

Round Robin Based Efficient Resource Allocation and Utilization in an Organization

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Abstract

In an organization, resource allocation to a request is a complex task. Traditionally, resource allocation is done through manually with high time consumption. Similarly, collision is occurring for allocating a single resource to multiple requests. Thus, leads to complex problems and slow-down the working process. The existing resource allocation technique, allocate resources continuously to a specific request and omit another request. This kind of allocation technique also leads to lots of critical issues. That is the non-allocated process never gets a resource. To overcome these issues, the Round Robin based Resource allocation and Utilization technique is proposed in this work. The Round Robin technique allocates resources to the request in an efficient with equal priority. Similarly, the proposed technique reduces collision and takes less time for mapping a resource with a request. The experimental results shows improved accuracy than the traditional resource allocation technique.

Keywords: Resource Allocation, Round Robin, Logistic Regression

1. Introduction

Job scheduling is the way of organizing, dominating and accretion of job in production on process. Scheduling can entangle within incidental attributes such as causal processing times, desultory due dates, it's also referred Stochastic Scheduling. The features of job scheduling can access anytime, anywhere, no duration of the time period is provided. A process will be transparent to everybody who involved in the task. Scheduling system process the work with remainder to do during the day to day process, so that time can be reduced, increases the productivity and efficiency. Optimizing the work and workloads in production on process will improve the productivity and efficiency with minimal manpower. Applications of scheduling are acuity scheduling is the appointment scheduling app to choose when you need to customize your booking process for getting the appointment and for the business providing task process to enhance. The schedule has once been the application that scheduled for performing process with clients. Super SaaS is used when unlimited staffs or members can be added and is opting for scheduling task.

First-Come-First-Serve (FCFS) schedules the job, according to the arrival time. The first job is able to do the work first and remaining task need to wait till the prior works are completed. The main problem of FCFS is starvation. Sooner the job time will get over when the arrival time is less. The main drawback of FCFS is the person comes first will always be allocated to the same

environment. Shortest-Job-First (SJF) scheduling will select the process with the smallest requirement of resources. The drawback of using SJF is to process only the shortest resource requirement is executed first and the longest resource requirement will wait till all the shortest requirements are completed. It is difficult to know the requirement of the process in an earlier. In a Priority scheduling, the highest priority requirement resources are utilized the resource frequently and the lowest resource requirement task need to wait. The lower priority job can be starved. In a Round Robin is a scheduling algorithm, all the tasks utilize the resources in an equal time limit. Hence, all the tasks are completed in an efficient manner with an average time limit and efficiency of the resources are improved. Hence, the Round Robin resource allocation technique is used in the proposed system.

The following sections are organized as, Section 2, the works that are related to the proposed system is discussed in detail. In section 3, the proposed system is explained with an architecture and algorithms. In section 4 and 5, the experimental results of the proposed is discussed in detail and finally, the paper is concluded with its future-work.

2. Related Work

A. Gennaro Cordasc et al, proposed that a craft schedules maximize the rate at which tasks are rendered eligible for allocation to remote computing workers for effective utilization of clients. The algorithmic shortcuts allow one to "read off" an optimal schedule [1]. H. Oguzhan kokanee et al. said that, the sequencing is the process of defining the order in which the set of jobs to be completed are done. Scheduling is the process of adding start and finish information to the job order dictated by the sequence [2]. A. Phani Sheetal et al. discussed about the methods of dealing with uncertain information, the developments of the stochastic project scheduling problems and the fuzzy project scheduling problems are described respectively [3]. Tao song et al. proposed a server consolidation, energy-saving algorithm based on resource reservation and resource allocation using server consolidation, energy-saving algorithm (SCES). This technique is to maintain the host resource utilization and to reduce the risk of system overload and improve the stability of the system [4]. Susheng Wang et al proposed a compromised resource allocation model for emergency response and a negotiation strategy as a fast access between resource suppliers and requesters. It is a mathematical model is presented to help solve the large-scale public emergency difficulties [5]. Mahendra Bhatu Gawali proposed a scheduling algorithm based on heuristic approach. This methodology does not show the proper response time [6]. Mubarak Haladu et la proposed a Task Scheduling using Enhanced Min-Min Algorithm. This proposed algorithm can be extended to consider other parameter such as cost of execution and to make a comparison between the proposed algorithms with other existing scheduling algorithms [7]. Amjad Gawanimeh et al uses the scheduling services for a limited number of resources. A fundamental problem has been solved by using multiple task resource allocation. The algorithm is carried without the cost of constraints. A Genetic algorithm is being used to solve the scheduling problem in cloud computing [8]. Guangzhong Sun et al uses the global computing for improving the performance of scheduling. Further, it is used to evaluate the performance of different scheduling mechanisms to choose a proper scheduling strategy [9]. B.S. Murugan et al provides some existing approaches to solve an aggressive resource provisioning task using SPRNT also faces some challenges in VM allocation. It deals with high level of flexibility and memory access time. It is used to speed up the adoption time [10]. Tsai et al. discussed a multi-object approach that employs the improved differential evolution algorithm. This existing system provides a cost model for cloud computing environment. However, variations in the tasks are not considered in this approach [11]. Magukuri et al. used a load balancing and scheduling algorithm that does not consider job sizes. The authors considered the refresh times of the server in fulfilling requests [12]. Cheng et al. discussed the scheduling of tasks preferred on a vacation queuing model. This methodology does not show the proper utilization

