

# Energy Efficient VM Migration in Cloud Datacenter using Dolphin Echolocation Optimization with Tchebycheff Algorithm



Rajesh P. Patel

**Abstract:** *The workload in cloud computing surroundings changes progressively delivering unwanted circumstances, for example, load unbalancing and minor usage. Virtual machine migration is an impressive plan in such circumstances in order to improve system performance. With a specific end goal to give productive energy virtual machine migration is essential that migrates a running virtual machine without disconnecting the client or application. In any case, an algorithm in view of a single objective is generally familiar with to coordinate the migration process. Unexpectedly, there stay alive unconsidered variables affecting the migration process, for example, burden capacity, power utilization and resource wastage. We offer a multi-objective algorithm for obtaining VM migration by evaluating the multi objectives that are responsible for migration overhead. In this manner, we suggest a narrative relocation approach united by a Multi objective Dolphin Echolocation Optimization Algorithm (MO-DEOA) to assess several objectives. The aim is to efficiently obtain improved migration that concurrently diminishes power consumption by guaranteeing the performance of the system.*

**Index Terms:** Multi Objective Dolphin Echolocation Algorithm, Tchebycheff Algorithm, VM migration

## I. INTRODUCTION

The expansion in computation capability and storage technologies in fast mode and grand success of internet, computing resources have become less costly, more powerful and more obtainable than past. This innovation in computing called cloud computing [1]. This computing model has become a concrete base for a many ventures and user applications [2]. Cloud applications, resources and services are accessible to consumers using thin clients everywhere and any time [3]. Cloud services have become a dominant architecture to perform complex large-scale computing every day jobs and extent a range of IT functions from computation and storage to database and application services. The requirement to process, analyze and to store big amounts of datasets has motivated many organizations and individuals to accept cloud computing [4]. The consumer, scientific and business applications can be easily host on cloud which is pay as you go model.

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The cloud datacenter applications have high operational costs, use splendid amounts of electrical energy and emission of CO<sub>2</sub> in environment [5]. The developing technology like Internet of services is on-demand services for platform, user applications and computing infrastructures.

Many challenges are addressed by cloud society relate to deployment of infrastructure, elastic service platforms on demand, scalable services. To improve energy efficiency, cloud providers need to upgrade cloud aggregation architecture [6]. The datacenter's enormous energy consumption has major impact on electric power. The data centers are energy-hungry and distributed at different locations geographically [7] Energy consumption is a serious issue for environment and financial in cloud which has become an important apprehension for providers who are looking to reduce the amount of energy consumption.[8] Power supply and core speed are decreased when there are small number of tasks in server. Conversely it is increased when more tasks in a server [9]. Virtual machine workload consolidation is a key feature to reduce the energy consumption in data center by properly consolidating in a big scale which is very essential. [10] Live migration enables proper balancing the workload on servers so unused servers or under-loaded physical servers can be switched off which reduce the consumption [11]. Virtual machine (VM) placement is considered as a bin packing problem where objective is to put properly the VMs in physical machines [12]. Recent survey in cloud more consternate on binding live migration of VMs to accomplish the load balancing and power saving among dissimilar servers[13]. In the proposed model Multi-objectives which are responsible for the power consumption are evaluated using Multi Objective Dolphin Echolocation Algorithm. The finest set generated by MO-DEOA will be an among several migration strategy we have to select the best migration plan which can be done by Tchebycheff Algorithm. The paper is ordered like; in section 2 scheduled some of the recent research related to the energy efficient VM migration in order to provide good power consumption. Section 3 provides the future method for energy efficient VM migration. Section 4 specified the detail description on implementation results and in the subsequent sections conclusion for this paper and given the list of references.

## II. RELATED WORK

Corradi A *et al.* [14] focused on VM consolidation from a pragmatic perspective,



