Live VM Migration with Redundancy Handling Mechanism in Cloud Computing

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Abstract— Cloud computing is an emerging technology used to ensure resource availability to users on pay-per -use basis. Cost is encountered on pay-per-use basis. Several resources including storage provided by cloud ensures clients to store critical data and information but cost is encountered as user stores the information that may be redundant in nature. This paper purposes cost efficient migration mechanism in cloud datacenter. In order to accomplish this, redundancy handling mechanism is proposed that replaces the similar information with the index value. Index file is maintained for this purpose containing all the keywords of the files in non redundant manner. As the size of the file to be migrated is reduced so does storage requirement. Storage resource thus is efficiently used to ensure reduced pricing during migration. Simulation is conducted in Netbeans with cloudsim integration and result shows 25% improvement in terms of cost and migration time from existing literature.

Keywords: Cloud Computing, Storage, Cost, Migration

I. INTRODUCTION

Cloud is for the most part intended to manage the idea of expansive measure of data once in a while known as Big Data. The cloud computing[1]allow the gadgets to store more data when contrasted with the limit of the cell phone. The cloud space[2]must be obtained by the cell phone keeping in mind the end goal to utilize the space exhibit inside the cloud. Subsequently one of unique IDs will be allotted to the gadget which are taking an interest in the cloud computing.

A. VM Migration

VM migration[3] can allow one physical memory to be divided into multiple virtual machines which share same physical devices and runs simultaneously.VM migration is way through which we can extend the space of devices like mobiles. It temporarily transfers data to the cloud. VM migration is categorised as under

B. Live virtual migration

[4]Live virtual migration is an imperative method to enhance the virtual improvement alongside physical handle in data focuses and productively adjusted the heap. While ceaselessly powered up the virtual relocation advanced starting with one physical host then onto the next, is known as live movement. From end client perspective this procedure when appropriately completed happens a recognizable impact. Without subjecting the framework's client to downtime[5]live migration allows a supervisor to take a virtual machine offline for preservation or upgrading.

C. Pre Copy Migration

In Pre-copy[6]memory migration, while the VM is not running on the source it duplicates the memory pages from begin to target. This procedure proceeds ,ifsome memory pages wind up faulty then they will be recopied until the point that the rate of duplicated pages is not as much as the messy page rate.There are two phases of post copy migration:

D. Warm Up Phase

[7]This is initialization phase causing the VM migration to start. VMs are initialised within datacenters using this approach.

E. Stop-and-copy phase

[8]After the warm-up phase, the VM will be halted on the first host, the staying faulty pages will be replicated to the goal, and the VM will be continued on the goal have. The time between ceasing the VM on the first host and continuing it on goal is called "down-time", and ranges from a couple of milliseconds to seconds as indicated by the measure of memory and applications running on the VM. There are a few systems to decrease live migration down-time, for example, utilizing likelihood thickness capacity of memory change.

F. Post-copy memory migration

[9]Post-copy VM migration is started by suspending the VM at the source. With the VM suspended, an insignificant subset of the execution condition of the VM (CPU state, registers and, alternatively, non-page capable memory) is exchanged to the objective. The VM is then continued at the objective. Simultaneously, the source effectively pushes the rest of the memory pages of the VM to the objective - a movement known as pre-paging. Thus pre-paging can powerfully adjust the page transmission request to organize faults by currently pushing pages in the region of the last blame. [10]Live VM migration is utilized as a part of request to offload the information to the VMs present inside the cloud. VM migration is partitioned into two classifications one is live and other is non live. Non live migration will make the machine close down first and afterward migration will happens. In the live VM migration the VM stays over the system and migration will takes pace. [11]The cost of exchanging the VM task from online to disconnected will be spared by the utilization of proposed paper. The VM migration in the proposed framework will be improved. The cost will be lessened and resource utilization is optimised.

G. Data Migration

In case of VM migration the entire OS system is migrated from one physical environment to another with that the whole running application with all its tasks shifted from one VM to another. But in case of data migration the whole strategy changed. In data migration some part of the application or some data is migrated from one virtual machine to another instead of whole application. The cause of data migration can be deadline, lack of resources, starvation, priority etc. [12]

In cloud environment each activity has need related with it. While execution of employment the need list is

checked first at that point as per need occupations are executed. In any case, need some of the time can be the reason for data relocation on the grounds that if the most minimal need work with least burst time aren't finished inside time then it can cause heaps of issue. To defeat these issues the data is relocated starting with one machine then onto the next so the undertakings are finished on time.

