Intelligent Randomize Round Robin for Cloud Computing

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ABSTRACT

Cloud computing is a recent scientific revolution in information technology, it is considered as the basic infrastructure of ubiquitous computing. It supports various features including, Internet based computing, and resources sharing. Delivery of services is provided to computers and other devices upon request. In other words, it is a technology based on the internet and central remote servers to maintain data and applications. This technology allows consumers and enterprises to use applications without the need of installing them or allowing access to their personal files at any computer with internet access. Among different users that may access the cloud data center, cloud computing must include job scheduling to organize and monitor these jobs, and to achieve fairness among all users. One of the most popular job scheduling algorithms is Round Robin (RR). This paper proposes an enhancement to the traditional RR, namely Randomized Round Robin (RRR). The enhanced version of RR algorithms is based on random selection for processes that come from different users to achieve near optimal selection of jobs to be served. A simulation has been carried out using CloudSim simulator V 3.0 to test the performance of the proposed scheme in terms of different evaluation metrics such as average throughput and average turnaround time.

KEYWORDS: Cloud Computing, Job Scheduling, and Randomize Round Robin (RRR), Round Robin

INTRODUCTION

Cloud computing is a recent advancement wherein IT infrastructure and application are provided as services to the end users under a usage payment model (Matarneh, 2009; Vecchiola, Chu, Mattess, Buyya, & Aneka, 2011). Cloud computing is related with a new paradigm of computing. This model transfers the infrastructure location to the Internet to diminish the overheads related with the management of hardware and software resources. Many technology experts believe that cloud computing is anticipated to change the way we access technology and that it may be as game-changing as the commercialization of the Internet over

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a 10 years ago (Huanga, Bessis, Norrington, Kuonendand, & Hirsbrunner, 2011; Ming & Marty, 2011). The adoption of cloud computing introduces new requirements and needs, such as resource management and task scheduling, in which this requirements significantly affect the efficiency of the entire system adopting cloud computing services and resources (Popvici & Wiles, 2005; Rana, Warnier, Quilliman, Brazier, & Cojocarasu, 2008). Scheduling algorithms from traditional distributed systems share the same objectives of spreading the workload on the available processors and increasing their utilization while decreasing the aggregate task execution time (Jain, 1992; Vouk, 2008).

Several heuristic algorithms have been proposed in the literature to address the issue of task scheduling such as: Round Robin (RR) algorithm (Shen & 2001; Yeo & Buyya, 2005), Weighted Round Robin (WRR) (Gunho, Byung-Gon, & Katzy, 2011), Weighted Fair Queuing (WFQ) (Gunho, Byung-Gon, & Katzy, 2011), Self-Clocked Fair (SCF) (Shen & 2001; Yuan & SuanFair, 2009), and Diff-Serv Algorithm. In this paper, we propose an enhancement to the traditional RR algorithm, in which the selection of processes from different users is done randomly instead of executing them in turns as they are received at the server side (i.e., First Come First Serve (FCFS)) (Sandeep, 2011; http://www.ca.com).

The rest of this paper is organized as follows: Section 2 discusses some related work, the motivation is presented in Section 3, Section 4 presents the proposed scheduling algorithm, the simulation setup and results are presented in Section 5, and finally some concluding remarks and future research issues are presented in Section 6.

**RELATED WORK**

Several algorithms have been proposed to address the problem of job scheduling in a distributed environment such as the cloud system; the following part discusses some of these algorithms:

**Round Robin (RR)**

RR Algorithm is a pre-emptive version of FCFS scheduling algorithm. Tasks from different users arrive at the server one after another, and then the scheduler serves the tasks based on their arrival time in a FCFS manner. The processor executes the task from the ready queue based on the predefined Time Slice (TS). If a task from a specific user is still running and needs more time to be fully served while TS ends, then the execution of the task is pre-empted and is added to the end of the ready queue. After that, the scheduler seizes the processor to the next task in the ready queue (Helmy, 2007; Linlin, Kumar, & Rajkumar, 2011; Song et al., 2008).

The pre-empted task is served during the next round of the scheduler. In each round, the scheduler serves each task for a fixed amount of time. The process of RR is shown in Figure 1.

**Weighted Round Robin (WRR)**

In this algorithm, jobs are classified into a number of service classes, the scheduler assigns these jobs to a number of queues that have different weights, and then they are served in RR fashion according to their weight. This algorithm addresses the starvation problem by guaranteeing all service classes will have the ability to access at least some pre-customized bandwidth as shown in Figure 2.

**PROPOSED ALGORITHM: RANDOMIZED ROUND ROBIN (RRR)**

The rapid growth and the increased popularity of distributed systems (cloud) demands careful attention to the resource management issues. A key component of the resource management suite is the scheduling scheme. Scheduling is the process of distributing the available resources among the users (tasks). This paper proposes a modified version of the traditional RR scheme to better utilize the cloud resources. The proposed
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