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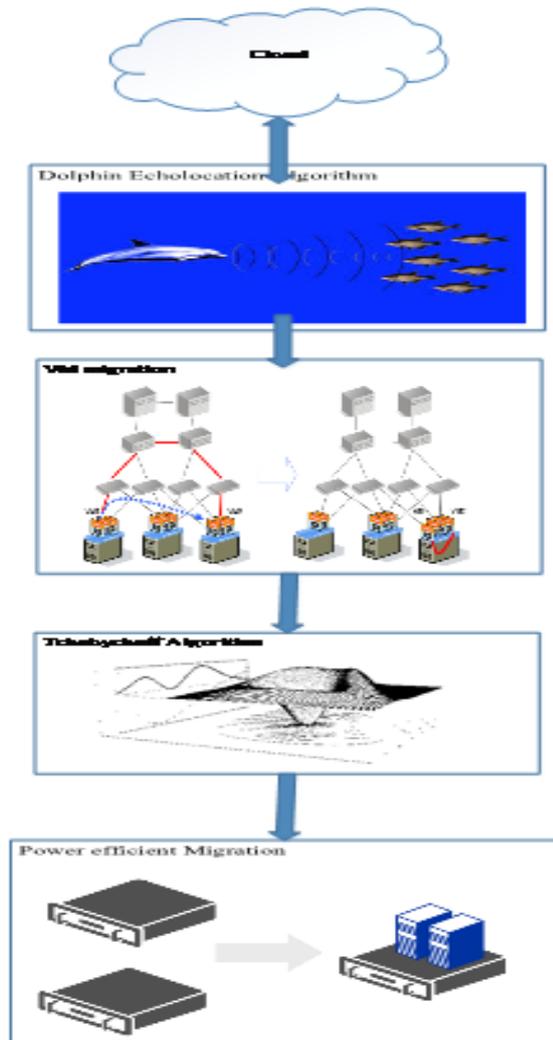
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with precise consideration on the consolidation feature linked to power, processor, and network resource. The work focused power consumption, host resources and networking for which it offered a Cloud organization platform to optimize VM consolidation. The experimental results noticed which indicate that interventions amid VMs to be cautiously measured to evade placement results. It cannot guarantee VM provisioning with service level guarantees. Virtualization method is to provision virtual machines on the same physical host to use available resources. Cloud vendors like IBM, Google, and Amazon initiated the development and deployment of many cloud computing solutions to minimize the exploit of data centers. By considering the collective resource consumption of co-located VMs in turn to evade performance decline. Now a day's open source platform like Eucalyptus and open stack are also in progress. Zhang F *et al.* [15] presented a multi-objective scheduling (MOS) scheme was particularly customized for cloud computing which is depends on ordinal optimization which was at first urbanized by the automation society for the design optimization of very compound dynamic systems. They showed the sub optimality through mathematical analysis. The work was extended for cloud platforms that affect to virtual clusters of servers from multiple data centers. The main advantage of MOS method is reduced scheduling overhead time and provides optimal performance. The Wide-ranging tests were performed on the clusters of 16 to 128 virtual machines. LIGO multitasking workload which is of real scientific workload was obtained for earth gravitational wave study. The results of experiments showed that the algorithm quickly and successfully produced a little set of semi-optimal development results. In distributed computing environment the scheduling algorithm of a multiple task was a famous NP hard problem. The problem becomes further complicated when the virtualized clusters were used to execute a many numbers of tasks in a cloud platform. The tests on a 128-system virtual cluster was performed and the system gave thousand times of decline in the seek time which is in contrast with the use of Monto Carlo and the blind pick technique for the purpose. The problem was even more complex and challenging when the virtualized clusters were used to implement a large number of tasks in a cloud computing platform. The complexity lied in fulfilling numerous objectives which are contradictory. Fiandrino C *et al.* [16] utilized a skeleton of metrics able to review outcome and energy efficiency of cloud computing systems, processes and protocols. The metrics have been assessed for the data centre together with fat tree three-tier, BCube, DCell and Hypercube. Evaluation of performance and power consumption of data centre becomes a basic need. The service provisioning approach of cloud over the internet is very demanding which is based on pool of shared computing resources available on demand. The power-related metrics such as NPUE which is power-related metrics measure with well granularity energy efficiency of

the cloud and let data centre operator to minimize their savings in networking components. The ALUR, allow thorough supervised and evaluation of network throughput, delay and error rate performance. Pop F and Potop-Butucaru M [17] employed adaptive methods they were leaning on: self-controllable, self-managerial systems; dynamic, accommodative and machine learning dependent disseminated algorithms; fault acceptance, dependability, accessibility of disseminated systems. Cloud Computing came with face up to: increase the revenue for cloud service supplier, reduce the expenses for clients and being responsive with the surroundings. This unique issue offered proceeds in virtual machine obligation and placement, multi-objective and multi-constraints job scheduling. The current development of cloud systems has directed to adjusted resource organization results for big number of broad distributed and heterogeneous datacenters. Gai k et al. [18] used an active energy-aware cloudlet-based mobile cloud computing model (DECM) more center of attention on explaining the extra energy exploitation during the wireless communications by influencing dynamic cloudlets (DCL)-based model. Mobile cloud computing employment which enables movable users to obtain advantage of cloud computing by an ecological forthcoming process was a capable scheme for gathering present engineering need. Limitations of wireless bandwidth and machine ability have fetched a range of barriers, like additional energy dissipate and delay, when organizing MCC.

