Patent Search

Invention Title	DYNAMIC LOAD BALANCING ALGORITHM FOR OPTIMIZED PERFORMANCE IN DISTRIBUTED CLOUD SYSTEMS
Publication Number	24/2025
Publication Date	13/06/2025
Publication Type	INA
Application Number	202541053881
Application Filing Date	03/06/2025
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	COMPUTER SCIENCE
Classification (IPC)	G06F0009500000, G06F0009480000, H04L0067100800, H04L0043080000, H04L0067100000

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Abstract:

[029] The present invention discloses a novel Dynamic Load Balancing Algorithm (DLBA) for distributed cloud systems that ensures efficient, intelligent, and adaptive distribution across heterogeneous computing nodes. The algorithm integrates real-time resource monitoring, predictive analytics, and multi-criteria decision-making task allocation and migration in dynamic cloud environments. A predictive engine employs machine learning models to forecast future system loads, enabling proact making. A task allocator evaluates node suitability based on current and predicted performance indicators, including CPU usage, memory, network bandwidth, task u energy efficiency. Additionally, a live task migration module enables seamless transfer of workloads with minimal service disruption using checkpointing and delta en system incorporates a feedback loop that continuously refines allocation strategies by comparing predicted outcomes with actual performance. Designed for scalabil tolerance, the DLBA supports centralized and decentralized deployments in public, private, hybrid, and edge cloud infrastructures. This invention significantly enhanc utilization, reduces latency, and maintains SLA compliance in complex and evolving cloud environments. Accompanied Drawing [FIGS. 1-2]

Complete Specification

Description:[001] The present invention relates generally to the field of cloud computing and distributed systems, and more particularly to dynamic load balancing techniques that enable efficient resource allocation and workload management in distributed cloud environments. It addresses the technical challenges associated uneven resource utilization, latency, and system bottlenecks that arise in large-scale distributed infrastructures. Specifically, the invention proposes an intelligent, a load balancing algorithm that dynamically monitors system metrics, forecasts resource demands, and reallocates computational tasks in real-time. This innovation at improving the operational efficiency, scalability, fault tolerance, and quality of service (QoS) in cloud-based architectures by minimizing downtime and enhancing responsiveness. The invention is applicable to public, private, and hybrid cloud models, and is designed to function in heterogeneous environments where computa resources vary in capacity, workload type, and availability.

BACKGROUND OF THE INVENTION

[002] In recent years, cloud computing has revolutionized the way computational resources are delivered, enabling on-demand access to scalable and virtualized re over the internet. With the proliferation of data-intensive applications, such as artificial intelligence, big data analytics, and IoT platforms, cloud infrastructures have increasingly complex, consisting of thousands of interconnected servers distributed across multiple geographic locations. In such large-scale environments, achievi optimal performance and reliability heavily depends on effective load balancing strategies that ensure an even distribution of computational tasks across all availab nodes.

[003] Traditional load balancing methods, such as round-robin, least connections, and static threshold-based allocation, are often insufficient in modern cloud environments. These techniques assume a relatively stable and homogeneous workload, which does not reflect the dynamic and heterogeneous nature of contemp

View Application Status