Reduce CO2 Emulsion for Green Control Algorithm in Cloud Computing for Cost Optimization

Ms. V. Brundha
B.TechIV year
Dept. of Information Technology
Indra Ganesan CollegeOf Engineering

Mrs. A.Sri Lakshmi
Assistant Professor
Dept. of Information Technology
Indra Ganesan College Of Engineering

Abstract:
Cloud computing is an Internet based computing for delivering remote computing resources such as Local servers,etc through a network. Achieving an energy-efficiency control and also satisfying a optimal performance have become critical issue for cloud providers. The existing work is has been done on power saving in the Virtual Machine and the potential performances overheads of server consolidation were evaluated. In this paper, three power-saving policies are implemented in cloud systems to mitigate server idle power. A server is allowed to stay in an idle mode for a short time when there has no job in the system, rather than to switch abruptly into a sleep mode right away when the system becomes empty. An idle mode is the only operating mode that connects to a sleep mode. Simulation results show that the benefits of reducing operational costs and improving response times can be verified by applying the power-saving policies combined with the proposed algorithm as compared to a typical system under a same performance guarantee.

I.INTRODUCTION

Cloud computing is an Internet based computing or on-demand computing.It provides shared processing of resources and data to computers .An efficient green control (EGC) algorithm is used for solving constrained optimization problems and making costs/performances tradeoffs in systems with different power-saving policies ,Green computing is the environmentally responsible and eco-friendly use of computers and their resourcesCLOUD computing is an Internet based computing for sharing a pool of computing resources that can be accessed independently based on the infrastructure. In the Olden days, an individual or company can only use their own servers to manage application programs or store data.Ideally, shutting down servers when they are left idle during low-load periods is one of the most direct ways to reduce power consumption. Unfortunately, some negative effects are caused under improper system controls.

II.PROBLEM DESCRIPTION

Power savings in cloud systems is the serious problem on various aspects in recent years, e.g., on the virtual machine (VM) side by migrating VMs, applying consolidation or allocation algorithms, and on the data center infrastructure side through resource allocations, energy managements, etc. To satisfy uncertain workloads and to be highly available for users anywhere at any time, resource over provisioning is a common situation in a cloud system. However, most electricity-dependent facilities will inevitably suffer from idle times or low utilization for some days or months since there usually have off-seasons caused by the nature of random arrivals. As cloud computing is predicted to grow, substantial power consumption will result in not only huge operational cost but also tremendous amount of carbon dioxide (CO_2) emissions. Therefore, an energy efficient control, especially in mitigating server idle power has become a critical concern in designing a modern green cloud system. Ideally, shutting down servers when they are left idle during low-load periods is one of the most direct ways to reduce power consumption. Unfortunately, some negative effects are caused under improper system controls.

III. RELATED WORK

Power savings in cloud systems have been extensively studied on various aspects in recent years, e.g., on the vir-tual machine (VM) side by migrating VMs, applying con-solidation or allocation algorithms, and on the data center infrastructure side through resource allocations, energy managements, etc.

A.Power-Saving in Virtual Machine:

Considered the problem of providing power budgeting support while dealing with many problems that arose when budgets virtualized systems.Their approach to VM-aware power budgeting used multiple distributed managers integrated into the virtual power management (VPM) framework.By investigated the potential performance overheads caused by server consolidation and lived migration of virtual machine technology.The potential performances overheads of server consolidation were evaluated. Their approach to VM-aware power budgeting used multiple distributed managers integrated into the virtual power management (VPM) framework.

B.Power-Saving in Computing Infrastructure:

The Datacenter Energy Management project was focused on modeling energy consumption in data centers, with a goal to optimize electricity consumption. Their project was focused on collecting data to define basic fuel consumption curves.A Heterogeneity- Aware Resource Monitoring and management system that was capable of performing dynamic capacity provisioning (DCP) in heterogeneous data centers. Their project was focused on collecting data to define basic fuel consumption curves. . The energy-efficiency of the infrastructure was defined as the amount of energy used to serve a single application request.

IV.POWER MANAGEMENT IN CLOUDS

Distributed service system consists of lots of physical servers, virtual machines and a job dispatcher. The job dispatcher in our designed system is used to identify an arrival job request and forward it to a corresponding VM manager that can meet its specific requirements.A server is allowed to stay in an idle mode for a short time when there has no job in the system, rather than switch abruptly into a sleep mode right away when the system becomes empty.An idle mode is the only operating mode that connects to a sleep mode.