### III. PROPOSED MODEL

Cloud computing provides auspicious platforms for accomplishing huge applications with massive computational resources to offer on demand. Though cloud computing acceptance augment, the energy utilization of the system is growing and the data centers consume enormous quantities of energy. Now a days energy consumption is flourishing in cloud data centers. Superior power consumption will affect the data center efficiency which results further power requirement. So as to improve data-center effectiveness, resource consolidation using virtualization methodology is becoming significant for the lessening of the environmental effect produced by the data centers. One of the significant bases in resource consolidation is the assigning of virtual machines to proper physical machines is called VM migration.



**Figure 1: Architecture of Proposed Model**

Although there are many existing algorithms in traditional cloud environments, they have difficulties in being reliably applied to the Cloud surroundings by its service-based resource handling method and pay-per-use pricing strategies. This paper proposes Multi objective Dolphin Echolocation Optimization Algorithm (MO-DEOA) for an energy efficient cloud computing. The result will be a set of solutions by means of some parameters which are responsible for the power consumption. To obtain the better solution from a set of solutions we present a new algorithm called Tchebycheff Algorithm for ranking VM. Here we consider set of VMs affected by some workload circumstances and are held by the source node. In our proposed model, the selection judgment to choose one or some list of Virtual Machines to be transferred to the new destination servers is two stages process.

(i) Stage I: To discover an ideal set of Virtual Machines (VMs) based on MO-DEOA, and then arrange VMs in the finest set by the Tchebycheff Algorithm to choose VMs with best position to fulfill the succeeding objective concurrently: (1) BC (2) PD (3) T (4) RW and (5) MR.

(ii) Stage II: To assess the main objective responsible for the migration. Here two objectives are considered, the first is the CPU and the memory utilization, which imitate resource wastage efficiency, power consumption and temperature effectiveness at the source. If the movement of the chosen

VM has obtained the goal, the process ends; if not, the process contains the selected VM in the ration list and revises the VMs' position to choose another one continually until the targets are met.

**A. Multi Objective Dolphin Echolocation Optimization Algorithms (MO-DEOA)**

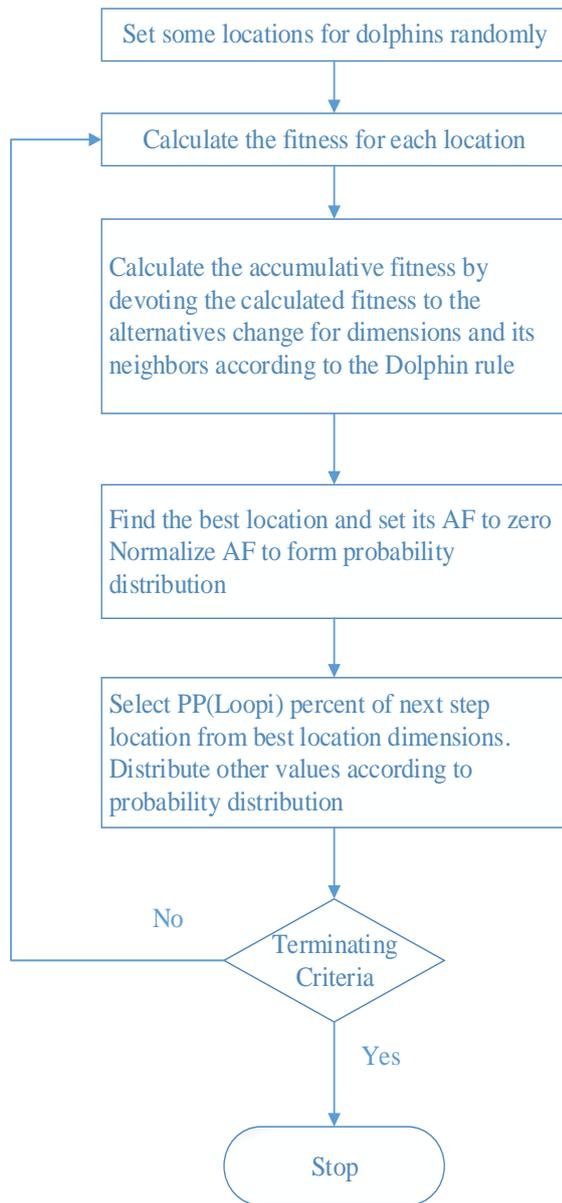
For the optimization purpose we are picking Dolphin echolocation enhancement. Dolphins essentially research everywhere the search space to find the victim. The minute a dolphin methodologies the objective, the creature keep its hunt, and incrementally builds its snap to focus on the area. The strategy reenacts (to repeat the actions of an event that happened in the past as a hobby or as a performance) dolphin echolocation by controlling its investigation in respect to the separation from the objective. Before beginning, search space ought to be dealt with by utilizing the accompanying regulation: To optimize each variable amid the method, sort the preferences of the inquiry space in a downward request. In the event that choices make note of more than one trademark, then complete requesting as indicated by the most noteworthy one. Utilizing this system, for variable  $j$ , vector  $A_j$  of length  $LA_j$  is formed to hold every single likely option for the  $j^{th}$  variable placing vectors hence to one another, as the columns of a matrix, the Matrix substitute

