International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 329-334 www.ijaem.net ISSN: 2395-5252

Analysis of Scheduling Algorithm: FCFS vs SJF

Debasish Dutta[1], Basab Nath[2]
[1,2]Student, Assam Down Town University, Guwahati, Assam
Corresponding Author: Debasish Dutta

Submitted: 15-06-2021 Revised: 27-06-2021 Accepted: 30-06-2021

ABSTRACT: Today, the need of storage, infrastructure to perform several task is the main issue so the service provider has to serve the required concern by providing services to may users and the increase of the request from the multiple user to the cloud provider has become one of the scalable technique to proposed to services. Many scheduling algorithms have been proposed to schedule the tasks in cloud computing environment such as (SJF) and (FCFS) algorithms. In several conditions, not every algorithm works better on the significant problem. Sometimes FCFS algorithm is better than the other in short burst time. However, it cannot be predicted what process will come after. Average Waiting Time is a standard measure for giving credit to the scheduling algorithm. Average Turnaround Time is the **time** interval from the **time** of submission of a **process** to the **time** of the completion of the **process**. Several techniques have been applied to maintain the process to make the CPU performance in normal. The objective of this paper is to compare two algorithms, FCFS and SJF. The target is to find out which algorithm will be suitable for certain process so that the time spent (Total waiting time and Total Turnaround time) is better in the algorithm section.

KEYWORDS: Shortest Job First, First-Come-First-Served, CPU Scheduling, Virtual Machine

I. INTRODUCTION:

Cloud computing is surely an attracting technology in the field of computer science. The cloud computing provide a number of resources hosted in different locations in data center. This new technology offers distributed virtualized, elastic resources as utilities to clients. As the cloud computing(CC) provide Virtual machine (VM). Each VM has it own specific configuration of processing request, Power , RAM and storage associated with it. So customers do not require purchasing several hardware and software. In cloud computing environment, the service provider provides three services - infrastructure as a service (IAAS), platform as a service (PAAS) and software as a service (SAAS) to the users on demand through the internet. Cloud computing (CC) has two components: Provider and User. The user submits the task(s) to provider for execution. The Provider receives the users' tasks, executes them at a specific data center, then sends the results back to the user. Load Balancing is an important issue in cloud computing. The cloud platform has the ability to scale up and down any time. In the distributed environment users generate request randomly in any processor. So the disadvantage of this randomness is associated with task assignment. The inconsistency in task assignment to the processor generates imbalance behaviour, i.e. some of the processors are overloaded and some of them are under loaded. The goal of load balancing is to transfer the load from overloaded process to under loaded process transparently. Load balancing technique decides which user would use the virtual machine and which requesting machines will be put on hold. Load balancing is done with the help of load balancers where each succeeding request is redirected and transparent to users who make the request. Based on different parameters like availability of current load, the load balancer uses different scheduling algorithm to decide which server should handle and forwards the request to the selected server. There are different scheduling algorithm exist in load balancing like First-Come-First-Served (FCFS), Shortest Job First (SJF) and some other scheduling algorithm. One of the basic objectives of the scheduler is to utilize the use of CPU to facilitate the processes of the completion and response time, waiting and turnaround time, priorities and the system throughput. In this paper our objective is to find out which scheduling algorithm helps us to find out the better performance compare to existing algorithms such as First-Come-First-Served (FCFS) and Shortest Job First (SJF) etc.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 329-334 www.ijaem.net ISSN: 2395-5252

II. THEORIES

The state in which a programming is performed is referred to as the process. Many processes are active at the same time when the computer is turned on. When a parent process produces a derivative process, it is called a derivative process. The derivation process can potentially build a new process, resulting in a process tree with all of these processes. When a process is created, it can access resources including CPU time, memory, files, and I/O devices. These resources can be taken directly from the operating system, the parent process that distributes resources to each derivative process, or the derivative and the parent process. The resources of an operating system are shared by multiple processes. A multi-programming operating system includes CPU scheduling. The purpose of job scheduling is to distribute CPU work among the processes. This increases the efficiency of computer work. A process is usually made up of two cycles of Burst I/O and CPU Burst, which are alternated until the operation is finished. Burst time is the amount of time required by a process for executing on CPU. It is also know as running time. Arrival time is the time when the process is ready for execution.

Waiting time is the total time spent by the process in the ready state waiting for CPU to execute the process which is in the ready state. Turnaround time is the time interval from the time of submission of the process to the time of the completion of the process. Completion time is the time when a particular process is finished processing at execution state.