1. Generation of Queuing Model
2. Implementation of ISN Policy
3. Modeling the SN Policy
4. Enhance SI Policy

A. GENERATION OF QUEUING MODEL:

Generally Queue maintains several job request given by the authorized users.The job request arrivals follow a Poisson process with parameter and they are served in order of their arrivals, that is, the queue discipline is the first come first served (FCFS). There may have some job requests that need to beperformed serially at multiple service stages. Then, applying phase-type distributions allow us to consider a more general situation.Queuing systems with the N policy will turn a server on only when items in a queue is greater than or equal to a predetermined N threshold, instead of activat-ing a power-off server immediately upon an item arrival. However, it may result in performance degradation when a server stays in a power-saving mode too long under a larger controlled N value.

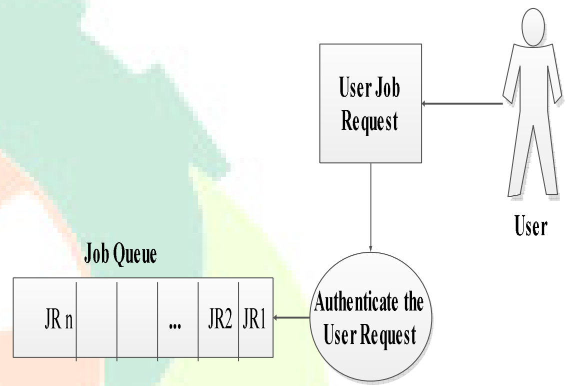

Fig.4.1 Generation of Queuing Model

B. IMPLEMENTATION OF ISN POLICY:

An energy-efficient control in a system with three operating modes m = {Busy, Idle, Sleep}, where a sleep mode would be responsible for saving power consumption.A server is allowed to stay in an idle mode for a short time when there has no job in the system, rather than switch abruptly into a sleep mode right away when the system becomes empty. An idle mode is the only operating mode that connects to a sleep mode.

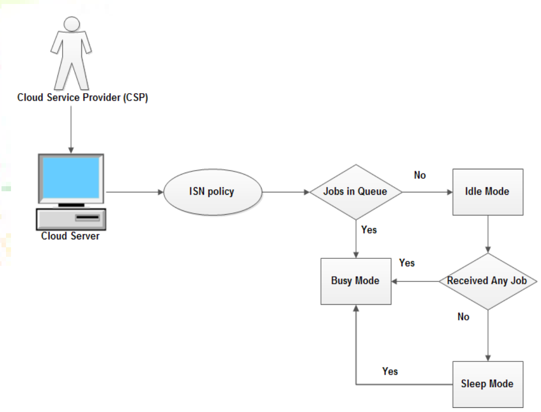

Fig.4.2 Implementation of ISN Policy

C. MODELING THE SN POLICY

According to the switching process (directly to Sleep) and the energy-efficient control (N policy), we have called such an approach the "SN policy.A server switches into a sleep mode immediately when no job is in the system.A server stays in a sleep mode if the number of jobs in the queue is less than the N value; otherwise, a server switches into a busy mode and begins to work.Fig3.2. illustrates the step-by-step decision processes and job flows of the SN policy.Instead of entering into an idle mode, a server immediately switches into a sleep mode when the system becomes empty.

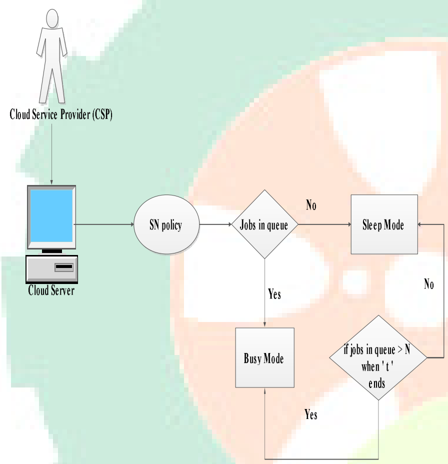

Fig.4.2 Implementation of SN Policy

D.ENHANCE SI POLICY:

According to the switching process (from Sleep to Idle), we have called such an approach "SI policy".The step-by-step decision processes and job flows of the SI policy.A server switches into a sleep mode immediately instead of an idle mode when there has no job in the system. A server can stay in a sleep mode for a given time in an operation period. If there has no job arrival when a sleeping time expires, a server will enter into an idle mode. Otherwise, it switches into a busy mode without any restriction and begins to work.

