ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

Simulation of Cloud Computing Environment and Evaluation of Resource Provisioning Algorithm using Improved Max-Min

Monika Mishra

Research Scholar, Dept. of Computer Science & Engineering, Gyan Ganga College of Technology, India

ABSTRACT: A major performance issue in large-scale decentralized distributed systems, such as grids, is how to ensure that jobs finish their execution within the estimated completion times in the presence of resource performance fluctuations. Previously, several techniques including advance reservation, rescheduling and migration have been adopted to resolve/relieve this issue; however, they have some non-negligent practicality hurdles. The use of clouds may be an attractive alternative, since resources in clouds are much more reliable than those in grids. This paper investigates the effectiveness of rescheduling using cloud resources to increase the reliability of job completion. Specifically, schedules are initially generated using grid resources, and cloud resources (relatively costlier) are used only for rescheduling to cope with a delay in job completion. A job in our study refers to a bag-of-tasks (BoT) application that consists of a large number of independent tasks; this job model is common in many science and engineering applications. We have devised a novel rescheduling technique, called rescheduling using clouds for reliable completion (RC 2) and applied it to three well-known existing heuristics. Our experimental results reveal that RC 2 significantly reduces delay in job completion. A unique modification of Improved Max-min task scheduling algorithm is proposed. The algorithm is built based on comprehensive study of the impact of Improved Max-min task scheduling algorithm in cloud computing. Improved Max-min is based on the expected execution time instead of completion time as a selection basis. Enhanced (Proposed) Max-min is also based on the expected execution time instead of completion time as a selection basis but the only difference is that Improved Max-min algorithm assign task with Maximum execution time (Largest Task) to resource produces Minimum completion time (Slowest Resource) while Enhanced Max-min assign task with average execution time (average or Nearest greater than average Task) to resource produces Minimum completion time (Slowest Resource).

KEYWORDS: Cloud Computing, Job Scheduling, Makespan, Load balancing, Minimum completion time, Minimum execution time, Service response time.

I. INTRODUCTION

Cloud Computing is getting advanced day by day. Cloud service providers are willing to provide services using large scale cloud environment with cost effectiveness. Also, there are some popular large scaled applications like social- networking and e-commerce. These applications can benefit to minimize the costs using cloud computing. Cloud computing is considered as internet based computing service provided by various infrastructure providers on an on- demand basis, so that cloud is subject to Quality of Service(QoS), Load Balance(LB) and other constraints which have direct effect on user consumption of resources controlled by cloud infrastructure [1] [2].

In Cloud, There are many tasks require to be executed by the available resources to achieve Minimal total time for completion, Shortest response time, Effective utilization of resources etc, Because of these different intentions, we need to design, develop, propose a scheduling algorithm that is used by task scheduler to outperform appropriate allocation map of tasks on resources [4] [5].

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

II. RESEARCH METHOD

This review aims at summarizing the current state of the art of various job scheduling techniques in cloud computing.

III. SOURCE OF INFORMATION

The Search was widely conducted in the following electronic sources to gain a broad perspective

ScienceDirect (www.sciencedirect.com)
ACM Digital Library (portal.acm.org)
IEEE eXplore (ieeexplore.ieee.org)
Springer LNCS (www.springer.com/lncs)

These sources cover the most relevant journals, conferences and workshop proceedings. The searches in the selected sources resulted in overlap among the papers, where the duplicates were excluded by manual filtering.

IV. SEARCH CRITERIA

The initial search criteria included the titles (Job scheduling in cloud computing), (job scheduling techniques in cloud computing), (job scheduling in clouds) and (job scheduling in datacentres). The start year set to 2001, and the end year was 2012. Only papers written in English were included.