$MA + NV$  is formed,  $MA$  is  $\max(LA_j)_{j=1:N}$ , with  $NV$  is

the quantity of variables. Furthermore, a arc as per which the convergence factor must change amid the optimization procedure ought to be appointed. Here, the vary of convergence (CF) is measured as

$$PP(LOOP_i) = PP_i + (1 - PP_1) \tag{1}$$

$PP$  is predefined probability,  $PP_1$  the convergence factor of the first loop,  $LOOP_1$  the amount of the present loop. The methodology of MO-DEOA as takes after



**Figure 2: Flowchart of Dolphin Echolocation Algorithm**

- 1) Begin NL areas for a dolphin self-assertively. This stride (step) encase (cover) making LNL+NV matrix, where NL is the quantity of positions and NV is the quantity of variables.
- 2) Process the PP of the loop utilizing Eq. (1).
- 3) Compute the fitness of every area.
- 4) Compute the collective fitness as indicated by dolphin echolocation policy as takes after.
  - for  $i = 1$  to magnitude location
  - for  $j = 1$  to magnitude of variable
  - discover the location of  $L(i, j)$  in  $j^{\text{th}}$  column of the substitute matrix  $A$ . for  $k = -R_e \text{ to } R_e$

$$AF_{(A+k)_j} = \frac{1}{R_e} * (R_e - |k|) \tag{2}$$

$AF_{(A+k)_j}$  is the cumulative strength of the  $(A + k)^{\text{th}}$  distinct option to be decided for the  $j^{\text{th}}$  variable,  $R_e$  is the efficient arc to the collective fitness of the option A's neighbors are

influenced from its strength. Fitness (i) is the strength of location i. It ought to be supplementary that for choices near edges, the AF is ascertained utilizing an intelligent trademark. Keeping in mind the objective is to distribute the alternative much equally in inquiry space, a small estimation of  $\varepsilon$  is supplementary to every one of the clusters as  $AF = AF + \varepsilon$  Here,  $\varepsilon$  ought to be chosen by technique the fitness is characterized. Locate the peak place of this loop and call it "The finest location".

Find out the choices designated to the variables of the top location, and make AF be equivalent to zero. It can be characterized as takes after

- for  $j = 1$ : quantity of variables
- for  $i = 1$ : quantity of alternatives  
if  $i =$  The most excellent place(j)

$$AF_{ij} = 0 \tag{3}$$

For variable  $j_{(j-1 \text{ to } NV)}$  form the likelihood of selection

substitute  $i_{(i-1 \text{ to } AL_j)}$ , as indicated by the associated correlation:

$$P_{ij} = \frac{AF_{ij}}{\sum_{i=1}^{LA_j} AF_{ij}} \tag{4}$$

Distribute a likelihood equivalent to PP to all options decided for all variables of the top position and commit rest of the prospect to alternate substitutes as per the accompanying equation:

- for  $j = 1$ : quantity of variables
- for  $i = 1$ : quantity of substitutes
- if  $i =$  The finest position(j)

$$P_{ij} = (1 - PP)P_{ij} \tag{5}$$

Figure the in this way step positions as per the probabilities relegate (transfer) to every option. Imitate Steps 2) to 6) the same number of times as the Loops Number.

**MO-DEOA for solving optimal VM migration**

- Prompt the depiction of the issue and pick the locations of dolphin arbitrarily
- Figure the strength for every positions
- Figure aggregate strength by committing the proposed strength to the options decided for every measurement and its neighbor as indicated by the dolphin regulations and locate the best position.



- Dole out the probability of the most fantastic position equivalent to the predefine plausibility esteem in the present circle and distribute the rest of the probability among different options as indicated by the planned collective fitness's.
- Pick next loop positions as per the outlined probability
- Is ending basis come to if yes terminate or go to step 2.

**B. Parameter Formulation**

Our proposed model considers five parameters to appraise the migration of virtual machine from Source  $V_s$  to destination  $D_j$ .

