IaaS Resource Usage Monitoring In cloud

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Abstract— Service Clouds are a key emerging feature of the Future Internet which will provide a basic platform through which it executes virtualized services. For effectively operating a cloud services there is a need to have a monitoring system which provides data on the actual usage and changes in the resources of the cloud and the services running in the cloud. Monitoring and managing cloud is a very different from monitoring and managing the individual servers. This paper will detail the different aspect of the monitoring and the parameters involved in monitoring of the cloud services.

I. INTRODUCTION

In recent years, Cloud computing has become a very hot topic in computing paradigm. Many companies, organizations and institutions are rushing to define clouds and provide cloud solutions in different ways. However, there is still no broadly accepted definition for Cloud computing. Cloud computing, which supports the model of "everything-as-a-service" (XaaS) , is basically based on grid computing, virtualization and Web service as well as Service-Oriented Architectures (SOA) [1]. Cloud computing is an evolutionary in nature where IT is moving from being deployed basically on independent, dedicated set of infrastructure to shared infrastructure, this shift will brings a need for a revolutionary and complex thinking when it comes to monitoring and managing the cloud infrastructure and applications. This is very essential requirement to keep the application Management as simple as it used to be on dedicated infrastructure.

There are basically three types of the cloud.

A. Public Cloud

This type of cloud is publically available. This is based on standard cloud computing model, in this model service provider offers its applications, storage, resources to the general public .It offers these services may be free or as pay-per-use bases depends on service provider[1].

B. Private Cloud

This type of cloud is owned by particular organization or institution, It is Internal cloud for this organization or institution, which is set up according to organization or corporate requirements and provides its services to limited number of users within this organization or institution. The specific organization's or company's employee can only access it and it will be accessible only within those organization's premises and by authenticating each and every user for particular organization, it is not open to all [1].

C. Hybrid Cloud

These types of cloud are combination of both public and Private cloud. Most of the commercial uses are influenced by this type of cloud, in this some resources are handled and provided by the organization itself and some are from external providers [1].

– The Cloud service models are as follows

1) Software as a Service (SaaS)

It is an alternative to locally run services. Provides Capability to use provider's applications running on a cloud infrastructure and These applications are usually accessible through thin client interface such as web browser. Users do not need to manage or control the underlying infrastructure although limited user specific application configuration settings can be used. SaaS eliminates or reduces upfront commitment of available resources, SaaS applications can be deployed in a particularly short time to a large group of users and since SaaS employs single instance, multi-tenant architecture, through which multiple users can share resources without disturbing each other's[2].
Examples of this service are being Google docs or Zoho Office.

2) Platform as a Service (PaaS)

In this service model Software platform where systems run on is provided. Users can deploy their own created or acquired applications on it. The tools and programming language which required by application is provided by PaaS provider. Users still have no control over the underlying cloud infrastructure but they have Control over the deployed applications [2].
Example of PaaS service is Google Apps Engine.

3) Infrastructure as a Service (IaaS)

It is Ad-hock systems that are basically built on a set of computing resources such as storing and processing capacity. Using virtualization technology these resources can be split, assigned and dynamically resized as per requirement. These are the fundamental resources where users can deploy and run software which can include operating systems and applications. From a user's perspective IaaS is similar to physical resources, in which user receives certain amount of hardware-like resources that can be used as user best sees fit his requirement for. User cannot have control over the underlying cloud infrastructure but has control of the operating systems, applications and even network components. The Benefits of using IaaS service include that large specialized organizations can run server farms more efficiently than the average enterprises; also IT departments of companies can easily supplement or replace their own servers with outsourced resources if it requires [2].

Example of IaaS is Amazon EC2. Amazon EC2 is a web service that provides resizable compute capacity in the cloud.

