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A HYBRID APPROACH FOR RESOURCE MANAGEMENT SCHEDULING IN CLOUD COMPUTING ENVIRONMENT

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Abstract: Cloud computing is a paradigm of distributed computing that uses the Internet to provide computing in an abstract, virtualized, managerial, and dynamic way driven by demand, that is, processing, storage, services, networks, and applications. When we talk about hosting, it means that we are talking about providing services and resources to users in a planned and hosting way. That means we are talking about resource management and resource scheduling. Resource management and resource scheduling both are important now a days because of high demand of cloud computing in Computer Science field. The high demand for cloud computing has led to the need to manage resources through resource scheduling. Our aim is to mix two basic scheduling approaches and to produce our hybrid approach for resource management scheduling in cloud computing environment. In this paper we are describing various resource management scheduling algorithms in related work section and in proposed work section we are proposing a hybrid approach (mixing of two basic approaches i.e., priority scheduling and shortest job first scheduling) for resource management scheduling in cloud computing environment, process allocation to the CPU and average waiting time of process allocation to the CPU. Also, we are giving one example. Through this example we will come to know that average waiting time in case 1 is less than the average waiting time in case 2. So therefore, case1 is considered to be the best hybrid approach as compared to case 2 and other approaches. Since, all approaches has some future challenges in the same way our proposed approach is the best approach, but it has some future challenges which can be removed in future.

Index Terms **- Resource Management Scheduling, Cloud Computing and Hybrid Approach.**

I. INTRODUCTION

"Cloud computing is an innovative technology that has brought a revolutionary change in the delivery of computing services. With the continuous development of the Internet and the Web, cloud computing has changed the way information and communication technology users access resources. By dynamically providing resources in a virtualized manner on the Internet, the focus can be shifted from local/personal computing to data centre-centric computing. Cloud computing transforms the use of computing into a fifth public utility, just like traditional public services such as water, electricity, gas, and telephone [1], pay-per-use. Cloud Definition Computing Simply put, the term is an emerging technology trend that uses the Internet to provide computing in an abstract, virtualized, managed, and demand-driven manner, that is, processing, storage, services, networks, and applications. The resource that provides the service is located somewhere on the Internet, not on our local system. All of this is provided to end users like any other utility, and they can access these utilities anytime, anywhere with the help of the Internet. It provides users with a set of virtualized resources according to their needs, thereby reducing the burden on users to manage hardware, software, storage, and networks, thus incorporating the concept of flexibility [2]. For these reasons, cloud computing is now considered like the Internet. Although Cloud Computing derives from existing models such as Cluster and Grid, it exhibits distinct characteristics such as virtualization, heterogeneity, measured service and pricing, scalability, and scalability. resource recovery and aggregation. To provide such differentiated functionality, cloud computing faces many challenges such as security and privacy, resource planning, scalability and fault tolerance, energy efficiency, etc., interoperability, etc. service for users to maintain their trust in the cloud. On the one hand, service providers aim to maximize profits and return on investment, on the other hand, users demand the cheapest, fastest, and most reliable service. To meet the requirements of both purposes, an appropriate resource management mechanism is required. In this article, we focus on resource planning, which is one of the hardest problems in the cloud, on both the provider side and the user side." [31]

II. NEED FOR RESOURCE MANAGEMENT SCHEDULING

"Cloud computing not only allows users to move their data and calculations to a remote location with minimal impact on system performance, but also ensures easy access to the cloud environment to access their data and get calculations. anytime and anywhere.

Cloud computing tries to provide easy and cheap access to compute resources that can be measured and billed against other models like distributed computing, grid computing, etc. In a cloud computing environment, tasks are distributed to separate compute nodes. For cloud resource allocation, redundant nodes capable of compute are detected and analyzed for network bandwidth, line quality, response time, cost of tasks, and allocation reliability. Therefore, the quality of cloud service can be described by resources like network bandwidth, full time, task cost and reliability, etc.

The cloud is a type of parallel, distributed system made up of a collection of interconnected and virtualized computers. These computers are dynamically provisioned and presented as one or more unique computing resources based on service level agreements, established by negotiation between service providers and consumers. Computing resources can be dynamically allocated based on user needs and preferences.

Resource management and resource scheduling both are important now a days because of high demand of cloud computing in Computer Science field. High demand of cloud computing has led to the need of managing resources which can be done through resource scheduling." [30]

III. RELATED WORK

"As in recent years, the popularity of cloud computing is increasing, several researchers resolve RSP in the cloud computing environment and provide the same method. To worry is to design a planning algorithm that optimizes the quality of the service such as MaisPan, execution, deadline, reliability, response time, migration costs and availability. Many surveys were conducted to integrate other approaches for the same solution. Bala et al. [3] The workflow describes the need to import a cloud for the execution of the existing algorithm that solves an example of an online banking system and solved the problem of workflow planning. Salot [4] reviewed the basic linear approach to resolve RSP. A wide range of Singh et al investigations. [5] Provisioning resources, as well as a reservation of resources, including resource reservations. They ranked them according to the parameters of QoS such as the cost, time, profit, priority, ALS, energy, etc., but they have ranked various approaches of RSP, but the cloud computing architecture is Performed by Wadhonkar [6] Another survey was another survey. Led. Plan for RSP." [31]