**Burden Capacity (BC)**

Depends upon the measurements like CPU, network and memory a VM can be overloaded we are going to re-claim the metric that seizes the collective CPU, network and memory capacity of a virtual as well as server. Consider  $U_c$  is the utilization of CPU;  $U_m$  is the utilization of memory and  $U_n$  is the network usage. The BC of a server or virtual machine is the formation of its CPU, network and memory capacity like

$$BC = \frac{1}{1-U_c} \cdot \frac{1}{1-U_m} \cdot \frac{1}{1-U_n} \tag{6}$$

**Power Decay (PD)**

The functional PD for a server node encompasses static energy decay  $E_s$ , which represents the static power decay  $P_s$  of all system components apart from the CPU in fraction to the all set time, and active energy decay  $E_d$  of the running applications, which rely mostly on the dynamic power  $P_d$  is

$$PD = E_s + E_d \tag{7}$$

The dynamic power  $P_d$  of the CPU is generally relative to the CPU frequency  $f_p$  given by

$$P_d = k \cdot f_p^3 \tag{8}$$

Where, k is proportionality constant. Consequently, we deliberate an application with execution time t, and the CPU runs at frequency  $f_p$  such that  $0 < f_p < f_m$  the execution time is defined by  $t/(f_p/f_m)$ . Thus the dynamic energy

decay  $E_d$  for this application is given by

$$E_d = \int_0^{t/(f_p/f_m)} P_d = k \cdot t \cdot f_m \cdot f_p^2 = \alpha \cdot t \cdot S^2 \tag{9}$$

Where  $\alpha$  is the proportionality constant and S is the related CPU speed connected to the  $f_p$  ( $S = f_p/f_m$ ) in equation (8), the energy decay for the system is affected unwaveringly by the BC. Nevertheless, still the BC of two systems are equivalent, the power decay can contrast in accordance to the system ability for every node as described in second equation.

**Temperature (T)**

The Temperature for a datacenter server is relative to the functional power of the system and the surrounding heat  $T_{amb}$  given by

$$T = P \cdot R + T_{amb} \tag{10}$$

Where, R is resistance.

**Resource Wastage (RW)**

Resource Wastage can be evaluated which rely on the waste remaining resource notation. This note relies on balancing the resource utilization with respect to smallest normalized enduring resource. It can be expressed as,

$$RW = \sum_{i \neq k} (NR_o - NR_s) \tag{11}$$

Where, NRs, recognize the dimensions which has the least normalized remaining ability and 'o' for other dimensions. For instance, for three goals CPU, memory and network RW can be estimated as,  $RW = (U_m - U_c) + (U_m - U_n)$  where  $U_m$  stand for  $NR_s$  in this condition.

**Migration Rate (MR)**

Migration Rate might contrast suggestively for various workloads because of the differences of VM arrangements and workload qualities. Briefly, the enactment of VM relocation is influenced by numerous components, essentially the amount of the Virtual machine memory, the network communication cost and energy usage because of relocation, mainly in a major system. Live immigration has more extra components. Migration cost measurements for VM relocation are incorporated in the accompanying equation:

$$MR = iV_m + jT_m + kE_m + [lT_d] \tag{12}$$

Where  $i + j + k + l = 1$  i, j, k and l are mass of rate metrics,  $T_m$  is the period of relocation,  $V_m$  is the overall network traffic of the relocation method,  $E_T$  is overall energy expended by the relocation method and  $T_d$  is the down time causes in the relocation method. Only for the offline relocation, the total network interchange  $V_m$  is the memory amount of the relocated virtual machine  $V_{mem}$ . The migration duration  $T_m$  is planned by

$$T_m = \frac{V_{mem}}{TR_m} \tag{13}$$

Where,  $TR_m$  is the communication speed of memory. The total energy  $E_T$  will be evaluated by

$$E_T = E_s + E_d + [E_N] \tag{14}$$

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Where,  $E_S$ ,  $E_D$  and  $E_N$  declare to the extra energy devoted by the resource, destination and network switches, individually.

## C. Multi-Objective Evaluation using Tchebycheff Algorithm:

The parameter evaluation can be carried out by Tchebycheff Algorithm and the regulated procedure is as per the following.

Let VM hold all list of virtual machines VMs hosted by the migration's source node and let set D is destinations  $D_j$  existing to host the transferred VM, and satisfying the below restriction.

$$D_j^{CPU} < C_j^{CPU}, D_j^{mem} < C_j^{mem} \quad (15)$$

These restrictions are used to sift the destinations so that the memory and CPU capability of chosen targeted ought not to go beyond the highest threshold. P includes possible migration processes of a virtual machine  $VM_s \in V$  to a target  $D_j \in D$ . We state P as matrix where  $VM_s$  signify the rows and  $D_j$  stand for the columns as follows:

The objective is to discover the most attractive migration process  $p_{ij} \in P$ . The relocation method with the uppermost association in the direction of objective functions  $f_k=1..5 \in \{BC, PD, T, RW, MR\}$ . To discover  $x_{ij}$  with least amount ( $f_{BC}, f_{PD}, f_T, f_{RW}, f_{MR}$ ) concurrently. To assess  $p_{ij}$ , first we use the MO-DEOA, the outcome is an best possible set, which is  $\bar{X}$ ; after we apply the Tchebycheff Algorithm technique to discover a single relocation method from  $\bar{X}$ , as following.

$$\min \max_k [w_k (f_k(x_{ij}) - u_k)] + \rho \sum_{k=j}^m (f_k(x_{ij}) - u_k) \quad (16)$$

Where  $w_k$  is a mass for goal  $k$ ,  $u_k$  indicates the utopia peak finest cost for objective function  $f_k$ ,  $m$  is the amount of goals and  $\rho$  is a adequately little optimistic scalar. A little value of  $\rho$  can give inadequately non-dominated result and a large  $\rho$  can direct to absent non-dominated results. So the value of  $\rho$  to be in the range  $[10^{-2}, 10^{-4}]$ .

## D. Target Estimation

The calculation of targeted CPU utilization  $U_{CT}$  for the most part relies on upon the burden capacity of the supply node (e.g. load irregularity, minor usage, scaling need). The  $U_{CT}$  can be evaluated as far as the CPU rate taking after two circumstances:

(i) Condition I: Processor use surpasses the pre-decided thresholds; In that situation  $f_p$  can be indicated specifically to return to the processor utilization peak value.

(ii) Condition II: To diminish the power usage or to bring down the Temperature of the operational system, since the dynamic power  $P_d$  is relative to the frequency  $f_p$ . Subsequently, the power consumption point can be resolved regarding  $f_p$  to express  $U_{CT}$ .

Then again, the calculation of targeted memory utilization  $U_{MT}$  likewise relies on two circumstances:

(i) Condition I: As soon as the memory utilization achieves the maximum threshold of the accessible memory, similarly

as  $U_{CT}$ , the  $U_{MT}$  can be assessed specifically to come back to the pre specified memory utilization thresholds.

(ii) Condition II: To decrease the RW. Circumstance  $U_{MT}$  can be evaluated by modifying the measure of memory to reduce the RW.

## IV. RESULTS AND DISCUSSION

It shows the proposed Multi Objective VM migration for efficient power consumption and the results obtained by them. The tools used for experiments are as follow.

IDE Tool: Netbeans IDE 8.2

Cloud Tool: CloudSim 3.0.3

### A. Experimental results

This segment demonstrates the outcomes found in the experimental study and also the examination taking into account them. Fundamentally, considering just particular objective can challenge with different objectives and might prompt the defeat of conceivable ideal results. In this manner, here we presented a Multi-objective assessment plan to assess the relocation method in view of an arrangement of objectives all the while. In whatever is left of the area, the proposed multi-objective Chebyshev calculation is assessed utilizing an arrangement of simulation testing and judge against with conventional algorithms to demonstrate its execution, expandability and strength over an extensive variety of environments.

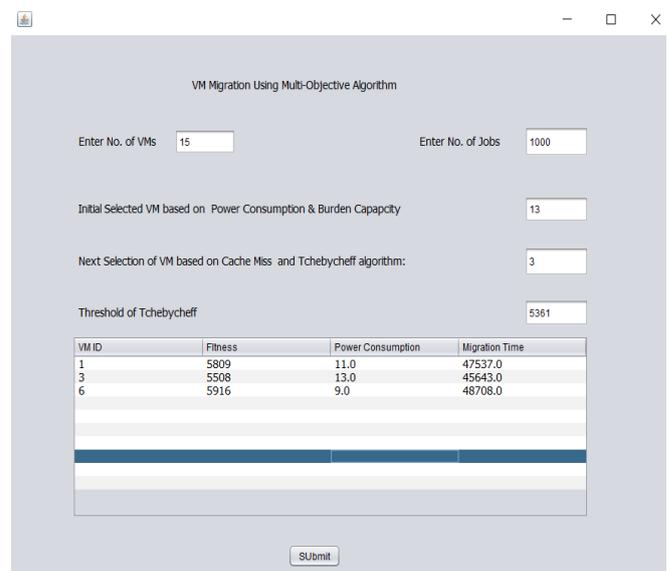


Figure: 3 Modified Algorithm Simulation

In above fig.3 experiment was carried out with 15 VMs have been assigned 1000 jobs. The proposed work initially selects VM for migration which is based power consumption and burden capacity. The next selection of VM is based on Minimum cache miss and Tchebycheff threshold which select the ideal VMs for migration.