V. IMPROVED MAX-MIN TASK SCHEDULING ALGORITHM [3]

Max-min algorithm allocates task T_i on the resource R_j where large tasks have highest priority rather than smaller tasks [6]. For example, if we have one long task, the Max-min could execute many short tasks concurrently while executing large one. The total makespan, in this case is determined by the execution of long task. But if meta-tasks contains tasks have relatively different completion time and execution time, the makespan is not determined by one of submitted tasks. They try to minimize waiting time of short jobs through assigning large tasks to be executed by slower resources. On the other hand execute small tasks concurrently on fastest resource to finish large number of tasks during finalizing at least one large task on slower resource. Based on these cases, where meta-tasks contain homogeneous tasks of their completion and execution time, they proposed a substantial improvement of Max-min algorithm that leads to increase of Max-min efficiency. Proposed improvement increases the opportunity of concurrent execution of tasks on resources.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

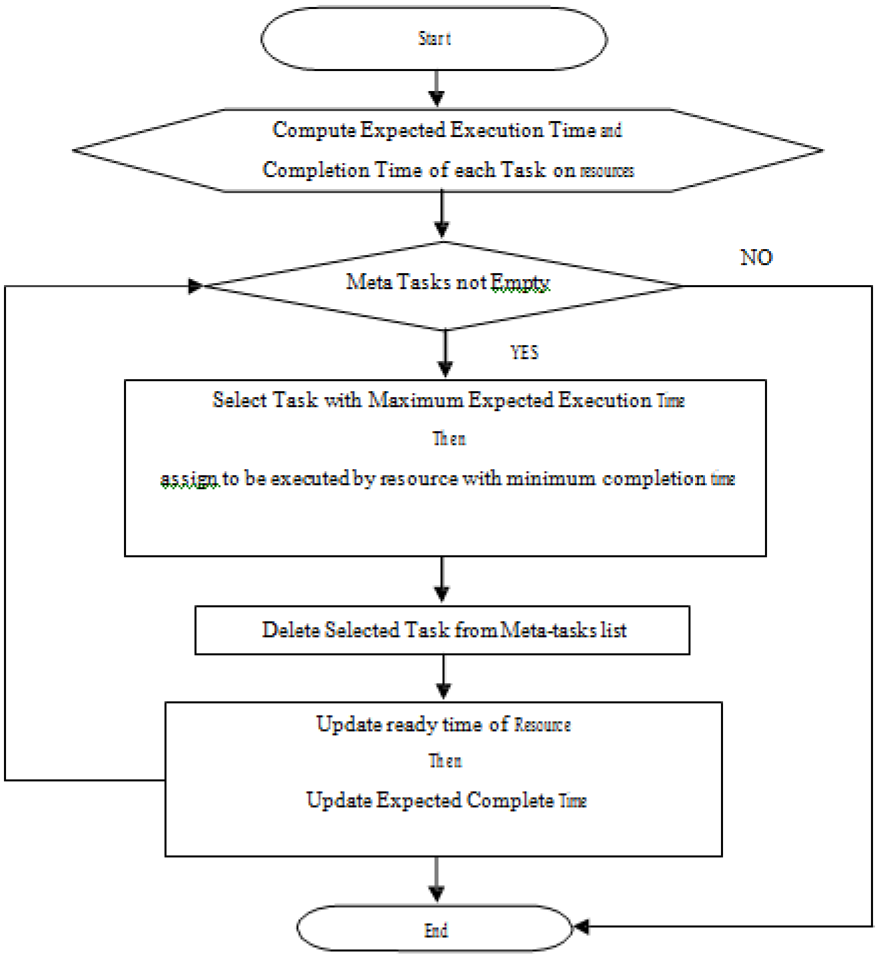
International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

Flowchart:



Algorithm:

1. For all submitted tasks in Meta-task; T_i
   1.1. For all resources; R_j
      1.1.1. $C_{ij} = E_{ij} + r_j$
2. Find task T_k costs maximum execution time (Largest Task).
3. Assign task T_k to resource R_j which gives minimum completion time (Slowest resource).
4. Remove task T_k from Meta-tasks set.
5. Update r_j for selected R_j.
6. Update C_{ij} for all j.
7. While Meta-task not Empty
   7.1. Find task T_k costs maximum completion time.
   7.2. Assign task T_k to resource R_j which gives minimum execution time (Faster Resource).
   7.3. Remove Task T_k form Meta-tasks set.
   7.4. Update r_j for Selected R_j.
   7.5. Update C_{ij} for all j.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