IV. BASIC RESOURCE MANAGEMENT SCHEDULING ALGORITHMS

The process scheduler schedules different processes that will be allocated to the CPU according to a specific scheduling algorithm. This chapter will discuss six popular process scheduling algorithms:

1. First-come-first-served (FCFS) scheduling
2. Shortest Job First (SJF) scheduling
3. Priority scheduling
4. Shortest remaining time scheduling
5. Round-robin (RR) scheduling
6. Multi-Level queue scheduling

Figure 1 shows various types of scheduling algorithms. These algorithms are preventive or non-preventive. The non-preventive algorithm is designed so that once a process enters the running state, it cannot move forward until it completes the allocated time, while preventive scheduling is based on priority, and the scheduler can advance the running process at any time of high priority to low priority. The process enters. In the ready state.

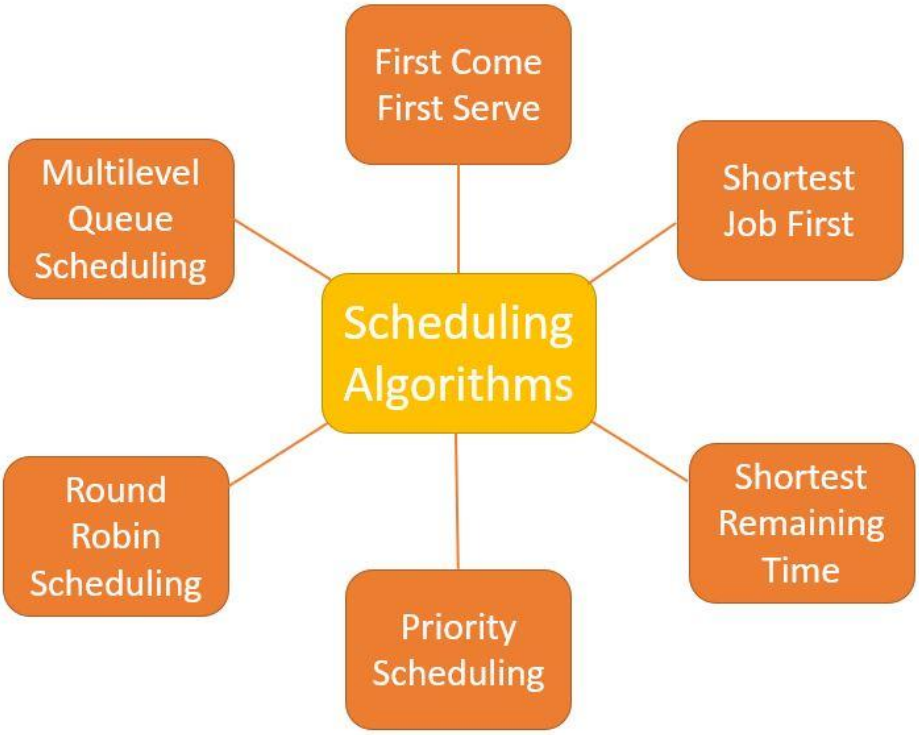


Figure 1: Various types of Scheduling Algorithms

4.1 First Come First Served (FCFS) Scheduling

- First-come, first-served (FCFS) operations are done on a first-come, first-served basis.
- It is a preemptive and non-preemptive scheduling algorithm.
- It is easy to understand and implement.
- Its implementation is based on a first-in, first-out queue.
- Performance is poor because the average wait time is too long.

4.2 Shortest Job First (SJF) Scheduling

- This is also called the Shortest First Job, or SJF
- This is a preventive and non-preventive scheduling algorithm.
- The best way to minimize waiting time.
- It is easy to implement in a batch processing system where the required CPU time is known in advance.
- Cannot be implemented in an interactive system where the required CPU time is unknown. The processor must know in advance how long the process will take.

4.3 Priority-based scheduling

- Priority scheduling is a non-preemptive algorithm and one of the most common scheduling algorithms in batch processing systems.
- Each process is assigned a priority. The process with the highest priority will run first, and so on.
- Processes with the same priority are on a first-come, first-served basis.
- It can determine the priority based on memory requirements, time requirements, or any other resource requirements.

4.4 The Shortest Remaining Time

- The Shortest Remaining Time (SRT) is a preemptive version of the SJN algorithm.
- The processor has been assigned to the job that is closest to completion but can be replaced by a newer ready job with a shorter completion time.
- Cannot be implemented in an interactive system where the required CPU time is unknown.
- Typically used in batch environments where short jobs need to be prioritized.