II. MONITORING IN CLOUD

Accurate and fine-grained monitoring activities are essential to efficiently operate Cloud Computing platforms and to

simplify and manage their increasing complexity and security requirements. Monitoring of Cloud is very importance for both Cloud Service Providers and Cloud Service Consumers. Thus it is a key tool for controlling and managing hardware and software infrastructures. Cloud Monitoring provides information and Key Performance Indicators (KPI) for both platforms and applications. The result of continuous monitoring of the Cloud and its Service Level Agreements (SLAs), for example, in terms of availability, delay, etc. - supplies both to the Providers of cloud and the Consumers of those services with information such as the workload generated, performance and Quality of Service (QoS) which is offered through by Cloud, also provides way to implement mechanisms to prevent or recover violations, for both the service Provider and Consumers.

Cloud Computing includes s many activities [3] for which monitoring is a very important task. The most important ones are as follows:

- Capacity and Resource Planning
- Data Centre Management
- SLA Management
- Billing
- Troubleshooting
- Performance Management
- Security Management

III. LITERATURE REVIEW

There are different cloud monitoring tools are available for monitoring the cloud, the most important tools are as follows.

A. *Cloud Watch*

Amazon CloudWatch is a web service which provides monitoring for AWS cloud resources, starting with Amazon EC2. It provides information to customers with visibility into resource utilization, operational performance, and overall demand patterns—including metrics such as CPU utilization, disk reads and writes, and network traffic [4].

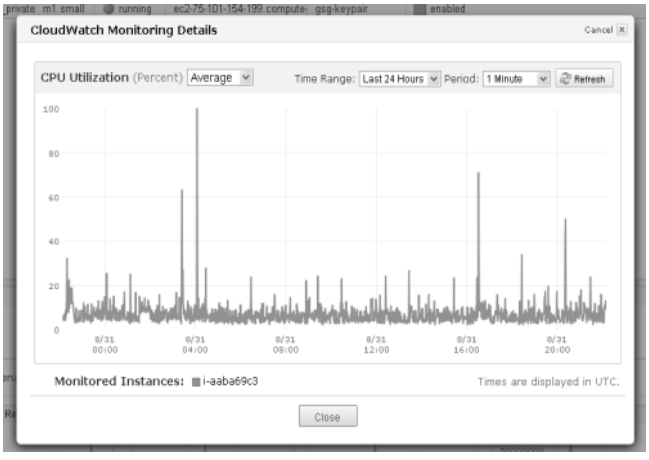

Fig. 1: Cloudwatch monitoring result for CPU utilization

B. *Ganglia*

Ganglia is a scalable distributed monitoring system for high-performance computing systems such as clusters and Grids. It is based on a hierarchical design targeted at federations of clusters [5].

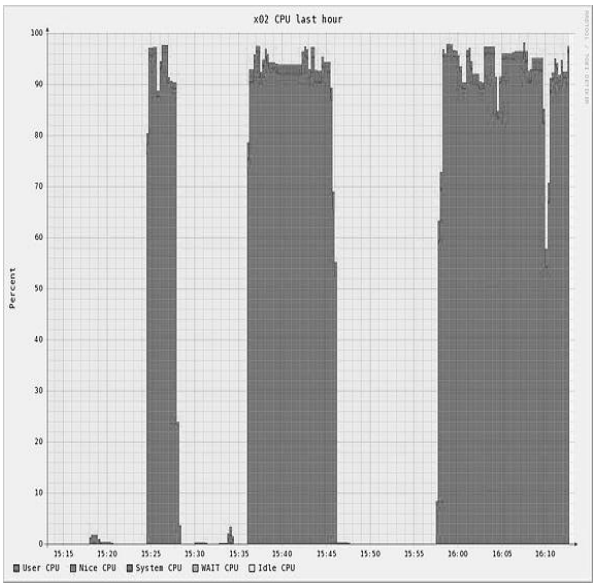

Fig. 2: Ganglia monitoring result for CPU utilization

C. *Nagios*

Nagios is another tool which provides monitoring data like application, services, operating system etc. which helps to detect security breaches, Plan and budget for IT upgrades [6].