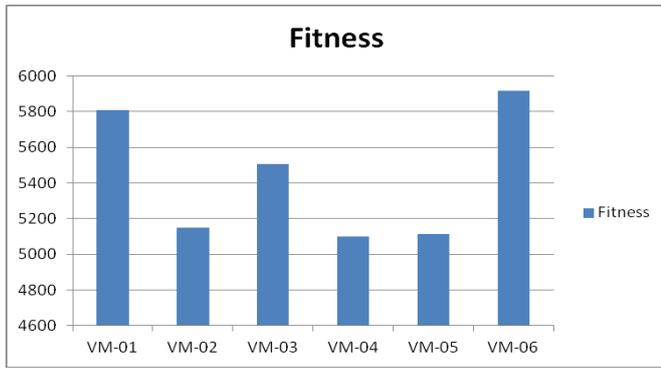


Figure: 4 Fitness of VMs

In above fig.4 Tchebycheff threshold is used to identify the final VMs for the migration. The VMs having fitness greater than threshold will be selected for final migration. In simulation we have got threshold value 5361. So the VM Id – 01, 03, 06 are finally selected for migration.

**B. Performance Evaluation**

Some criteria such as Temperature (T), Power Consumption, CPU Utilization (CU), and Migration Time (MT) were employed in accordance to the recommendations to assess performance of multi objective evaluation with bin packing heuristics FFD and BFD.

**First FD-CPU and First FD-MEM**

In the First place fit-decreasing (FFD) submits things in a falling request of amount, and at every stride, the following thing is put to the most readily accessible bin. First FD-CPU speaks to the First FD arrangement arranged by virtual-machine CPU necessities and FirstFD-MEM is the FirstFD arrangement arranged by memory prerequisites.

**Best FD-CPU and Best FD-MEM**

Best-fit-decreasing (BFD) puts VMs in the occupied system which yet has sufficient confines. BestFD-CPU and BestFD-MEM speak to the BestFD arrangements arranged by CPU necessities and memory prerequisites, separately.

**C. Comparison**

The objectives might be investigated and recognized utilizing a few procedures, for example, First Fit Decreasing, Best Fit Decreasing, and Genetic Algorithm and so on. The underneath figures think about the aggregate Migration Time, power consumption, and greatest temperature for each of the calculations under thought. The proposed strategy is contrasted and a few existing technique in view of a few parameters, for example, Temperature, Power Consumption, CPU utilization, Migration Time. All are figured utilizing graphs which demonstrates that the proposed technique gives better execution among the others. Our framework conveys better resource wastage, less temperature and sensible power consumption.

Table I: Performance Comparison of Proposed method with Existing methods

Criteria	First FD CPU	First FD-MEM	Best FD-CPU	Best FD-MEM	Proposed method
Temperature	65	68	65	70	45
Power Consumption (Kw)	16	15	16	15	11
CPU Utilization	0.11	0.14	0.105	0.13	0.204
Migration Time (ms)	53334	58676	60344	52889	46629

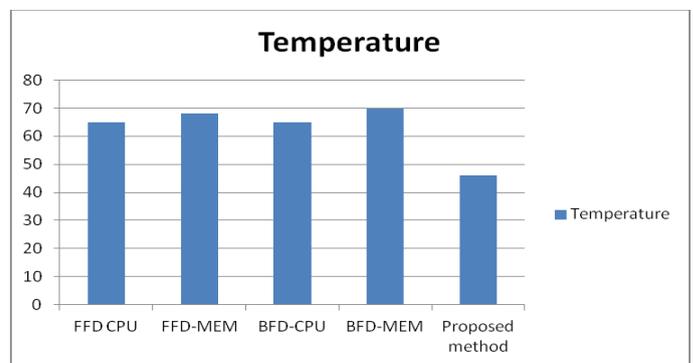


Figure 5: Temperature Comparison of different VM Migration methods

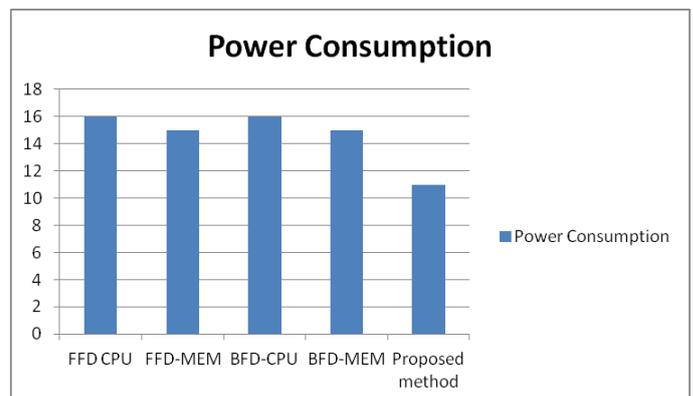
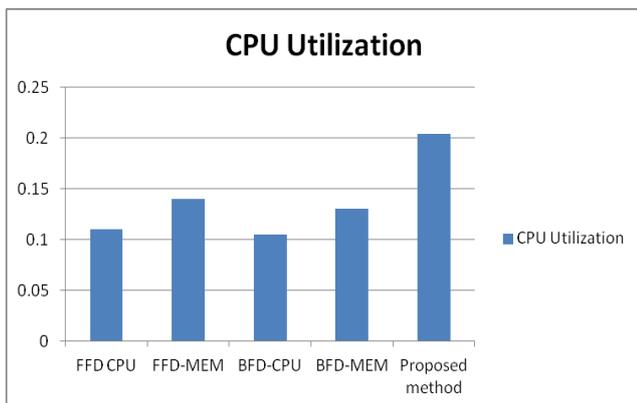


