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Comparative Architecture and Algorithm Study for Energy-aware Social Networking Virtualized Data Centers

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***Abstract*—**Cloud computing is an internet based computing technology that provide on demand computing for end users. Normally, data centers allocation for application on statically based. But today so many data centers have a problem how to reduce energy consumption? Due to increase use of cloud services and infrastructure by various cloud providers, uses of energy day by day increase that's why energy consumption increase lots. Large numbers of data centers that consume lots of energy which increase the level of co2. For decrease energy consumption of data centers need to develop efficient VM migration algorithm which will provide utilization of the VM. Energy conservation then becomes essential, in order to decrease operation costs and increase the system reliability. Using VM consolidation and VM migration data centers per- form efficient energy saving. In this paper discuss Comparative Architecture and Algorithm Study for Energy-aware Social Networking Virtualized Data Centers.

***Keywords*-**Cloud Computing, Virtualization, Allocation of virtual machines, Quality Of Service (QoS), Energy Aware VM Allocation, Social Networking

I. INTRODUCTION

Cloud technology aims to provide pay per use service, reliable, Specified resources and QoS services for the consumers and end users. There are several companies provide cloud computing services to the end users [1].

Using several fundamental models cloud providers offers various services for the users according to their requirements:

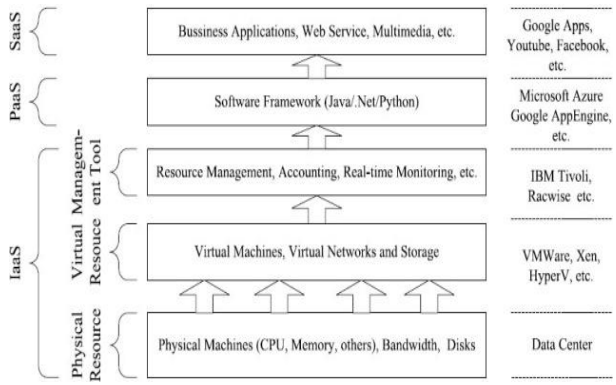

Figure 1. Cloud Computing Architecture [2]

1) **Infrastructure as a service (SaaS)**
2) **Platform as a service (IaaS)**
3) **Software as a service (PaaS)**

There are four deployments in cloud [3].

1) **Private cloud**
2) **Community cloud**
3) **Public cloud**
4) **Hybrid cloud**

II. WHY ENERGY-AWARE CLOUD COMPUTING FOR SOCIAL NETWORKING?

"As per McKinsey report data centers approximate energy bill in 2010 is $ 11.5 billion. Also this costs double every five years" [4].

- **Energy Efficient** Energy efficient in virtualized data centers provides QoS and also reduces the operational cost for the companies.
- **Energy Savings** As per current utilization of resources, topologies of network, and thermal computing nodes achieved energy saving using VM migration and VM consolidation algorithms [4].

III. RELATED WORK

The main aim of this work is to implement and development of energy-aware resource allocation techniques and defines various policies for data centers. So, that data centers become more eco-friendly to drive scientific, commercial and technological advancement for future generations. There are basically four main entities involved [4]:

- Brokers

- Green Resource Allocator and Providers
- Virtual Machines
- Physical Machines or Node

*A. **Sources of Power Consumption:***

As per Intel Research Labs report [5] physical server is main part of power consumed which includes various Processors, RAM and losses due to the power supply ineffi- ciency (Figure). As per data show in figure the Processors no longer dominates power consumption by a physical server. That's why techniques required continuous improvement of the processor power efficiency and application of power saving techniques (e.g. DVFS) that enable active low-power modes.

As per some report multi-core processors are much more efficient than conventional architectures. There are another reason to reduce the power consumed by CPU relatively to the whole system is adoption of multi-core architectures.

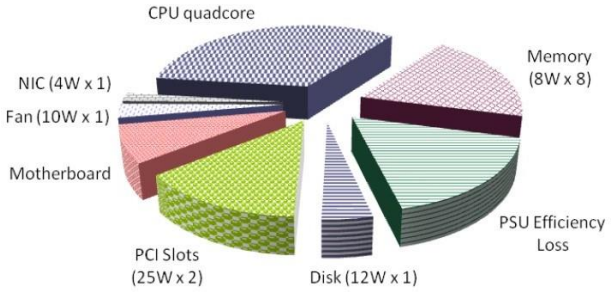

Figure 2. Sources of Power Consumption [6]

IV. ENERGY CONSUMPTION IN COMPUTING SYSTEMS

In world there are large number of researchers which are works for to develop techniques and methods for decrease of the energy consumption in physical data centers [6].

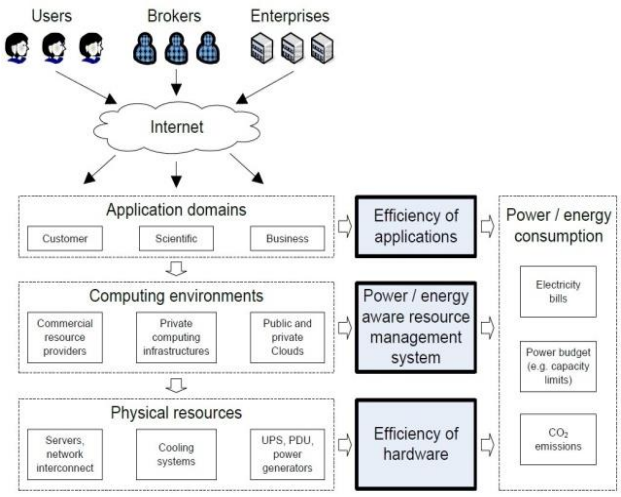

Figure 3. Energy Consumption in Computing Systems [6]

V. VIRTUALIZATION TECHNOLOGY VENDORS

There are three types of virtualization technology solutions:

A. Xen

Xen hypervisor is one of the open source virtualization technology developed by the Xen community [7].