Rest of the paper is organized as follows: Section 2 presents literature survey describing cost effective mechanism along with VM migration for optimising resource utilization, section 3 describes the problems of existing literature, section 4 presents objectives and methodology to be followed, section 5 gives performance analysis, section 6 gives the conclusion and future scope and last section gives references.

II. LITERATURE SURVEY

Background analysis of various techniques associated with VM migration and storage space preservation is described in this section. Storage space preservation mechanism required to accomplish better utilization of resources to conserve cost. For this purpose [13] proposed disk space conservation using power aware cache management mechanism. Offline greedy algorithm is used to ensure shortest search path between VMs for job allocation thus conserving energy. Security of data along with duplication reduction is proposed by [14]. The process is known as deduplication. Data to be migrated to cloud first of all checked for redundancy and then encryption operation is performed. Conserving space, conserve energy as well as cost. VM migration through technique proposed by X.Zhang is efficient but still further modifications are desired as proposed by [15]. In this approach block level deduplication mechanism was proposed ensuring every aspect analysis mechanism to ensure better conservation of space.

Hashmi A. [16] proposed an algorithm whose main aim is to completely use a host by utilizing virtual machines. The two principle undertakings in cloud computing are VM distribution and assignment planning. The point is to utilize insignificant number of hosts, productive load adjusting (dynamic), low reaction/turnaround time, and low power utilization. In this paper, all VMs are available in a single server centre. Subsequently it does not considering the components like system/web transmission capacity while ascertaining delay accordingly time (as per separate b/w client and the server farm).

S. K. Mandal [17]emphasized to serve more demands at a specific time allotment, the physical machines ought to be utilized viably i.e., the virtual machine arrangement approach should be adequate to limit the quantity of physical machine utilized, thinking about the cost and SLA. In this paper it talked about some virtual machine arrangement approaches received by different open-source cloud processing arrangements. In this the depiction of proposed strategy named VM Scheduler for virtual machine arrangement has been done.

L. Fabio[18]introduced a broad progressive survey of the most important VMP writing with a specific end goal to distinguish look into circumstances. Cloud Computing Datacenters have a great many virtual machines (VMs) on genuine situations. In this specific circumstance, Virtual Machine Placement (VMP) is a standout amongst the most difficult issues in cloud foundation administration, considering likewise the extensive number of conceivable streamlining criteria and diverse details that could be contemplated. VMP writing incorporate important subjects, for example, energy-efficiency, Service Level Agreements (SLA), cloud benefit markets, Quality of Service (QoS) and carbon dioxide outflows, every one of them with high practical and environmental effect.

A. Shankaret. al. [19]proposed a GGA algorithm. GGA works well in most of the cases, irrespective of the number of constraints being high or low. It is important to choose a feasible initial solution, because the genetic operators are applied to this solution. In order to get a solution in fixed time, this can put a restriction on the number of generations. Thus, it may end up not getting the optimal solution, but the solution will be better than the one it had begun with.

P. Daharwalet. al. [20]presented an overview on the sorts of cloud, design of cloud and diverse asset portion and booking calculations for cloud. Cloud comprises of a few physical machines and over them numerous virtual machines are executed. So cloud asset booking turns into a NP-Hard issue. Along these lines in this paper a portion of the normally enlivened meta-heuristic and developmental calculations are contemplated which incorporates Genetic calculation, Ant settlement advancement and relocating Bird enhancement. In future an asset booking calculation by altering the Genetic calculation wellness capacity can be proposed which may give energy productive planning for the cloud in the continuous.

Further improvements in terms of storage space conservation are desired for cost reduction. As from analysed survey, least amount of work is done to ensure cost conservation through space conservation. This paper present cost aware mechanism for VM migration to ensure efficient use of storage space.

III. PROPOSED SYSTEM

Proposed system consists of phases including optimal VM selection from within the data center. Datacenter is associated with the resources. Based on those resources, VMs are extracted out of the datacenter. VM placement becomes critical while allocating resources to the cloudlets. So the first phase performs the sorting operation on the basis of maximum resource first mechanism.

A. Phase 1:

In this phase, VMs sorting operation is applied. The operation gives VM_list which is sorted on the basis of maximum resources first and least resources VM at last place. In order to allocate the task, VM is selected from VM_List which is at first place and then rest of the VMs are selected on the order of first come first serve basis. Algorithm for the first phase is as under

1) Algorithm Phase 1

1) Input VM_Req corresponding to the jobs
2) Input Datacenter Requirements including RAM, PES and Power

3) $VM_i = \frac{Datacenter_i}{VM_{Req}}$

where VM_igives total number of VMs

Step 3 is repeated until all the datacenters are partitioned to corresponding VMs.

