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TASK SCHEDULING ALGORITHMS FOR EFFICIENT RESOURCE ALLOCATION IN CLOUD COMPUTING

Mrs.A.Nagaswathy
Assistant Professor & Head,
PG Department of Commerce with Computer Applications & Department of Commerce(IT),
Mannar Thirumalai Naicker College,
Madurai, Tamil Nadu, India.

Mrs.R.Vanitha
Assistant Professor,
PG Department of Commerce with Computer Applications,
Mannar Thirumalai Naicker College,
Madurai, Tamil Nadu, India.

Abstract

Cloud computing provides on-demand access to computing resources such as storage, servers, and applications through the internet. As the number of cloud users increases, efficient management of tasks becomes very important. Task scheduling algorithms help assign tasks to available resources in an efficient manner. Proper scheduling improves system performance, reduces execution time, and increases resource utilization. This paper discusses different task scheduling algorithms used in cloud computing and their role in improving resource allocation and system efficiency.

Keywords: Cloud Computing, Task Scheduling, Scheduling Algorithms, Resource Allocation, Virtual Machines

Introduction

Cloud computing has become an important technology in modern information systems. It allows users to access computing services from anywhere through the internet. Organizations use cloud computing because it reduces infrastructure cost and provides flexible computing resources.

In cloud environments, many users submit tasks at the same time. These tasks must be assigned to available computing resources such as virtual machines and servers. This process is called task scheduling.

Efficient scheduling helps improve performance, reduce processing time, and increase system reliability. Therefore, selecting appropriate task scheduling algorithms is very important in cloud computing systems.

Review of Literature

- Several researchers have studied different scheduling algorithms to improve cloud system performance.
- Many studies focus on traditional scheduling methods such as First Come First Serve and Round Robin algorithms.

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These methods are simple but may not always provide optimal resource utilization.

- Some researchers proposed priority-based scheduling algorithms, where tasks with higher priority are executed first. Other studies focus on load balancing techniques, which distribute tasks evenly among servers.
- Recent research also highlights intelligent scheduling algorithms that improve system performance and reduce processing time in cloud environments.

Task Scheduling in Cloud Computing

Task scheduling is the process of assigning user tasks to available computing resources in a cloud environment. The main goal is to execute tasks efficiently while using available resources effectively.

Important Objectives of Task Scheduling include:

- Efficient use of Computing Resources
- Reduced Task Execution Time
- Balanced Workload Distribution
- Improved System Performance

Scheduling helps ensure that cloud resources are properly utilized without overloading any server.

Common Task Scheduling Algorithms

Several algorithms are used in cloud computing for scheduling tasks.

First Come First Serve (FCFS)

In this method, tasks are executed in the order in which they arrive. It is simple to implement but may cause delays when large tasks arrive first.

Round Robin Scheduling

Round Robin scheduling assigns a fixed time slot for each task. Tasks are executed one by one in a circular order. This method provides fair resource sharing among tasks.

Priority-Based Scheduling

In this method, tasks are assigned priorities. Tasks with higher priority are executed first. This helps critical tasks finish faster.

Min-Min Scheduling

Min-Min algorithm selects tasks with the minimum completion time and assigns them to resources that complete them fastest. This improves overall execution efficiency.

Benefits of Efficient Task Scheduling

Effective scheduling algorithms provide several advantages in cloud computing systems.

- Faster Task Execution
- Better Resource Utilization
- Improved System Throughput
- Reduced Waiting Time
- Better Performance of Cloud Services

Challenges in Task Scheduling

Despite many scheduling techniques, several challenges still exist in cloud environments.

- Large number of tasks arriving simultaneously

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- Dynamic workload changes
- Resource availability variations
- Maintaining load balance across servers

Researchers continue to develop new algorithms to overcome these challenges.

Conclusion

Task scheduling plays a vital role in cloud computing systems. Proper scheduling algorithms help improve resource allocation, reduce execution time, and enhance overall system performance.

Various algorithms such as FCFS, Round Robin, Priority Scheduling, and Min-Min are commonly used in cloud environments. Future research can focus on developing advanced intelligent scheduling algorithms that improve efficiency and adapt to dynamic cloud environments.

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