B. VMware

VMware offered VMware ESX Server and VMware ESXi enterprise level virtualization solutions [8].

C. KVM

As a module or part of Linux kernel (Open Source) KVM provides virtualization platform [9].

VI. VIRTUALIZED SYSTEMS

1) VirtualPower: Coordinated Power Management
2) Coordinated Multi-level Power Management
3) Resource Allocation using Virtual Clusters
4) pMapper: Migration and power Cost Aware Application Placement
5) GreenCloud: SLA and Energy-efficient based cloud resources management

VII. USING THE DVFS GREEN ENERGY-EFFICIENT SCHEDULING ALGORITHM

The system architecture shown in Fig. consists of the Submit Job, the VMM, Scheduling Algorithm, Various Servers and Virtual Machines, and the DVFS controller for power saving.

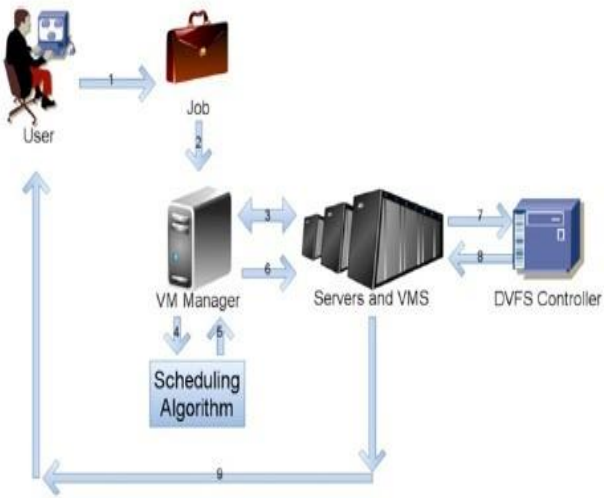

Figure 4. The system architecture using DVFS controller [10]

The following steps are there [10]:

- **Job submission:** To submit job from users
- **VM manager:** To manage VMs as well as application
- **Scheduling Algorithm:** To schedule job
- **DVFS controller:** For power saving
- **Servers and VMs:** Includes physical machines and virtual machines

The main objective of this work is using green energy-efficient scheduling algorithm perform job scheduling for Cloud computing. To select various VMs for executing jobs is priority for job scheduling algorithms [10].

VIII. ENERGY-AWARE MODEL

There are main three parts are there for energy-aware models [11]:

- **Energy-aware VM Scheduler:**
- **Energy Consumption Estimator:**
- **Cloud Iaas Manager:**

IX. ALGORITHMS

There are main three types of algorithms are there [11]:

- **Exact VM Allocation Algorithm:**
  - **Objective:** Initial VM placement with reducing the number of used servers.

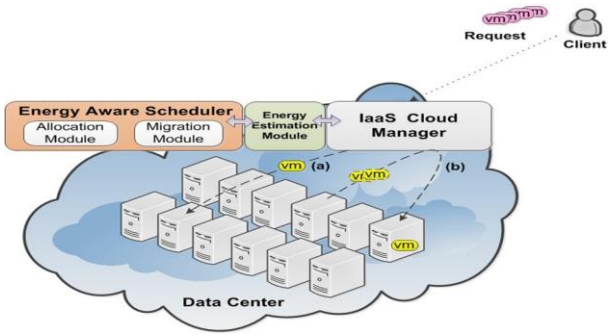

Figure 5. Emergy-aware Model [11]

- **Mathematical Programming Formulation:** Modelled as a bin packing problem with a minimum power consumption objective.

- **Exact VM Migration Algorithm:**
  - **Objective:** Optimize constantly the data cen- ter's power consumption via dynamic VM consolidation.
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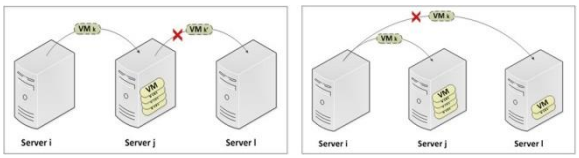

Figure 6. Server with VM [11]

  - **Mathematical Programming Formulation:** Based on a mathematical model for VM consolidation via migration that relies on a linear integer programming formulation.
- **Adapted Energy-aware Best Fit Algorithm:** Adaptation of the Best-Fit heuristic which consists in two principal steps [12]:
  - Sort items (VMs) in a decreasing sequence of their power consumption.
  - Place all the sorted VMs by considering the first item (VM) in a server with a minimum rest of power consumption.

X. CONCLUSION

Cloud computing technology is expected to grow and provide large services and computational power to end users. In this context energy efficiency is more important for virtualized data centers. Due to more energy consumption operating cost higher and co2 emission to the environment. From this paper identify all existing algorithms for energy aware and efficiency. Also find out research objective and scope in the field of energy-aware virtualized data centers. In particular Literature survey presented in details all existing paper review, analysis of methods and comparative study between existing algorithms and techniques. Using literature survey to identify research gaps, open challenges and clearly determine the research direction. From the literature survey identify so many open source technologies like CloudSim Toolkit, Green Cloud Simulator Toolkit and Open Stack framework which will help to develop and deploy energy aware algorithms for virtualized data centers.

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