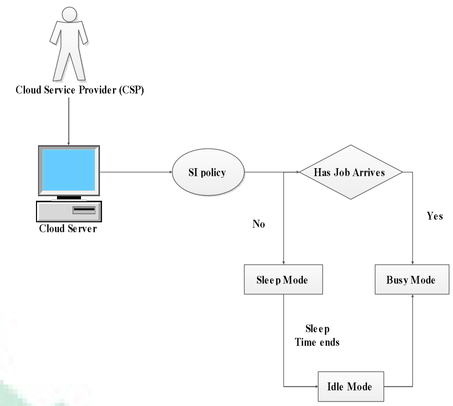

Fig.4.4 Enhance SI Policy:

V. TECHNIQUE USED:

Three power-saving policies that (a) switching a server alternately between idle and sleep modes, (b) allowing a server repeat sleep periods and (c) letting a server stay in a sleep mode only once in an operation cycle are all considered for comparison. The main objective is to mitigate or eliminate unnecessary idle power consumption without sacrificing performances.

1. ISN policy: Mainly used when the response needs immediately along some extra energy used.

2. SN policy: For a cloud provider who focuses on reducing cost, implementing the SN policy is a better choice to deal with a wide range of arrival rates.

3. SI policy: It can significantly improve the response time in a low arrival rate situation.

4. *Objective*:To mitigate or eliminate idle power wasted, three power-saving policies with different energy efficient controls, decision processes and operating modes are presented.

VI.SYSTEM ARCHITECTURE

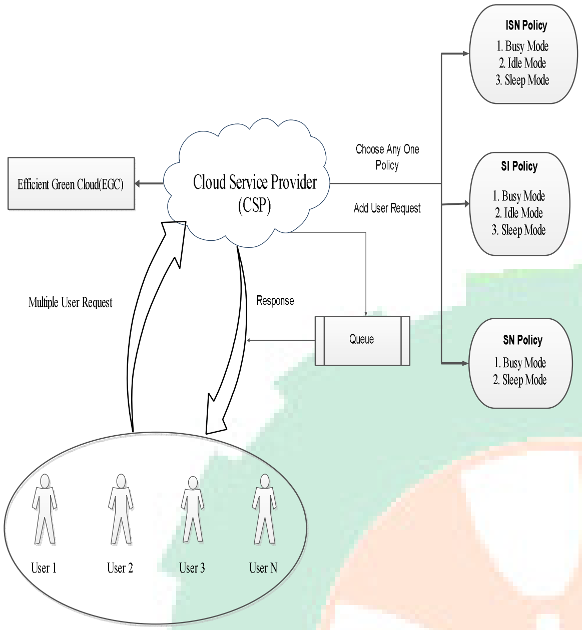

Fig.5.1 System Architecture Diagrams

VII. Response time comparison

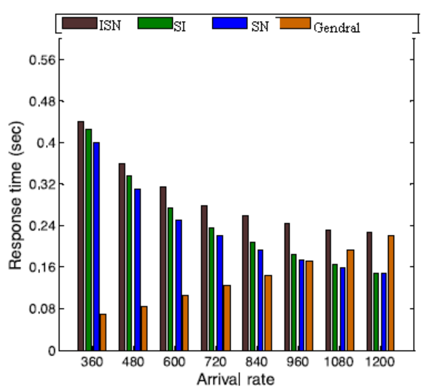

Fig.6.1 Response time comparison

The system with the SI policy doesn't reduce the sleep probability as the arrival rate increases; hence, it results in higher response times than other power-saving policies with a higher arrival rate