The algorithm calculates the expected completion time of the submitted tasks on each resource. Then the task with the overall maximum expected execution time (Largest Task) is assigned to a resource that has the minimum overall completion time (Slowest Resource). Finally, this scheduled task is removed from meta-tasks and all calculated times are updated and then applying max-min algorithm on remaining tasks. Selecting task with maximum execution time leads to choose largest task should be executed. While selecting resource consuming minimum completion time means choosing slowest resource in the available resources. So allocation of the slowest resource to longest task allows availability of high speed resources for finishing other small tasks concurrently. Also, we achieve shortest makespan of submitted tasks on available resources beside concurrency.
"Select task with the overall maximum expected execution time (Largest Task) then assign to be executed by resource with minimum expected completion time (Slowest Resource)".

VI. ENHANCED MAX-MIN TASK SCHEDULING ALGORITHM (PROPOSED)

Sometimes largest task is too large compared to other tasks in Mata-task, in that kind of case overall makespan is increased because too large task is executed by slowest resource first while other tasks are executed by faster resource OR when there is major difference among slowest and fastest resource in context of processing speed or bandwidth in that case largest task is executed by slowest resource cause increasing in Makespan and load imbalance across resources.
Therefore, instead of selecting largest task if we select Average or Nearest greater than average task then overall makespan is reduced and also balance load across resources.

Algorithm:

1. For all submitted tasks in Meta-task; T_i
    1.1. For all resources; R_j
        1.1.1. $C_{ij} = E_{ij} + r_j$
2. Find task T_k costs Average or nearest Greater than Average execution time.
3. Assign task T_k to resource R_j which gives minimum completion time (Slowest resource).
4. Remove task T_k from Meta-tasks set.
5. Update r_j for selected R_j.
6. Update C_{ij} for all j.
7. While Meta-task not Empty
    7.1. Find task T_k costs maximum completion time.
    7.2. Assign task T_k to resource R_j which gives minimum execution time (Faster Resource).
    7.3. Remove Task T_k form Meta-tasks set.
    7.4. Update r_j for Selected R_j.
    7.5. Update C_{ij} for all j.

So in Enhanced Max-min, task selection scenario is changed, it is stated as "Select task with Average or Nearest
greater than average execution time (Average or Nearest greater than average task) then assign to be executed by resource with minimum completion time (Slowest resource)".

VII. THEORETICAL ANALYSIS

In this we shall discuss the experimental results done on the cloud simulator with the existing and proposed optimization methods. From these various scheduling techniques we choose the effective task scheduling algorithm. The algorithm is implemented with the help of simulation tool (CloudSim) and the results obtained increase the performance.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

Cloudlet ID	STATUS	Data Centre ID	VM ID	Time	Start Time	Finish Time
0	SUCCESS	3	0	320	0	320
5	SUCCESS	3	0	320	0	320
1	SUCCESS	3	1	320	0	320
6	SUCCESS	3	1	320	0	320
2	SUCCESS	3	2	320	0	320
7	SUCCESS	3	2	320	0	320
4	SUCCESS	3	4	320	0	320
9	SUCCESS	3	4	320	0	320
3	SUCCESS	3	3	320	0	320
8	SUCCESS	3	3	320	0	320
101	SUCCESS	3	101	320	200	520
106	SUCCESS	3	101	320	200	520
103	SUCCESS	3	103	320	200	520
108	SUCCESS	3	103	320	200	520
100	SUCCESS	3	100	320	200	520
105	SUCCESS	3	100	320	200	520
102	SUCCESS	3	102	320	200	520
107	SUCCESS	3	102	320	200	520
104	SUCCESS	3	104	320	200	520
109	SUCCESS	3	104	320	200	520

