ISSN 2319-1236

Measuring the usage of Cloud

Dr. A. Askarunisa[1] , Mr.N.Ganesh[2], Mr.A.Athiraja[3],
Professor and Head[1], Sr.Lecturer[2], Sr.Lecturer[3],
Vickram College of Engineering,
Madurai, Tamilnadu, India.

ABSTRACT

Cloud computing is used all over the world and the demand to it gets increased which makes the small organization's unable to use it. The rising usage of the cloud is difficult to analyze whether the cost collected for it, is worthy. I propose the metering in the cloud usage which analyses the amount of usage of the cloud resources and checking whether it satisfies all the users in the cloud. This paper proposes the activity which is to be done for measuring usage on the cloud and how the payment is implemented.

Keywords: real time pricing (RTP); *Cloud computing;*

Council for Innovative Research
Peer Review Research Publishing System
Journal: International Journal Data & Network Security (IJDNS)

Vol.4, No.1
editor@cirworld.com
www.cirworld.com, member.cirworld.com

1. INTRODUCTION

Cloud computing makes computing as a utility in the field of Information Technology to deliver services. It makes the desktop system platform to an internet system platform. These platforms were stored in large number of servers and were placed in large number of data centers. Data centers include redundant (or) backup power supplies, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices. Data centers are filled with more number of different components for storing and operating the data. Due to the raise in the demand of the cloud services the usage of data centers were also increased and the workload of these traditional data centers are high when compared with the Cloud Data Center as shown in the Table 1. The rising of these data centers requires large amount of energy efficiently. So the process in the data centers such as operational power should be reduced by using large number of powerful servers, electricity. These operational costs should be reduced by implementing the concept of metering (pay for the usage of resources) in the fields like IT industry, data centers and even to the customers who use cloud as a service for the operation.

Table 1: Workload shift from Traditional Data Center to the Cloud Data Center

Shifting Workload from Traditional Data Center to Cloud Data Center							
GLOBAL DATA CENTER WORKLOADS IN MILLION							
	2011	2012	2013	2014	2015	2016	CAGR 2011-2016
Traditional data center workloads	49.8	53.1	58.3	63.7	66.7	68.5	7%
Cloud data center workloads	21.3	33.5	49.7	67.9	88.4	112.1	39%
Total data center workloads	71.1	86.6	108.0	131.6	155.1	180.6	20%
Cloud workloads as a percentage of total data center workloads	30 %	39 %	46 %	52 %	57 %	62 %	NA
Traditional workload as a percentage of total data center workloads	70%	61%	54 %	48 %	43 %	38 %	NA
SOURCE : CISCO GLOBAL CLOUD INDEX, 2012							

In this paper I have concentrated on the metering concepts implemented in the usage of the cloud even when there is problem like power failure (or) network failure. I have divided the problems into two parts such as the metering the usage of the cloud, based on the account information of the user and the various pricing concepts implemented in the cloud usage. The usage of the cloud includes the total amount of the CPU usage in MHz, memory used in MB, total disk I/O in Kbps, total LAN I/O in Kbps, total WAN I/O in Kbps and total storage measured in GB. In the rest of this paper I have concentrated on the other topics which are included in the cloud computing when metering in implemented.

2. CONCEPTS AND TRENDS

The cloud based services increases the cost, performance and the reliability.

