

Synopsis Seminar

Seminar Title	: Efficient VM Placement and Task Scheduling Approach using Optimization Techniques
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Venue	: CS-208, Convention Hall, CSE Department
Date and Time	: 16 Jul 2025 (11:00 AM)
Abstract	: The rapid expansion of cloud computing and Internet of Things (IoT) technologies has introduced significant challenges in efficiently managing resources and reducing energy consumption in large-scale data centers and Mobile Edge Computing (MEC) systems. This dissertation proposes a framework that incorporates innovative optimization methods to address these challenges. It includes a DBSCAN-based Virtual Machine (VM) placement technique to mitigate resource overutilization, a hybrid Particle Swarm Optimization (PSO) algorithm to improve task scheduling, and a reinforcement learning for 3D Bin Packing method for real-time VM allocation. Additionally, a PCA-SGD-Whale Optimization Algorithm (PS-WOA) is introduced to optimize energy usage and throughput by integrating dimensionality reduction and multi-objective optimization. This research responds to the growing demand for computational resources while addressing environmental concerns associated with data center energy consumption. The proposed framework was tested through extensive simulations, focusing on key performance metrics such as energy efficiency, task execution time, and system adaptability to dynamic workloads. The results demonstrate that the DBSCAN-based VM placement approach reduced energy consumption by 47.3%, while the hybrid PSO algorithm enhanced scheduling efficiency and system load balancing. The reinforcement learning-based 3D Bin Packing approach exhibited adaptability to workload fluctuations, significantly improving energy efficiency. Furthermore, PS-WOA achieved a 10.11% improvement in energy optimization, ensuring scalable and sustainable cloud and MEC operations. The findings underscore the potential of the proposed techniques to enhance energy-efficient resource management in cloud and MEC environments. This study contributes to sustainable computing practices by reducing operational costs and minimizing the environmental impact of large-scale cloud data centers.