Table 1.0 Existing System Simulation Data

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

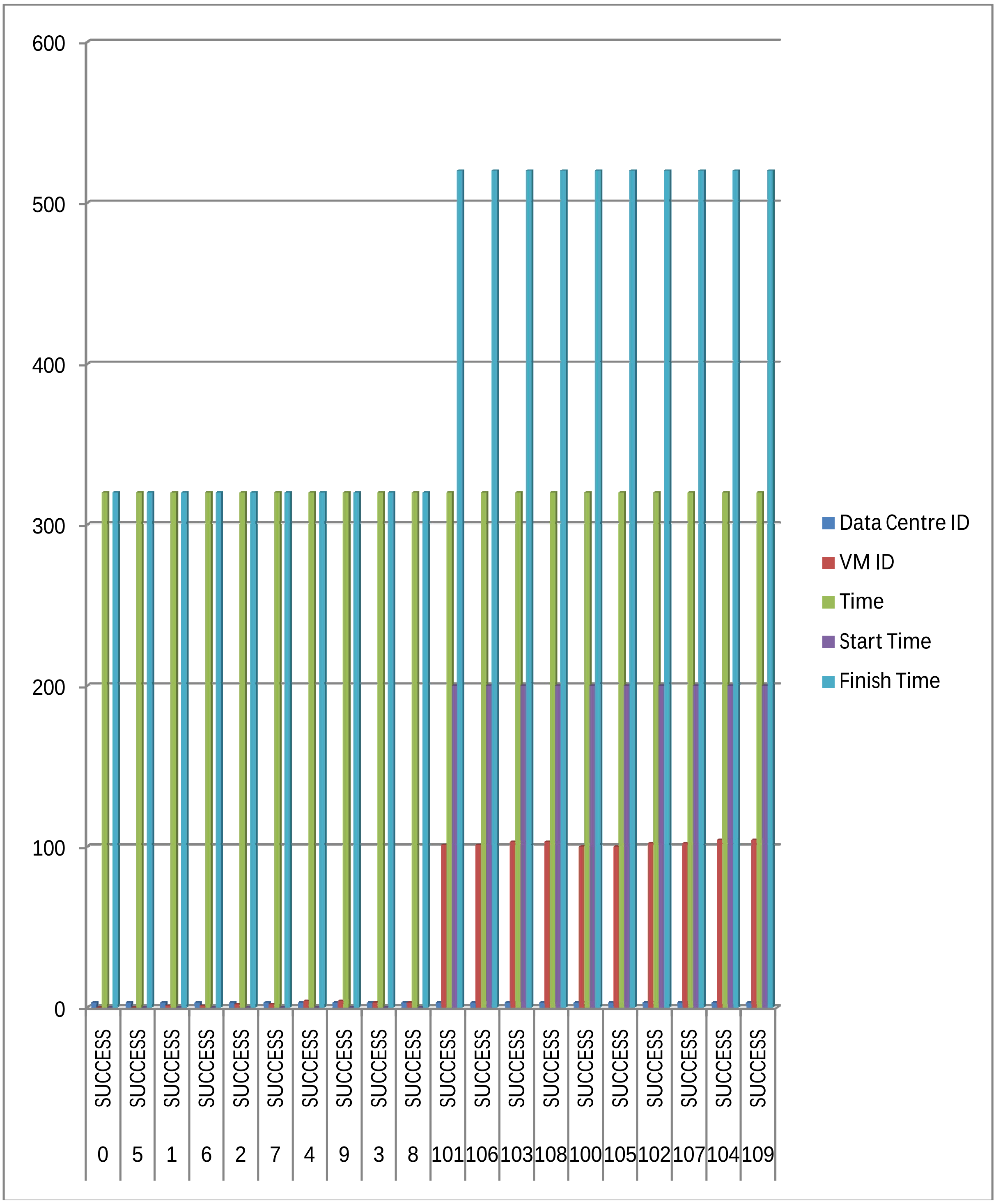


Fig. 1.0 Existing System Simulation Result Graph

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

Data canter ID	STATUS	Data Centre ID	VM ID	Time	Start Time	Finish Time
0	SUCCESS	3	0	320	0	300
5	SUCCESS	3	0	320	0	300
1	SUCCESS	3	1	320	0	300
6	SUCCESS	3	1	320	0	300
2	SUCCESS	3	2	320	0	300
7	SUCCESS	3	2	320	0	300
4	SUCCESS	3	4	320	0	300
9	SUCCESS	3	4	320	0	300
3	SUCCESS	3	3	320	0	300
8	SUCCESS	3	3	320	0	300
101	SUCCESS	3	101	320	200	500
106	SUCCESS	3	101	320	200	500
103	SUCCESS	3	103	320	200	500
108	SUCCESS	3	103	320	200	500
100	SUCCESS	3	100	320	200	500
105	SUCCESS	3	100	320	200	500
102	SUCCESS	3	102	320	200	500
107	SUCCESS	3	102	320	200	500
104	SUCCESS	3	104	320	200	500
109	SUCCESS	3	104	320	200	500