ISSN 2319-1236

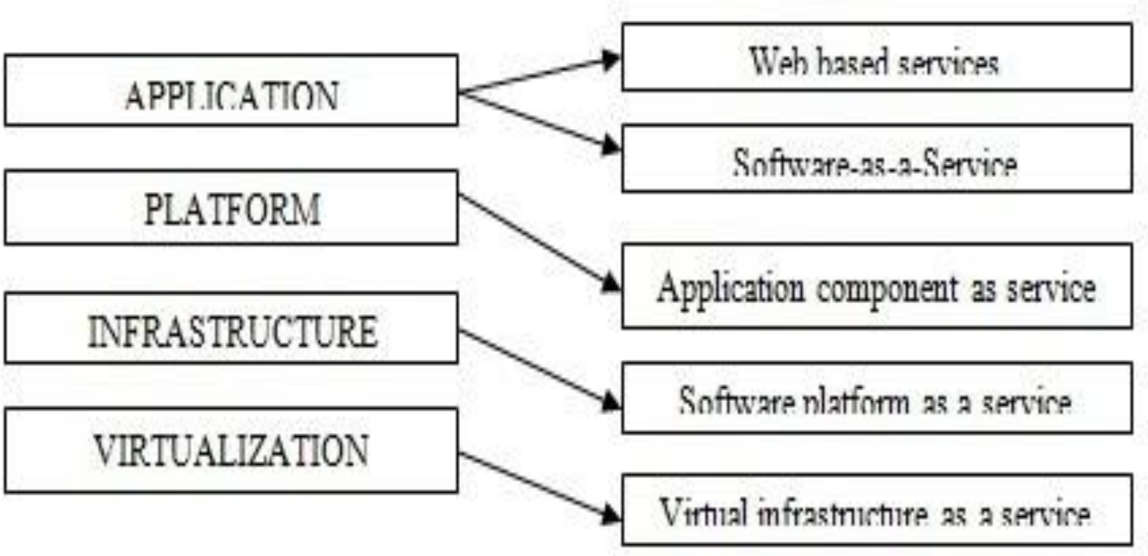

Fig 1: Architecture of the Cloud and its Services

2.1 Development of Cloud Services

Cloud Services includes the concept of delivering the IT Services as shown in Fig 1. The idea is to provide utility service in which user can enter to access the centrally located services and on-line delivery to customer and other business services. In general providing virtual services on virtual machines and to large pool of machines in large number of data centers includes the addressing of the scalability, availability for large applications. It builds the research in web and software services, parallel and distributed system, virtualization, computing utility, advances in networking.

2.2 Efficiency and Costs for Data Center Energy consumption

Cloud computing provides services by building data centers, which results in consumption of wastage of enormous amount of electricity for the following reasons:

- Conservation of energy has increased in the last few years by the equipments like physical servers, storage and network.
- IT industries are demanding high amount of energy for large solutions which involves complex processing elements and dependencies.
- Latest level cloud-based services requires unpredictable demands for the electricity, scaling and availability.
- Low efficiencies for large power distribution and high cost.

A survey reports that estimation of energy costs may increase from 10% of the IT budget today to over 50% in the next coming years. Data centers should be constructed to meet the peak loads. There is a gap between data centre energy consumption and peak-to-average processing and it should be solved by using fine-grained idling, faster power shut down and restoration and support computational architecture to improve the efficiencies and to remove the diseconomies of power. The data centre efficiency can be calculated from Effectiveness of Power Usage (EPU) and Effectiveness of Data Centre Infrastructure (EDCI).

EPU = (Total Power) / (IT Equipment Power)

EDCI = (IT Equipment Power) / (Total Power) * 100.

EPU measures power used for computing such as lighting and cooling. EDCI is the reciprocal of EPU and tells what percentage of power is delivered to the facility actually gets delivered to the servers. A score of 1 means no power goes to extra cost, 1.5 means half the power goes to ancillary services.

Further the cost depends upon the factors like Total amount of CPU usage (MHz), Total memory(MB), Total disk I/O(Kbps), Total LAN I/O (Kbps), Total WAN I/O (Kbps) and the Total Storage (GB) for the computation of 1 WAC (Workload Allocation Cube) unit.

2.3 Implications on Environment

Environmental awareness in the government and corporate circles is demanding for the data center energy consumption. The corporate officials are allocating energy, time and money to invest in this environmental activities. Research and regulations are allocated by the government to address the efficiency of the data centers and in the other critical components of the IT Infrastructure. IT organizations are measuring the ongoing energy costs and environmental impact of specific applications within the enterprise through the use of Energy Usage Profiles.

2.4 Structure of Decision Points

Reducing the power consumption is important. Energy consumption is a complex problem and requires capacity planning techniques to optimize operational process and facilities. This leads to the action of developing solutions to the technological advances, strategic initiatives and frameworks in computational ecosystem which ranges between energy suppliers, data centers and governance bodies to the end-users and includes encouraging IT reuse, reducing IT complexity, aligning all stakeholders to optimize the functional and non-functional quality goals, usage of metering schemes. For driving down the associated operating cost for data centers and business I introduce Effective metering and Effective Grid constructs in which Effective metering is now becoming the pervasive.