4) Perform sorting according to maximum RAM,PES, power and cost
5) Stores all VMs in VM list.

B. Phase 2:

In this phase, VMs data or cloudlet is checked for redundancy and it is handled using modified replication handling mechanism. Algorithm for doing so is given as under

1) Input Cloudlets.
2) $Buffer_i = Cloudlet_i$
3) Repeat while $i < N$ where N is the total clodlets
4) Check for replicated cloudlets

$$if(cloudet_i == buffer_i)$$
$$index = Cloudlet\_i$$
Replace cloudlet with index

I=i+1

End of loop

C. Phase 3

In the phase 3 cloudlets so obtained are replaced with original cloudlets and allocation is done to optimal VMs for execution. In case of failure of current VM next VM from VM list is selected for allocation causing inter datacenter migration. Cloudlet execution process is given as under

1) Fetch VMs from Vm_list
$$VM_i = VM\_list_i$$
2) Allot cloudlet to the VM
$$VM_i = Cloudlet_i$$
3) Analyse failure of current VM
$$if\ failed(VM_i) == true$$
I=i+1

Select VM from VM_List

$VM_i = VM\_List_i$(inter Cloud datacenter migration)

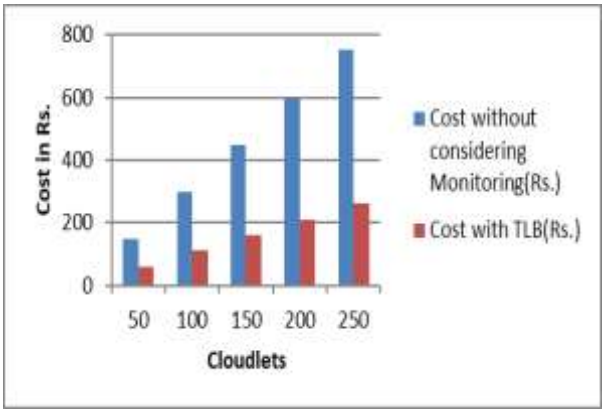
$finished(Cloudlet_i) == true$

Goto next step otherwise goto step 3.

4) Cloudlet executed and note the result in terms of exaction time and cost
After all the cloudlets executed, result is attained and performance is compared against the existing literature without optimal VM selection and buffer allocation method.
5) Performance Analysis
Performance analysis gives the results attained from the proposed system. The result is presented in terms of cost and execution time. The results indicate the performance enhancement upto 25%.

Cloudlets	Cost without Considering Redundancy	Cost with Redundancy handling(Rs.)
50	150	60
100	300	110
150	450	160
200	600	210
250	750	260

Table 1: Cost comparison of existing and proposed system

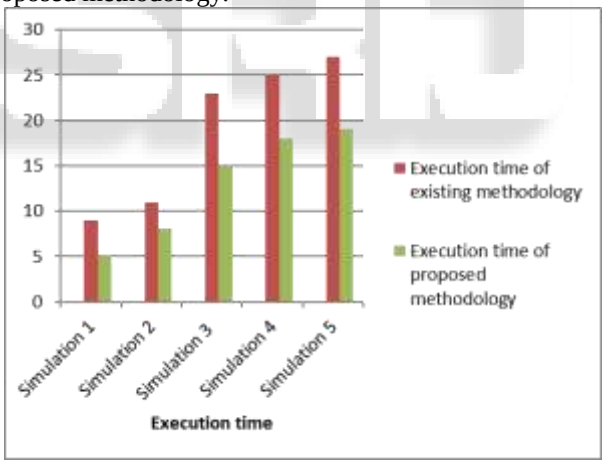


In term of execution time

Simulation	File Size(KB)	Execution time of existing methodology	Execution time of proposed methodology
Simulation 1	1024	9	5
Simulation 2	2048	11	8
Simulation 3	2056	23	15
Simulation 4	2089	25	18
Simulation 5	2090	27	19

Table 2: Comparison in terms of Execution time

Execution time also greatly reduced by the use of proposed methodology.



IV. CONCLUSION & FUTURE SCOPE

This paper pays a stress on existing migration techniques for data. The migration of data involves time and space complexity. The time complexity avoids the use of data migration hence reduces utilization of cloud in modern era. The proposed system uses buffer method for replication handling along with optimal VM selection procedure for cost reduction. Result obtained shows improvement by 25% in terms of cost and execution time. Some modification to existing techniques including redundancy handling, integrity check and priority calculation for migrations are required for improving existing data migration. In case cost, space and time complexity associated with migration is reduced then cloud usage in near future could be improved greatly.