VIII. OPERATIONAL COST IMPROVEMENT RATES

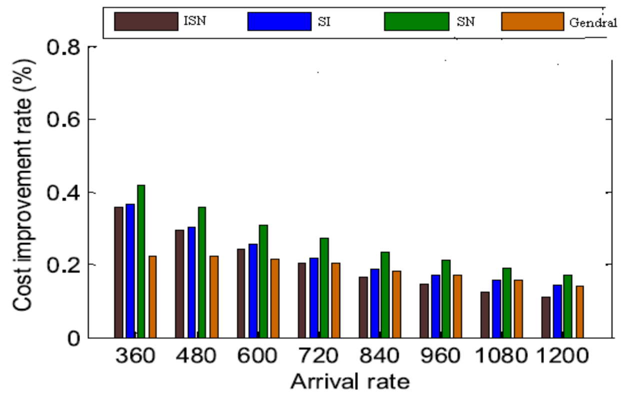

Fig.7.1 Operational cost improvement rates

Proposed power-saving policies can effectively reduce cost, especially when an arrival rate is low. For a cloud provider who focuses on reducing cost, implementing the SN policy is a better choice to deal with a wide range of arrival rates. Benefits when the startup cost is high. As compared to a general policy, cost savings and response time improvement can be verified.

IX. OPERATIONAL COST COMPARISONS

Although the general policy tries to keep the service rate as low as possible, it still results in higher cost than other policies, as shown in finally; we measure the cost improvement rates, which calculate the relative value of improvements to the original value instead of an absolute value. The proposed power-saving policies combined with the EGC algorithm are evaluated on the basis of comparisons with a general policy. For a general policy, it implies that a solution is given only by considering an absolute performance guaran-tee [28], [29], [30]. Different arrival rates ranging from 360 to 1,200 request/min are demonstrated to investigate a wide range of load intensities from an off-season to a peak-load period. In order to compare the power-saving policies with a general policy, we mainly control the service rate to obey the same performance guarantee of SLA(W _ 0:5) under various arrival rates with the fixed N value of 5. Comparisons of the idle probability in a system with the general policy, and sleep probabilities in systems with the power-saving policies are shown in Fig. 20. The sleep probabilities and the idle probability will be reduced as the arrival rate increases since a server has more probability to work and stay in a busy mode.

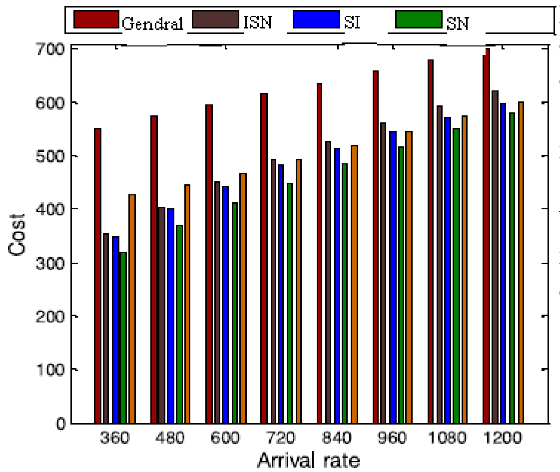

Fig.6.1 Operation cost comparison

X.NEG LATE REPEATING REQUEST

The multiple users request in add the queue for cloud service provider and response for the based on any one policy. But some time repeating same user and same record in the add queue, slow down the response process and significantly increase the cost. So we can overcome this problem the cloud service provider check the repeat request in the queue using Request Matching algorithm neg late the same request for same process.

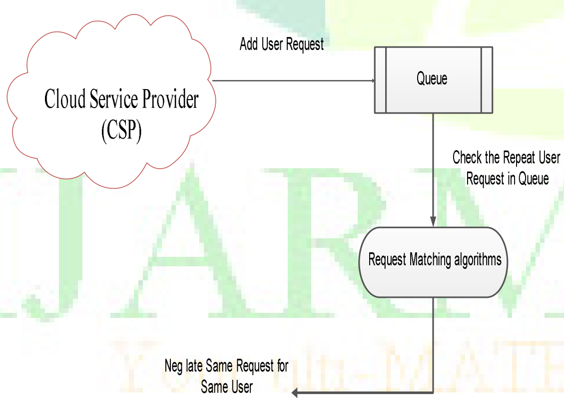

Fig.9.1 Neglate Repeating Request

XI.CONCLUSION

To mitigate unnecessary idle power consumption, three power saving policies with different decision processes and mode switching controls are considered. A proposed algorithm ECG allows cloud providers to optimize the decision-making in service rate and mode-switching restriction, so as to minimize the operational cost without sacrificing a SLA constraint.To satisfy uncertain workloads and to be highly available for users anywhere at any time, resource over-provisioning is a common situation in a cloud system. That can be resolved by ISN policy

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