- **Effective Metering:** It is a next generation utility measurement device which contains real-time sensors, power outage notification, power quality monitoring and used to measure when and where the energy is consumed which makes the price setting agencies (or) energy suppliers to introduce different pricing on the time of day and the session.
- **Effective Grid:** It makes consumers of electricity to change their behavior around variable electric rates, and pay increased rates during the peak condition and reduced rates at off-peak condition. The Grid is used to reduce demand during peak by using advance technology in metering and communication protocols and makes all customers to act in response to the market signals.

3. PROPOSED MODEL: MEASURING (METERING) THE USAGE OF THE CLOUD

Energy efficiency and demand response plays a major role in the future energy needs. Effective metering as shown in Fig 2 and effective grid in the future reduces energy consumption and promotes sustainability. It also allows the users to monitor their daily energy usage and to optimize the usage. Meters which will come with real time pricing (RTP) and improves the efficiency of consuming energy and investment with fluctuation in the market, electricity load.

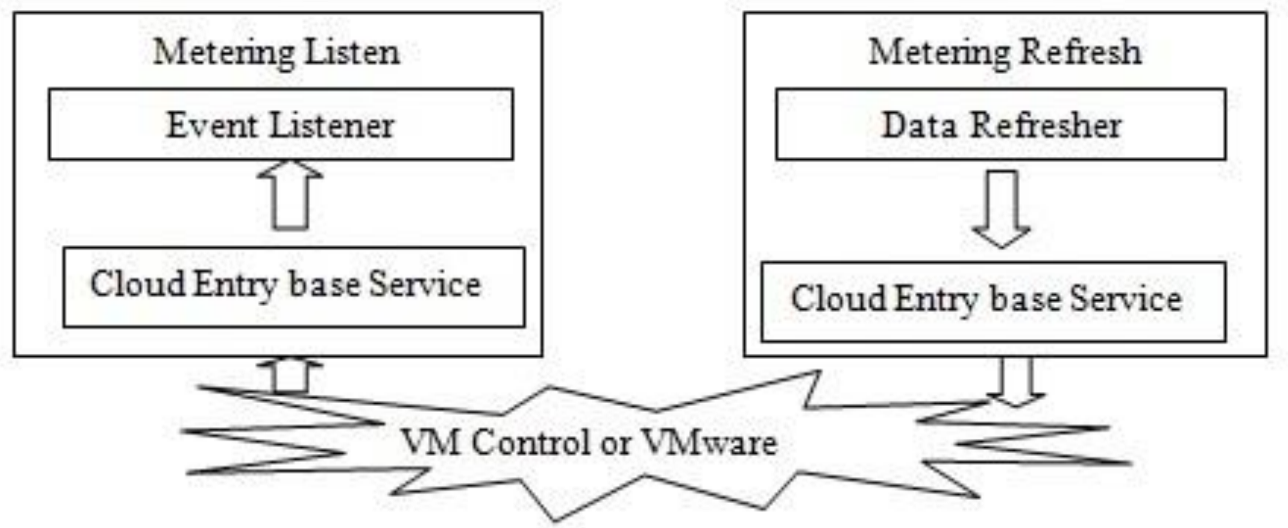

Fig 2: Metering Process flow

3.1 Application of Smart Metering to clouds:

It includes Managing the energy cost incurred on the basis of the usage of information. Data center buildings and industrial activities, hardware applications, codes and standards for new applications. Using technologies which controls the cost in the conditions such as internal and external server thermal metering, circuit meters, base board controller energy consumption metering, power strip meters, plug meters. Rate designing on the basis of inclining block rates and dynamic pricing rates.

3.2 Proposed Architecture:

The key features of the proposed architecture as show in Fig 2 includes,

Smart Meter Interface: Measures how much is consumed and what time it was consumed and checks day of the week, seasonality.

Energy API Services: API model is used to interface the metering device. It is important to set up reliable and open design standard that reaches across data centers and technologies.

Consumption Communication Layer: This communication layer interfaces with the metering and reporting system.

ISSN 2319-1236

Interface Management: It controls the functions of business management which includes outage management system by consumption data aggregation layer, billing and accessing the customer information system.