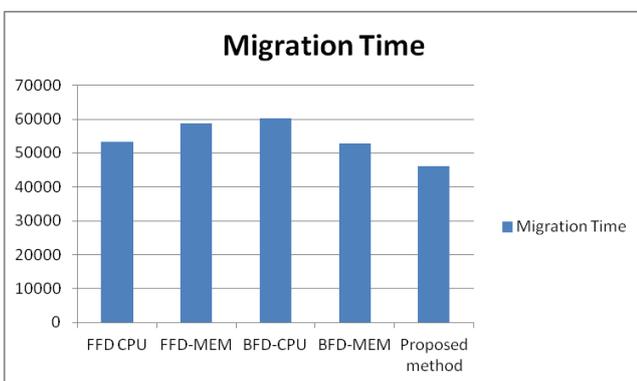
Figure 6: Power Consumption Comparison of different VM Migration methods

FirstFD, BestFD yield the most noteworthy temperature since every one of them have a tendency to merge VMs into a lesser amount of servers, bringing about upper resource consumption and upper processor temperature. The proposed strategy delivers moderately small amount for power usage,

max out temperature, and better CPU utilization since it contemplates all targets to discover solutions that enhance each goal and accomplish great balance among conflicting objectives.



**Figure 7: CPU utilization Comparison of different VM Migration methods**



**Figure 8: Migration Time Comparison of different VM Migration methods**

The CPU utilization and the migration time of various examinations are appeared in Fig. 7 and Fig. 8 separately. The projected method can discover the solutions with a better utilization of CPU and less migration time contrasted with FirstFD-CPU, FirstFD-MEM, BestFD-CPU, BestFD-MEM algorithms. The proposed algorithm additionally creates the most minimal resource expenditure much of the time of various number of VMs. The proposed algorithm do better than FirstFD-CPU, FirstFD-MEM; BestFD-CPU and BestFD-MEM algorithms since it can seek the solution space all the more effectively taking into account models for decreasing absolute CPU resources expenditure, memory resources consumption and the total energy utilization.

#### D. Discussion

Virtual machine migration is a possible way out for some basic circumstances in a Cloud domain, for example, loads lopsidedness, lower usage and workload hotspots coming about because of the dynamic vacillation of the framework workload. Notwithstanding, the choice of moved VMs and destinations is typically taking into account a solitary target, for example, power utilization. Also some bin packing heuristics in the past decades were used for VM migration such as FirstFD, BestFD etc. In the first place fit-decreasing (FFD) submits things in a falling request of size, and at every stride, the following thing is put to the most readily

accessible bin. FirstFD-CPU speaks to the FFD arrangement arranged by virtual-machine CPU necessities and FFD-MEM is the FFD arrangement arranged by memory prerequisites. BestFD put VMs in the occupied server that yet has sufficient limits. BestFD-CPU and BestFD-MEM speak to the BFD arrangements arranged by processor necessities and memory prerequisites, separately. These bin packing problem results poor performance in terms of CPU and memory utilization, Resource Wastage etc. Particular intention can challenge with other goals and may cause the loss of likely best results. Our multi-objective assessment rule to assess the relocation method support on many objectives concurrently plays a vital role in VM migration.

#### V. CONCLUSION

We have offered architecture of the energy efficient system for Cloud data centers. With the expanding predominance of vast scale cloud computing situations, how to productively migrate VMs into accessible computing servers has turned into a vital exploration issue. We propose a multi-objective Dolphin Echolocation technique for the virtual machine migration issue. Dolphin echolocation is a technique with the capacity of embracing itself by the sort of the issue close by, having a sensible union rate and prompting a worthy optimum answer in various circles determined by the client. The objective is to effectively acquire an arrangement of non-overwhelmed arrangements that all the while minimizes all out resource wastage and power consumption. Also for checking the rank of each VM we have used Tchebycheff algorithm that alters the issue from one of picking the finest result unseeingly that of to select the next choice to the preferred result.

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