FCFS is an operating system scheduling method that performs queued requests and processes in the order in which they arrive. It's the most straightforward and straightforward CPU scheduling strategy available. Processes that request the CPU initially are given priority in this type of algorithm. A FIFO queue is used to handle this. First Come, First Serve is the full form of FCFS. For example – In a railway station or in cinema hall while taking ticket we use to join the queue until the first person in that queue is finished taking ticket we have to wait for your change this is know as First Come First Serve.

The algorithm Shortest Job First (SJF) chooses the process with the shortest execution time for the next execution. Preemptive or non-preemptive scheduling methods are available. It cuts down on the time it takes for other procedures to complete. Shortest Job First is the full form of the acronym SJF. For example- let us take an example that two person (person 1 and person 2) is going to take grocery item from grocery store. Person 1 have a list of item with him to purchase from store and the person 2 have only two item to purchase. The grocery store owner will give priority to the person 2 because he has less item to purchase then the priority will shift to person 1 as he was waiting then there is no other person to buy any item. If in that moment any other person comes to the store then the owner will check who has less item to purchase then the priority will given to that person who has less item to purchase.

In this project we are taking non – preemptive scheduling in both the cases (FCFS and SJF).

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 329-334 www.ijaem.net ISSN: 2395-5252

Both are the example of FCFS and SJF cases

III. TESTING

The following table 1 contents the process, Arrival time and burst time as the data have been selected randomly.

Table 1

Process No.	Arrival Time (AT)	Burst Time (BT)
P1	0	2
P2	1	3
P3	0	1
P4	1	2
P5	2	1
P6	4	2
P7	5	3
P8	6	2
P9	8	1
P10	10	2
P11	12	3
P12	14	3
P13	16	1
P14	18	2
P15	22	4
P16	24	3
P17	28	1
P18	32	2
P19	34	1
P20	34	2
P21	38	3
P22	42	2
P23	43	3
P24	46	1
P25	48	2

Let's consider that Process is P, Arrival Time is AT, Burst Time is BT, Waiting Time is WT. The formula below is to obtain the waiting time.

WT = TAT – BT ……(I)

TWT = CT – AT ……(II)

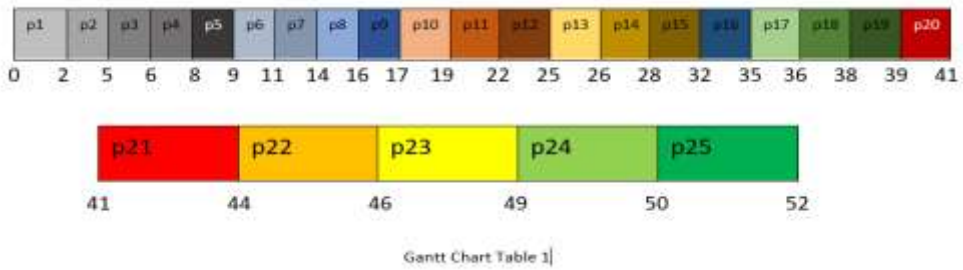
International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 329-334 www.ijaem.net ISSN: 2395-5252

First Come First Serve (FCFS table)

Process No.	Arrival Time (AT)	Burst Time (BT)	Completion Time (CT)	Turnaround Time (TAT)	Waiting Time (WT)	Response Time (RT)
P1	0	2	2	2	0	0
P2	1	3	5	4	1	1
P3	0	1	6	6	5	5
P4	1	2	8	7	5	5
P5	2	1	9	7	6	6
P6	4	2	11	7	5	5
P7	5	3	14	9	6	6
P8	6	2	16	10	8	8
P9	8	1	17	9	8	8
P10	10	2	19	9	7	7
P11	12	3	22	10	7	7
P12	14	3	25	11	8	8
P13	16	1	26	10	9	9
P14	18	2	28	10	8	8
P15	22	4	32	10	6	6
P16	24	3	35	11	8	8
P17	28	1	36	8	7	7
P18	32	2	38	6	4	4
P19	34	1	39	5	4	4
P20	34	2	41	7	5	5
P21	38	3	44	6	3	3
P22	42	2	46	4	2	2
P23	43	3	49	6	3	3
P24	46	1	50	4	3	3
P25	48	2	52	4	2	2

Every single Completion Time must be calculated. Then calculated the Turnaround Time and Waiting Time of the FCFS algorithm.

Table 2 shows the Gantt Chart of FCFS algorithm.



Gantt Chart Table 1

Gantt Chart table of FCFS

As the calculation shows in the table. Then we need to calculate the total waiting time and total turnaround time so that we finally get the Average Waiting Time and Average Turnaround Time. In order to find out the Average waiting time and Average Turnaround Time we need to divide total waiting time by total number of process and total turnaround time by total number of process.