REFERENCES

[1] R. Buyya, C. S. Yeo, and S. Venugopal, "Market-oriented cloud computing: Vision, hype, and reality for delivering IT services as computing utilities," Proc. - 10th IEEE Int. Conf. High Perform. Comput. Commun. HPCC 2008, pp. 5–13, 2008.
[2] A. Luntovskyy and J. Spillner, "RAIC integration for network storages on mobile devices," Int. Conf. Next Gener. Mob. Appl. Serv. Technol., pp. 142–147, 2013.
[3] S. Fiebig et al., "DETECTING VM LIVE MIGRATION USING A HYBRID EXTERNAL APPROACH," no. May, 2013.
[4] Z. Li, "Optimizing VM Live Migration Strategy Based On Migration Time Cost Modeling," pp. 99–109, 2016.
[5] M. R. Desai, "Efficient Virtual Machine Migration in Cloud Computing," no. Vm, pp. 1015–1019, 2015.
[6] and Z. L. F. Ma, F. Liu, "Virtual machine migration based on improved pre-copy approach," Proc. IEEE Int'l Conf. Softw. Eng. Serv. Sci., pp. 88–97, 2010.
[7] Y. Sharma, B. Javadi, W. Si, and D. Sun, "Journal of Network and Computer Applications Reliability and energy ef fi ciency in cloud computing systems : Survey and taxonomy," vol. 74, pp. 66–85, 2016.
[8] N. R. Katsipoulakis, K. Tsakalozos, and A. Delis, "Adaptive Live VM Migration in Share-Nothing IaaS-Clouds with LiveFS," in 2013 IEEE 5th International Conference on Cloud Computing Technology and Science, vol. 2, pp. 293–298, 2013.
[9] M. S. Y. Abe, R. Geambasu, K. Joshi, "Urgent Virtual Machine Eviction with Enlightened Post-Copy," 12th ACM SIGPLAN/SIGOPS Int. Conf. Virtual Exec. Environ, pp. 51–64, 2016.
[10] [10] Z. W. Su, W. Chen, G. Li, "RPFF: A Remote Page-fault Filter for Post-copy Live Migration," IEEE Int. Conf. Smart City/SocialCom/SustainCom together with DataCom, pp. 936–943, 2015.
[11] D. Kapil, E. S. Pilli, and R. C. Joshi, "Live virtual machine migration techniques: Survey and research challenges," in 2013 3rd IEEE International Advance Computing Conference (IACC), pp. 963–969,2013.
[12] A. Dhingra and S. Paul, "A Survey of Energy Efficient Data Centres in a Cloud Computing Environment," vol. 2, no. 10, pp. 4033–4040, 2013.
[13] Qingbo Zhu, F. M. David, C. F. Devaraj, Zhenmin Li, Yuanyuan Zhou, and Pei Cao, "Reducing Energy Consumption of Disk Storage Using Power-Aware Cache Management," 10th Int. Symp. High Perform. Comput. Archit., pp. 118–118, 2008.
[14] D. M. X. Zhang, Z. Huo, Jie Ma, "Exploiting Data Deduplication to Accelerate Live Virtual Machine Migration," IEEE Int. Conf. Clust. Comput., pp. 88–97, 2010.
[15] R. Chen, Y. Mu, G. Yang, and F. Guo, "BL-MLE: Block-Level Message-Locked Encryption for Secure Large File Deduplication," IEEE Trans. Inf. Forensics Secur., vol. 10, no. 12, pp. 2643–2652, Dec. 2015.
[16] A. Hashmi, "Cloud Computing : VM placement & Load Balancing," vol. 3, no. 11, pp. 9197–9200, 2014.
[17] S. K. Mandal, "On-Demand VM Placement on Cloud Infrastructure on-Demand VM Placement on Cloud Infrastructure Master of Technology."
[18] L. Fabio, "Virtual Machine Placement Literature Review," no. 1.
[19] A. Shankar, G. By, and U. B. April, "Virtual Machine Placement in Computing Clouds," no. 9305920, 2010.
[20] P. Daharwal and S. Rgpv, "Energy Efficient Cloud Computing Vm Placement Based On Genetic Algorithm," vol. 44, no. 1, pp. 15–23, 2017.