of resources [13]. Lin et al. discussed about the scheduling of tasks and consider the bandwidth as a resource. A nonlinear programming model has been formed to allocate resources to tasks [14]. Ergu et al. proposed AHP is ranking-based task scheduling algorithm for allocating resources to users. In this technique, the resource allocation depends on the rank, i.e. higher rank users always got resources first and lower rank users wait long periods [15]. Zhu et al. purposed rolling-horizon scheduling architecture to schedule and real-time tasks. They will illustrate the relationship between task scheduling and energy conservation by resource allocation [16]. Lin et al. proposed scheduling for parallel workloads. They used the FCFS approach to order jobs while resources are available. The proposed system does not focus on aborting the jobs and starvation [17]. Keshk et al. discussed the use of modified ant colony optimization in load balancing. This method improves the make span of a job. This system does not consider the availability of resources or the weight of tasks [18]. Shamsollah et al. discussed about the system based on a multi-criteria algorithm for scheduling server load. The scheduling process depends on the priority for performing divisible load scheduling that employs an analytical hierarchy process [19-21].

Limitations of existing techniques:

- The priority and rank-based scheduling algorithms always allow higher priority task first and lower priority task waiting time is high.
- In an energy-aware scheduling algorithm, energy consumption time must know before beginning an execution.
- The genetic algorithm-based resource allocation technique is not working well for all domains.
- No one discussed about the time delay process of a scheduling algorithm.

Hence, an alternate technique is required for providing equal importance to all requestor or resources.

Our Contribution:

- To develop an optimized scheduling algorithm with improved accuracy and resource utilization.
- To reduce time delay for a scheduling task.
- To schedule the task with better resource utilization.

3. Proposed System

The proposed Round Robin based Efficient Resource Allocation and Utilization Technique of an organization is discussed in with a flow graph Figure 1. The role of each participant is listed as follows.

- **Admin** - The administrator is a person who ensure that an organization operates efficiently. Their specific duties depend on the type of company, or entity where they work the duties revolve around managing and distributing information within an organization. Based on the request, the admin has to allocate the resources for respective request. The admin has to count the total number of requests is going to utilize the particular type of resources and to select the resources and divide the available resources into number of requests. The admin sends, the available resource and request to the classifier for map the resource and request in a perfect manner.

- **Logistic Regression based Classification Technique** - The logistic regression technique classifies the resource into a number group with specific range. This range of values is mapped to the request for finding the exact mapping of resource and request.
- **Round Robin Scheduling Algorithm**- When a classification process is completed the Round Robin Scheduling algorithm is used for allocating a resource at an equal level of priority is given to all resources. Scheduling is a method used to allocate the resources to a requester at a particular time period in an efficient manner. Based on the number of requests and total number of resources available the resources are allocated to the requester in a cyclic manner. If we want to add a resource or request in a process, the resource and request are added at the end of the queue.
- **User** - The user is a resource requester who is going to utilize the resources in an efficient manner.

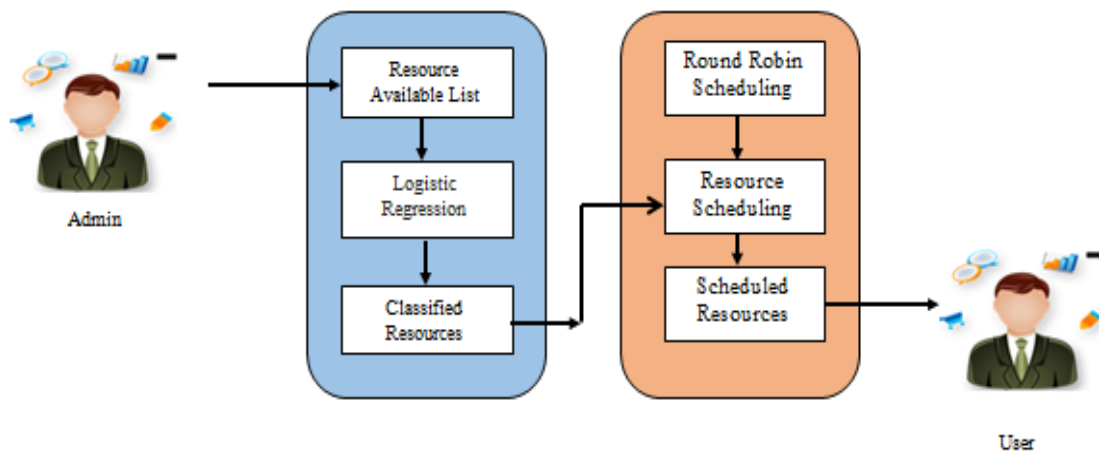


Figure 1. Proposed System Architecture

Algorithm: Resource Allocation and Utilization

Input: Number of Request (R_q), Available Resource (R_{AL})