4.5 Round Robin Scheduling

- Round Robin is a preventive process scheduling algorithm.
- Each process has a fixed running time, called quantum.
- Once a process runs for the specified time-period, it will be replaced, and another process runs for the specified time period.
- The context switch is used to save the preferred process state.

4.6 Multi-level queue scheduling

- Multi-level queue is not a separate scheduling algorithm. They use other existing algorithms to group and schedule jobs with common characteristics.
- Maintain multiple queues for processes with common characteristics.
- Each queue can have its own scheduling algorithm.
- Each queue has a priority.

For example, you can schedule CPU-related jobs in one queue, and schedule all I/O-related jobs in another queue. Then, the process scheduler alternately selects jobs from each queue and assigns them to the CPU according to the algorithm assigned to the queue.

V. PROPOSED WORK – A HYBRID APPROACH

Our aim is to mix two basic scheduling approaches and to produce our hybrid approach for resource management scheduling in cloud computing environment. In our hybrid approach we are taking two scheduling algorithms i.e., priority scheduling and shortest job first scheduling. We are taking two cases. In first case, we have total four processes in which two processes having burst time are allocated priorities and the rest two processes does not have any priorities but have burst time. Process P1 and P2 are allocated to the CPU according to priority scheduling and then processes P3 and P4 arrives which are allocated to the CPU according to Shortest Job First scheduling. In second case, one process i.e., P2 executes according to priority scheduling, after these two processes arrives P3 and P4 and these are executed first, according to SJF scheduling and after that process P1 executes. In both the cases the average waiting time is calculated and compared with one another. Case with shortest average waiting time is the best approach for resource management scheduling in cloud computing environment. This hybrid approach may have some future challenges. Example is shown in the next section

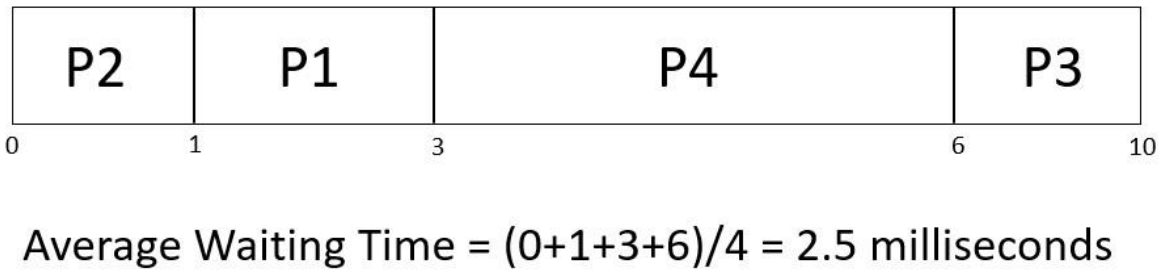
VI. AN EXAMPLE OF HYBRID APPROACH

Case 1: In first case, we have total four processes in which two processes having burst time are allocated priorities and the rest two processes does not have any priorities but have burst time. Process P1 and P2 are allocated to the CPU according to priority scheduling and then processes P3 and P4 arrives which are allocated to the CPU according to Shortest Job First scheduling. Table 1 shows all four processes with their CPU burst time and Fig 2 shows its average waiting time

Table 1 Processes with CPU burst time

	BURST TIME	PRIORITY
P1	2	2
P2	1	1
P3	4	NIL
P4	3	NIL

Gantt Chart

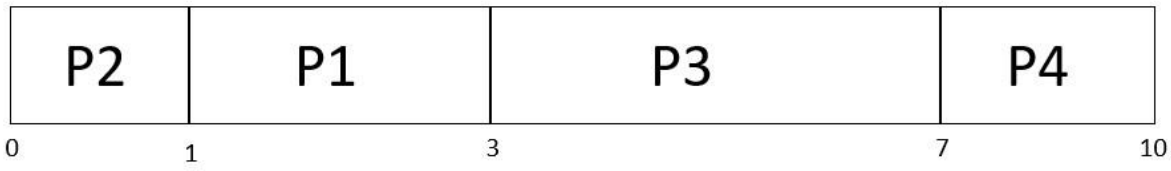


Average Waiting Time = (0+1+3+6)/4 = 2.5 milliseconds

Figure 2: Average waiting time for case 1

Case 2: In second case, one process i.e. P2 executes and after that process P1 executes according to priority scheduling, after this, two processes arrives P3 and P4 and these are executed first, according to SJF scheduling and. Fig 3 shows average waiting time

Gantt Chart



Average Waiting Time = (0+1+3+7)/4 = 2.75 milliseconds

Figure 3: Average waiting time for case 2

VII. CONCLUSION

Our aim is to blend two basic scheduling approaches and to produce one hybrid approach (our proposed approach) for resource management scheduling in cloud computing environment. Through above example (as shown in above section) we conclude that case 1 has smallest average waiting time so case 1 takes less time to execute as compared to case 2 and therefore and this is the best hybrid approach for resource management scheduling in cloud computing environment as compared to case 2. Our hybrid approach may have some other future challenges which can be removed in future.

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