Consumption data aggregation layer: It is a repository of data collection for the updation of frequently used data's.

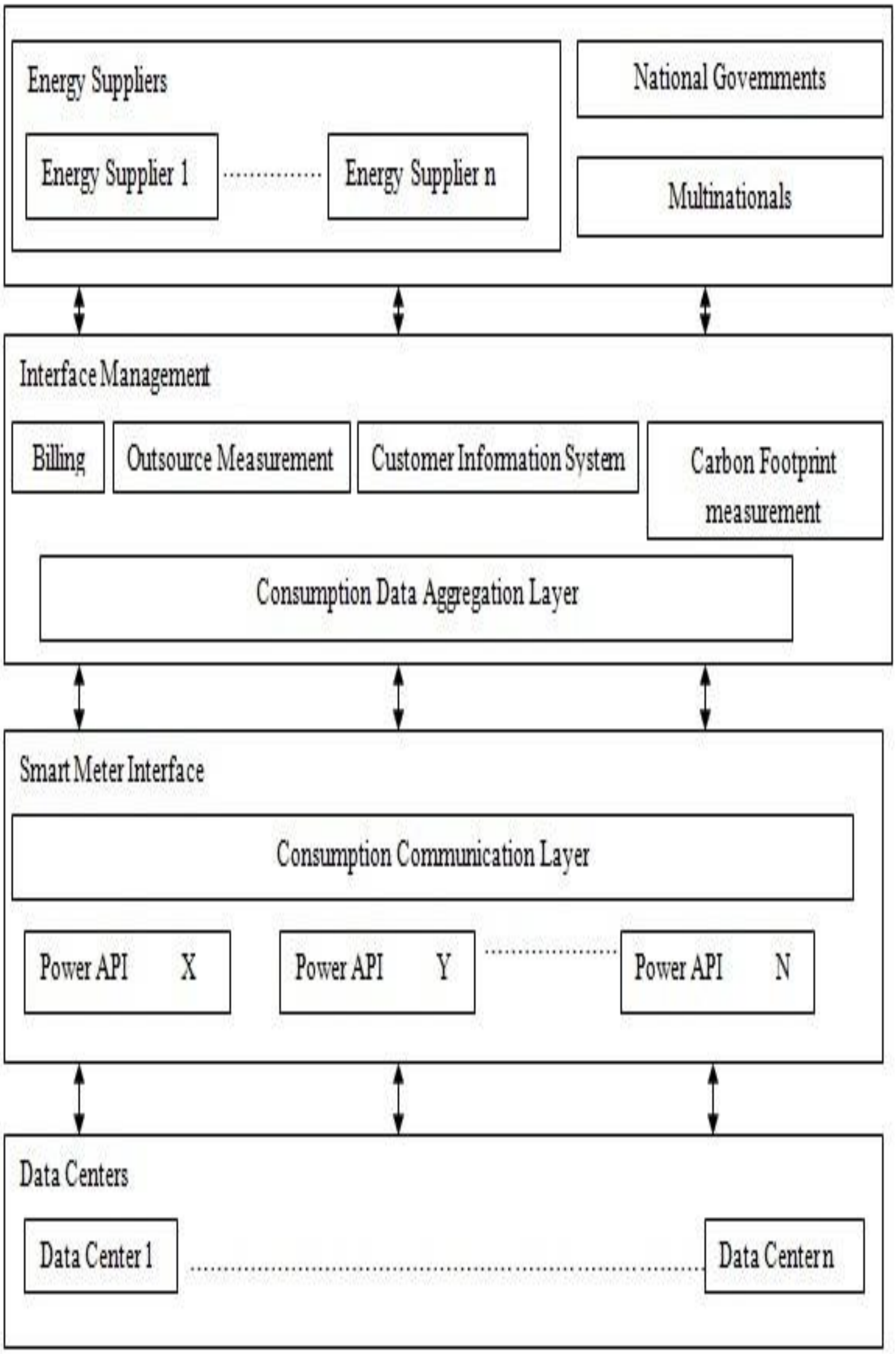

Fig 3: Proposed Architecture

ISSN 2319-1236

3.3 Implementation Idea

The proposed architecture can be implemented on Reading Meter values Automatically (RMA) by using any reliable communication mechanism (or) wireless network. These network operations can be carried by any of the topology like star (or) peer-to-peer in which each node performs a two way communication and transmits data's within a particular range (or) within the neighboring nodes.