Output: Resource Allocation (R_{Alloc})

Procedure:

- 1 For each R_q in R_qList do
 - 2 Iteration 1
 - 3 Classify R_q type using Logistic Regression
 - 4 If $R_q \in \text{Specific Group (Resource)}$
 - 5 Allocate resource to R_q
 - 6 Else
 - 7 Allocate resource to exact mapped Group
 - 8 Repeat step 3 to 6 till all R_q are satisfied
 - 9 Iteration 2
 - 10 If same R_q enter into the queue
 - 11 If same R_q enter into the queue
 - 12 Else
 - 13 Allocate alternate resource to R_q
 - 14 Repeat step 11 to 13 till all R_q are satisfied
 - 15 Return Resource Allocation Table
-

Algorithm 1. Shows the proposed Round Robin based Resource efficient resource allocation and utilization process. In Round Robin based resource allocation and utilization process, the list of resources and requests are categorized into the number of groups. If the resource type is not allocated previously, then that resource is allocated into the request else alternate resource type is allocated. This process is done in a Round Robin fashion. Thus, the proposed system provides equal priority to all requests. Hence, the waiting time of the request and resource mapping is reduced in an efficient manner. This kind of resource allocation is suitable for an organization task allocation, hall allocation in an examination, scheduling of task etc.

4.Experimental Results

The hardware requirement for our proposed system are 2GB RAM, 486 Processor, 512MB Memory, Windows 10 OS, 20GB RAM and NVIDIA Tiatan GPU. The Software requirements are Java Script and PHP for frontend and My SQL for backend. In this technique we will apply the process to schedule the students to allocate in the particular hall respectively and the way to apply the rule of the student should not enter into the same hall on another day. Now we consider exam cell management, in these students are allocated to the exam hall day by day.

Table 1. Scheduling Time

S.No	Number of Halls	Number of Students	Time Taken
1	10	1000	15sec
2	20	1200	18sec
3	30	1300	19.5sec
4	40	1400	21sec
5	50	1500	22.5sec

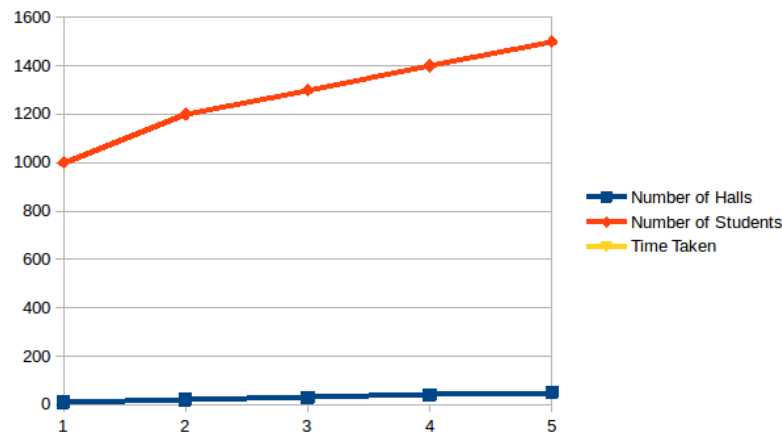


Figure 2. Scheduling Time

Consider a college with 1500 students we have to allocate the students with respective classes. The same department students are not allocated in the same exam hall. If it is a class room, we have to allocate maximum of 25 students. If more than 25 students we have to allocate the drawing hall likewise we allocate the number of halls and students dynamically. Here we are using round robin technique for hall allocation. When compared to traditional man power allocation, the automatic allocation scheme takes lesser time. Figure 2 and Table 1 shows the scheduling process of our proposed system.

5.Conclusion

This paper discussed about allocating the resources using round robin scheduling algorithm and logistic regression technique. The logistic regression technique will classify the resources and round robin algorithm will schedule the resources by using this technique we can easily allocate the resources. It eases our work load and produce us an accurate measure to resolve resource allocation. The importance of our proposed system is to make our tasks faster and more reliable. Future work will be focused on more effective scheduling algorithm for a dynamic process. Our results show efficient allocation process than the man-made scheduling process.

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Conflict of interest

None of the authors have any conflicts of interest to declare.

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