Table 1.1 Proposed System's Simulation Results

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

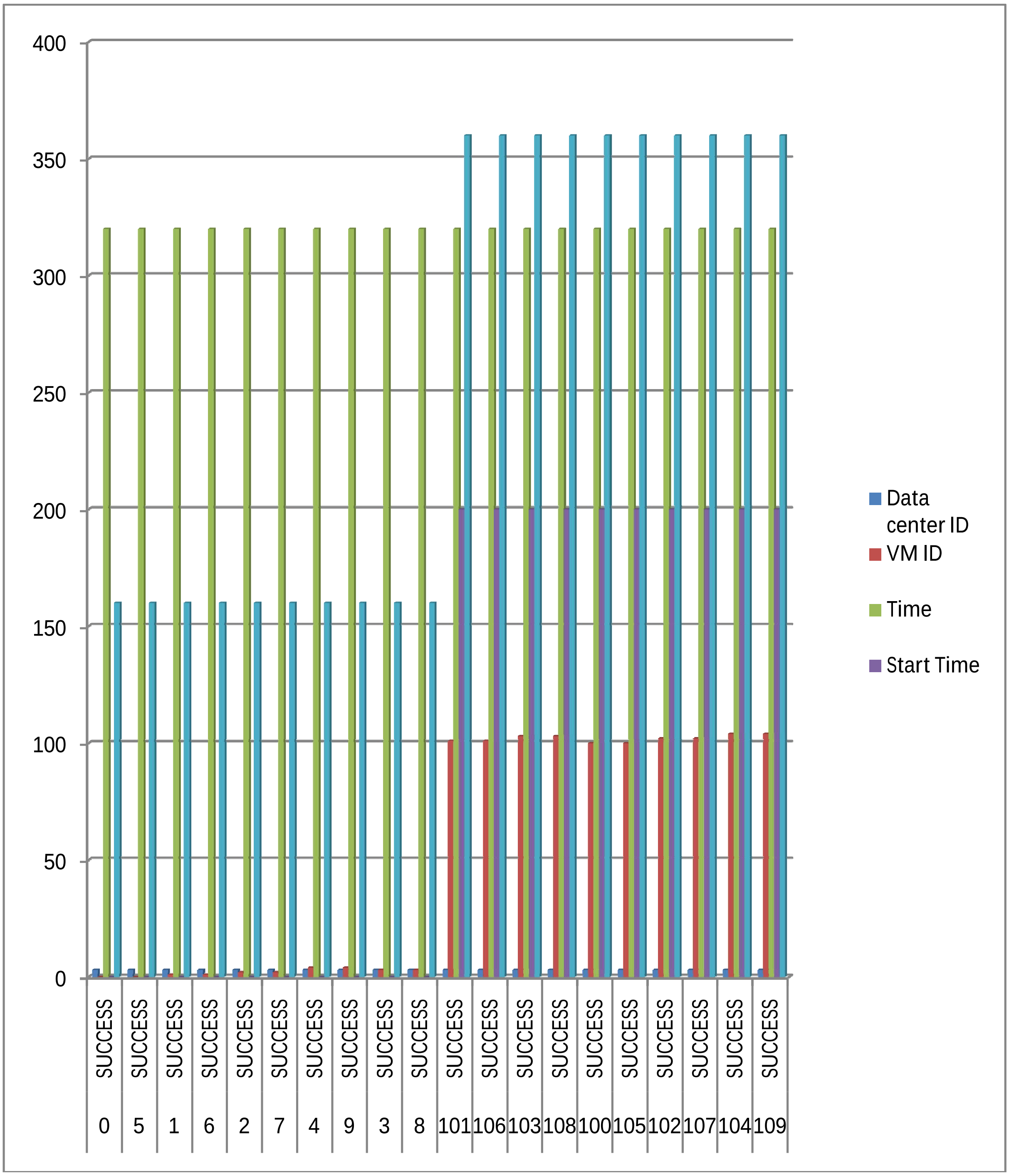


Fig 1.2 Proposed System Simulation Result Graph

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

7.2 COMPARISONS

Parameters used in the simulation include the following based on which performance of algorithm is being measured. Table shows parameter on the basis of which comparison is done.

