ABSTRACT

Disasters such as floods, tsunamis, and cyclones frequently happen worldwide. A natural disaster management system deals with a large amount of data obtained from several organizations and a multitude of people. Current emergencies across the globe indicate the tendency that the occurrence frequency of natural disasters is predicted to rise in the future. Thus novel approaches for emergency management ought to be elaborated based on the latest IT advancements. Cloud computing provides computing services, including storage, databases, servers, software, and networking over the Internet ("the Cloud") to provide on-demand, scalable resources based on a pay-per-use model. Cloud computing handles a wide range of virtualized resources, making task scheduling a vital component. The idea behind task scheduling is to schedule tasks to maximize the system's performance. Thus, scheduling plays a crucial role in cloud computing to efficiently allocate the available resources to incoming tasks.

Accordingly, this research work strives to solve the task scheduling problem in distinct ways, initiating with enhancing the task scheduling by proposing an energy-aware task scheduling based on multi-criteria decision-making in the cloud. The proposed approach discovers a better scheduling solution by performing the ranking process using m-AHP in an orderly manner. Secondly, all the tasks with high precedence are assigned to VMs. To achieve dynamism in the cloud environment and satisfy the tasks' distinct QoS requirements, an energy-aware dispatcher/ scheduler is used, where a threshold-based dynamic scheduler algorithm has been presented. The energy-aware dispatcher is liable for the transmission of tasks to dynamic queues. Three different objectives, namely energy consumption, makespan,

and resource utilization, have been considered for task scheduling. The experimentation results showed that the proposed approach outperforms the existing works taken for study. With decision problems, there is only one correct solution for each input, but optimization problems are concerned with identifying the best answer to a particular input.

Adaptive Butterfly Optimization Algorithm has been applied to handle task scheduling problems in the cloud. BOA with adaptive strategy has been associated with enhancing the performance of the proposed algorithm. The efficiency of the ABOA has been assessed with the state-of-art BOA, PSO, and BAT algorithm. The simulation results exhibited that the ABOA algorithm minimizes the energy consumption and makespan and assures the maximum resource utilization than the existing algorithms. With meta-heuristic approaches, the current state of the cloud environment is not considered, making them naïve about environmental changes.

Existing machine learning algorithms predict resource consumption, and with these predictions, heuristic/meta-heuristic algorithms choose the appropriate computing resource for a given task. An energy-aware independent task scheduler that uses a recurrent neural network to select computing resources for tasks and adjusts to the cloud environment's current state. Rather than predicting resource consumption, the neural network is trained to envisage the schedule itself, i.e., which computing resource should be used for a given task in the particular state of the cloud. The proposed scheduler aims to obtain reduced makespan, energy consumption, and execution overhead/time while maximum resource utilization.

Blockchain technology has been deemed an ideal choice for various ways to strengthen existing computing systems. As one of the network-enabled technologies, cloud computing has been broadly adopted in the industry through numerous cloud service models. Fusing blockchain technology with existing cloud systems has great potential in both

functionality/performance enhancement and security/ privacy improvement. An energy-aware task scheduling in Blockchain+-based data centers has been proposed. Here, the transaction indicates the task scheduling by considering the resource allocation of requested VMs. Here, DCs perform task scheduling by activating the intelligent contract.

In this thesis, the CloudSim toolkit has been used to simulate the cloud environment. The research affirms the system efficiency using the evaluation metrics such as makespan, energy consumption, and resource utilization and the statistical method, the Analysis of Variance (ANOVA) technique. The proposed approach can effectively attain good performance from experimentation by minimizing the makespan and energy consumption and enhancing resource utilization while fulfilling the priority constraints.