3.4 Pricing schemes

Different pricing schemes can be implemented on the basis of energy supplier's side to improve the bursts in resource demands on the data centers and on the basis of scalability requirement. It also results in useful manner to utilize the resource management and divides the demand from high level demand time to low level demand time. Smart metering can be used to balance the data centers dynamically to provide resource's on-demand. This scheme enables a new system which can react to the changes in the workload at the level of aggregation itself.

There are several challenges because the providers of services are having pricing which are inflexible, limits rates and services are restricted for the customers by using only a single provider at a time. Charging is not acceptable because the customers will have different usages and demanding for different quality of service for various resource requests that can change at any time.

Another scheme used is Real time pricing which includes the time of prices that varies depending on the block of time within a particular day, spot pricing contract and critical time pricing schemes. Another thing in two part real time pricing which offers constant price for a agreed volume and the spot price for the changes in this agreed volume.

3.5 Advantages

Metering allows benefits of cloud computing like transference of risk like over provision (under the utilization) and under provisioning (saturation), periodic demand gets varied like the usage of e-commerce, photo sharing and other unexpected demands. Other benefits are achieving lower energy costs within the existing rate and greater impacts with pricing in dynamic based on the seasonality, provisioning real time feedback on the consumption of energy with better management in the behavior of energy, storing the consumption and billing details for the measure as you go model which depends on the day and time among many others.

4. SUMMARY AND FUTURE WORK

We have seen about the cost and the importance of the emerging cloud service data centers, scaling, and smart metering which depends upon the suppliers of energy, data centers, third-party software vendors, end customers and cloud service providers. Other advantages are self-healing using real-time information and automatic controls to anticipate, detecting and responding to system problems. Ecosystem partners can take advantages of this and can create new infrastructure and solutions which requires next generation energy efficiency and demand response. Interface can be exposed as consumable APIs for remaining partners. Smart grid and smart metering can be used in the performance modeling, optimization and control theory. We are working to give a perfect and effective metering pricing mechanism to deal with the cloud environments in the future work.

REFERENCES

[1] S.Baker. Google and the wisdom of the clouds. Busniess Week, December 2007. [online]. Available: http://www.msnbc.msn.com/id/2261846.

[2] The green grid data center power efficiency metrics: PUE and DciE. The Green Grid. Whitepaper. [online]. Available:http://www.thegreengrid.org/gg_content/TGG_Data_Center_Power_Efficiency_Metrics_PUE_and_DCiE.pdf

[3] Data Center Energy Forecast. Silicon Valley Leadership Group. Whitepaper, 2008. [online]. Available: http://svlg.net/campaigns/datacenter/docs/DCEFR_report.pdf

[4] M. K. Patterson, D. Costello, D. Grimm, P. M. Loeffler. Data Center TCO: A Comparison of High-density and Low-density spaces". THERMES 2007, SantaFe, NM

[5] Google. Going Green at Google. Webpage [online]. Available:http://www.google.com/corporate/green/datacenters/

[6] IDC. Solutions for Data center's Thermal Challenges. Whitepaper [online].Available: http://www.blade.org/docs/wp/idccoolbluewhitepaper.pdf

[7] J. Koomey. Worldwide electricity used in data centers. Environmental Research Letters 3(034008) [online]. Available:.http://www.iop.org/EJ/article/1748-9326/3/3/034008/erl83034008.html

[8] Performance and Power Consumption on Dell, IBM, and HP Blade Servers. Principled Technologies. Whitepaper, December 2007. [online]. Available:http://www.dell.com/downloads/global/products/pedge/en/pe_blades_specjbb2005.pdf

[9] S.Baker. Google and the wisdom of the clouds. Busniess Week, December 2007. [online]. Available: http://www.msnbc.msn.com/id/2261846.

[10] R. Camfield, D. Glyer and J.Kalfayan. Self-designed electric products. Electricity Pricing in transition. US: Kluwer Academic, 2002