7.2.1 Comparison Table of Energy Efficient Cloud with Existing System

Parameters	Existing System	Proposed System
Start Time	0	0
Initial Completion Time	320	300
Finish Time	520	500
Average Completion Time (For Initial Completion)	32.00	30
Status	Success	Success

Table 1.3 Comparison Table of Energy Efficient Cloud with Existing System

7.2.2 Execution Time Comparison between Existing and Proposed System

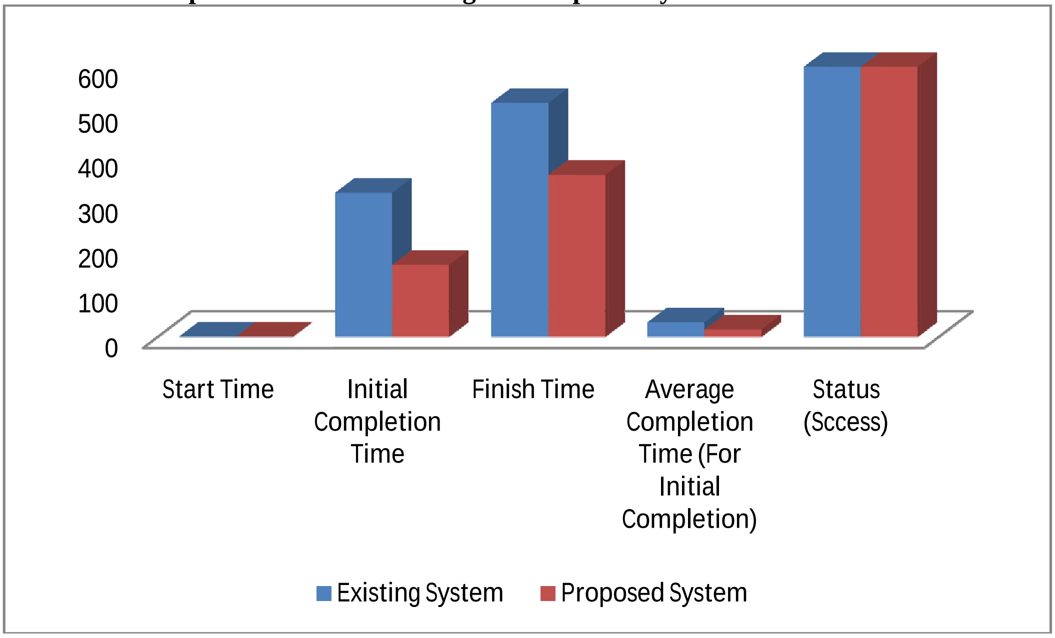


Fig 1.3 Execution Time Comparison between Existing and Proposed System

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

4.2.3 The Comparison of process finished time of the batch of 10 number of processes

Parameters	Existing System	Proposed System
Start Time	0	0
Finish Time	320	300
No. of Processes in a group	10	10

Table 1.4 Comparison of process finished time of the batch of 10 numbers of processes

