Cost-based Energy Efficient Scheduling Technique for Dynamic Voltage and Frequency Scaling System in cloud computing

Synopsis

CEEST

The goal of this algorithm is optimization and management of servers in the datacenters by utilizing maximum resources of the servers and powering off the underutilized servers.
It utilizes the scaling of virtual machines to finish jobs in the deadlines to reduce violations of service level agreement (SLA). This algorithm saves energy up to 30% in comparison to existing algorithms. The utilization of resources is also significantly increased by to 30%. In terms of SLA violations, this algorithm reduced SLA violations up to 50%.

CEEST schedules jobs to reduce energy consumption, handles high workloads, minimizes task completion time and minimizes SLA violations. The architecture of CEEST comprises of job submission, job manager, scheduling algorithm, scalability algorithm, server manager, DVFS controller and servers/VMs.

Working of CEEST

Jobs are submitted to system in the form of length, communication cost, and SLA level. Job manager gets a list of servers and VMs and their states from the server manager and gives it to a scheduling algorithm. After getting results from the scheduling algorithm, they are submitted to the server manager. The server manager then assigns required resources to the job. Scheduling algorithm receives a list of servers and VMs from the job manager and calculates appropriate resources for allocation to the job. If no virtual machine can complete the job in deadline, then it sends a request to the scalability algorithm. The scalability algorithm chooses a virtual machine and scales it. If system remains unable to complete job in the deadline after scalability, then it will be SLA violation. Server manager has a list of states of servers and virtual machines. It receives results of the scheduling algorithm from the job manager and allocates resources to the job. Server Manager also monitors the server's utilization after some interval and migrates virtual machines from underutilized servers to save power. DVFS controller intelligently supplies adequate voltage and frequency to the servers based on their utilization. Servers and VMs execute the jobs. The scheduling algorithm decides which resources should be given to a job.

Result

This way CEEST saves energy up to 30% in comparison to existing algorithms. And also increase utilization upto 30% and also reduce SLA violations up to 50%.