TWT (Total Waiting Time) = 130 and
TTAT (Total Turnaround Time) = 182

Average WT = 130/25 = 5.2

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 329-334 www.ijaem.net ISSN: 2395-5252

Average TAT = 182/25 =7.28

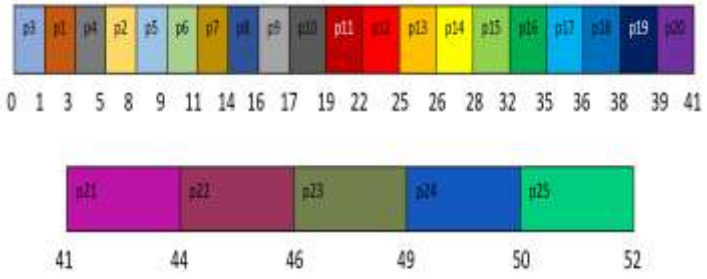
Process No.	Arrival Time (AT)	Burst Time (BT)	Completion Time (CT)	Turnaround Time (TAT)	Waiting Time (WT)	Response Time (RT)
P1	0	2	3	3	1	1
P2	1	3	8	7	4	4
P3	0	1	1	1	0	0
P4	1	2	5	4	2	2
P5	2	1	9	7	6	6
P6	4	2	11	7	5	5
P7	5	3	14	9	6	6
P8	6	2	16	10	8	8
P9	8	1	17	9	8	8
P10	10	2	19	9	7	7
P11	12	3	22	10	7	7
P12	14	3	25	11	8	8
P13	16	1	26	10	9	9
P14	18	2	28	10	8	8
P15	22	4	32	10	6	6
P16	24	3	35	9	6	6
P17	28	1	36	8	7	7
P18	32	2	38	6	4	4
P19	34	1	39	5	4	4
P20	34	2	41	7	5	5
P21	38	3	44	6	3	3
P22	42	2	46	4	2	2
P23	43	3	49	6	4	4
P24	46	1	50	4	3	3
P25	48	2	52	4	2	2

SJF table 2

SJF table 2

Every single Completion Time must be calculated. Then calculated the Turnaround Time and Waiting Time of the SJF algorithm. The smallest burst time will be the first order while the bigger will be the last one. The same arrival time must be sorted from low to high. The competition time calculation are done in the Gantt Chart.

Table 3 shows the Gantt Chart of SJF algorithm.



Gantt Chart of SJF Table 3

As the calculation shows in the table. Then we need to calculate the total waiting time and total turnaround time so that we finally get the Average Waiting Time and Average Turnaround Time. In order to find out the Average waiting time and Average Turnaround Time we need to divide total waiting time by total number of process and total turnaround time by total number of process.

TAT (Total Average Time) = 125 and
TTAT (Total Turnaround Time) = 176

Average WT = 125/25 =5

Average TAT = 176/25 =7.04

IV. CONCLUSION

In this paper we have discussed about scheduling and then various types of scheduling. A comparison of various types of algorithms is also shown with practical implementation. The calculation of two algorithms shows the different waiting time, turnaround time, total waiting time, total turnaround time, average waiting time and average turnaround time. The SJF is better if the process comes to processor simultaneously. All algorithm is good, but the speed of the process depends on the processor load.

SOME OF THE ADVANTAGES FROM THE ABOVE RESULTS

a) Better Average response time compare to FCFS.
b) Low Average Waiting Time compare to FCFS
c) Low Average Turnaround Time compare to FCFS.

REFERENCES

[1]. H. Heidari dan A. Chalechale, "Scheduling in Multiprocessor System Using Genetic Algorithm," International Journal of Advanced Science and Technology, vol. 43, pp. 81-94, 2012.
[2]. C. Bajaj, A. Dogra dan G. Singh, "Review And Analysis Of Task Scheduling Algorithms," International Research Journal of Engineering and Technology, vol. 2, no. 3, pp. 1449-1452, 2015.
[3]. N. Hamid, "Scheduling Policies," [Online]. Available: http://homepages.uel.ac.uk/u8902383/scheduling_policies.htm.
[4]. Arpaci-Dusseau, "Shortest Job Next," 12 April 2016. [Online]. Available: https://en.wikipedia.org/wiki/Shortest_job_next. [Diakses 1 May 2016].
[5]. A. Dusseau, R. H. dan A. C., Operating Systems: Three Easy Pieces, Arpaci-Dusseau Books, 2014. Tanenbaum, Modern Operating Systems, Pearson Education, Inc., 2008.