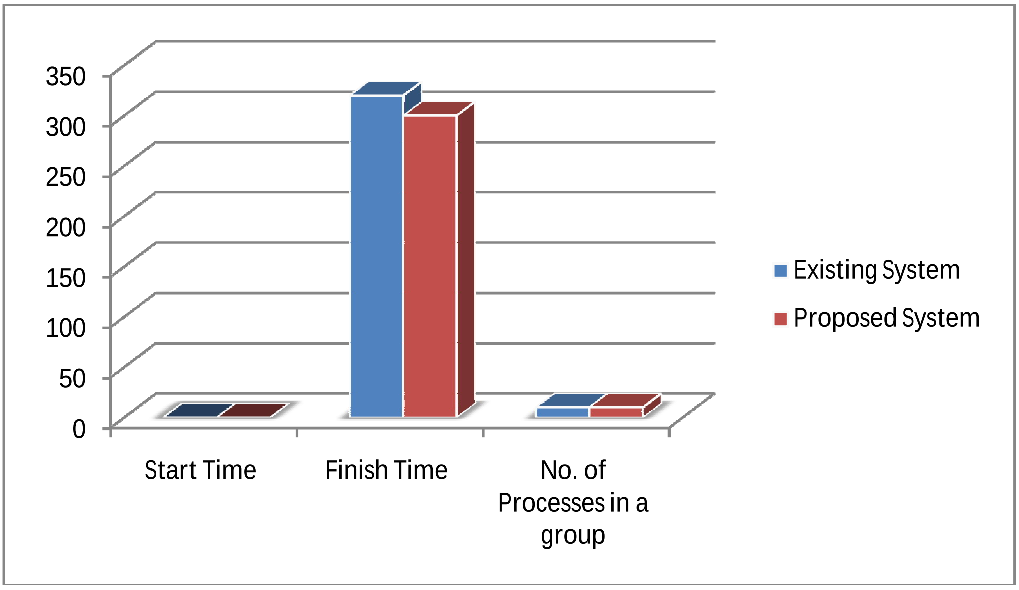


Fig 1.4 Graph of Comparison of process finished time based on ten processes

VIII. CONCLUSIONS AND FUTURE WORKS

When we schedule tasks using improved max-min task scheduling technique then in case, largest task is too large compared to other tasks in Mata-task, in that kind of case overall makespan is increased because too large task is executed by slowest resource first while other tasks are executed by faster resource OR when there is major difference

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 8, August 2017

among slowest and Fastest resource in context of Processing speed or Bandwidth in that case largest task is executed by too slow resource cause increasing in Makespan and load imbalance across resources.

Therefore, a unique modification of Improved Max-min task scheduling algorithm is proposed. The algorithm is built based on comprehensive study of the impact of Improved Max-min task scheduling algorithm in cloud computing. Improved Max-min algorithm assign task with Maximum execution time (Largest Task) to resource produces Minimum completion time (Slowest Resource) while Enhanced Max-min assign task with average execution time (average or Nearest greater than average Task) to resource produces Minimum completion time (Slowest Resource). This reduces overall makespan and balance load across resources.

For simulation, we will use CloudSim which is java based simulation toolkit that enables modeling, simulation and experimenting on designing cloud computing infrastructures.

REFERENCES

[1.] Salim Bitam, "Bees Life algorithms for job scheduling in cloud computing", International Conference on computing and Information Technology, 2012.

[2.] Saeed Parsa and Reza Entezari-Maleki, "RASA: A New Grid Task Scheduling Algorithm", International Journal of Digital Content Technology and its Applications, Vol.3, pp. 91-99, 2009.

[3.] O. M. Elzeki, M. Z. Reshad and M. A. Elsoud, "Improved Max-Min Algorithm in Cloud Computing", International Journal of Computer Applications (0975 – 8887).

[4.] Braun, T.D., Siegel, H.J., Beck, N., Boloni, L.L.,Maheswaran, M., Reuther, A.I., Robertson, J.P., et al. "A comparison of eleven static heuristics for mapping a class of independent tasks onto heterogeneous distributed computing systems", Journal of Parallel and Distributed Computing, Vol. 61, No. 6, pp.810–837, 2001.

[5.] He. X, X-He Sun, and Laszewski. G.V, "QoS Guided Minmin Heuristic for Grid Task Scheduling," Journal of Computer Science and Technology, Vol. 18, pp. 442-451, 2003.

[6.] Etminani .K, and Naghibzadeh. M, "A Min-min Max-min Selective Algorithm for Grid Task Scheduling," The Third IEEE/IFIP International Conference on Internet, Uzbekistan, 2007.