking, resource allocation, and security (Dewangan B., 2016), distributed computing presently features extra pressing issues looking for consideration in the territory of adaptation to non-critical failure in executing assignments and furthermore virtual machines (VM) disappointment. (Jain A., 2014) These sorts of problems in a wide blueprint are called NP-hard (non-deterministic polynomial time), which implies that there is no correct arrangement and no snappy answer for it. The adaptation to internal failure strategies relies upon both time and equipment repetition or any of these elements in address disappointment issues. The main technique that applies the time inertness needs the re-execution of the fizzled work whenever the disappointment is observe. Besides, another issue looked in this condition is that, at scale, originates from its inclination to work execution breakdown. Despite the fact that, the likelihood of a server breakdown is negligible, the measure of registering assets, stockpiling and correspondence system that can come up short is overpowering. In this manner, a substantial scale disappointment is currently a custom rather than a special case.

The inspiration to improvise the existing fault tolerance techniques and models in cloud computing through the autonomic algorithm is to provide the efficient algorithm in terms of cost, energy-efficiency (Mao, 2016) (Dewangan B. K., 2019), turnaround time (Sirisha, 2017), optimization (Convolbo, 2018) (Zhou, 2016), service level agreement (SLA) (Dewangan B. K., 2019), quality of service (QoS) (Agarwal, 2011), and job completion (Guo Longkun, 2017). This paper is organize to discuss various aspect of faults tolerance techniques and its frameworks with its implementation ideas to compare proposed fault tolerance method in cloud computing. The main objective of this work is to design a fault tolerance framework that identifies the fault virtual machines (VM's) from the pool and reject those faulty VM's from the pool automatically. Once faulty VM's identify, the proposed method selects the best VM's based on average cost and time and assign the workload through scheduling. The proposed framework is coming under the proactive and self-healing method. It is implemented and simulated in cloudsim and achieved the better results in terms of energy, cost and SLA violation rate as compared to existing frameworks.

BACKGROUND

There are different shortcomings, which can happen in cloud/distributed computing. Based on adaptation to internal failure arrangements different adaptation to internal failure strategies can be utilized that can be either resource monitoring, management or scheduling level. Fault tolerance techniques can be further divide into two categories, Reactive and Proactive. Reactive can be further categorize into checkpoint restart, job migration and replication as well as proactive also divided into preemptive migration, system rejuvenation, and self-healing.

Reactive Frameworks

Process Lever Redundancy (PLR) (Egwutuoha I. P, 2012) the most usually utilized adaptation to internal failure procedures for high performance computing is checkpoint/restart. Notwithstanding, checkpoint/restart expands the divider clock time of the execution of utilization which builds the execution cost. In this paper, authors show an adaptation to non-critical failure system for superior figuring in Cloud. This system proposes utilizing PLR methods to lessen the divider clock time of the execution of computational escalated applications. Their fundamental trial comes about demonstrate that overhead connected with check pointing can be altogether less by 40% with the PLR approach propos in this paper. They have an arrangement to fabricate a model that completely executes this system as their future work.

Fault-Tolerance-Mechanism (FTM) (Jhawar, 2012), This paper presents an imaginative point of view on making and overseeing adaptation to internal failure that shades the usage subtle elements of the dependability strategies from the clients by methods for a diehard commitment layer. This

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