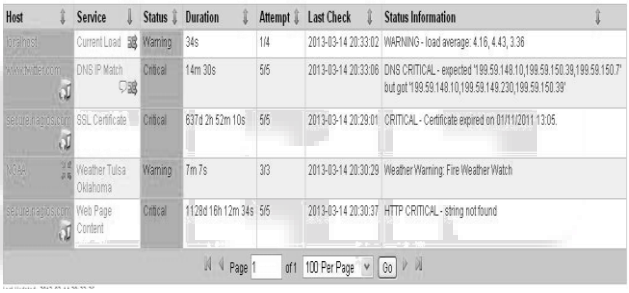

Fig. 3: Service status overview using nagios

These tools are very useful for monitoring cloud but they have their limitation including performance and limited parameters. Whenever going to think on a monitoring need to keep in mind different properties like: Scalability, Elasticity, Adaptability, Resilience Reliability and Availability, Timeliness, Automaticity, Comprehensiveness, Extensibility and Intrusiveness, and Accuracy.

IV. PROBLEM IN RELATED WORK OF CLOUD MONITORING

Cloud-dependent organizations with business-critical web sites & web applications have an ever-increasing set of new demands – for unified visibility, simplicity, quality of service and value, and speed – demands that the first generation of cloud application and server monitoring tools just can't provide. These users have been relying on 1st-generation cloud performance management tools – legacy, open-source (e.g., Nagios, Munin, Ganglia), or one-dimensional products. They are frustrated with their current monitoring tools that are too fragmented, too complex (high-maintenance, expensive, hard to use, scale, & administer), slow, and all too often wrong (with too many false alarms and too narrow a focus).So, the Accurate and fine-grained monitoring activities are required in to cloud to efficiently

operate Cloud Computing platforms and manage their increasing high complexity and security requirements and require to send details to user as per request.

V. PROPOSED ARCHITECTURE

Below is the working model which we have proposed.

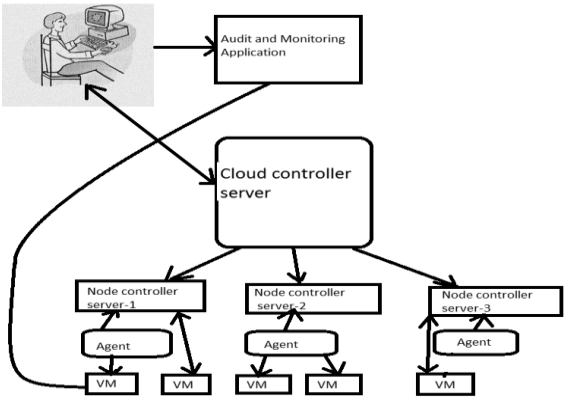

Fig. 5: Proposed Architecture

A. Cloud Controller Server

Cloud Controller Server (CLS) is the front end of the entire cloud infrastructure.CLS provides the EC2/S3 compliant web services interface to the client tools on one side and it interacts with the remaining part of the eucalyptus infrastructure on the other side.CLS also provides web interface to users for managing certain requirement of cloud infrastructure [7].

B. Node Controller Server

Node controller server (NCS) is a virtual extension (VT) enabled server which is capable of running KVM as the hypervisor .The VMs running on the hypervisor are controlled by cloud server are called instances.NCS is run on the each of the node and controls the life cycle of instances running on the nodes. The node controller server interacts with the OS and the hypervisor running on the node on one side and cloud controller on the other side [7].

C. Agent

Agents are the services which is capable to monitor and audit virtual instances from the time they are started. They also generate the log files and the report of the monitoring, which is provided to the user according to their demand.

D. Virtual Machines (VMs)

VMs are one kind of the cloud instances, based on the demand of service. Separate instance are created for every user .Through the instances, the services are provided to the user. Instances are stored on the node controller server.

E. Users

Users are those who access the services of the cloud.

VI. APPROACH

As per the above architecture as shown in Fig 4.0 be accessing his services from the Cloud Controller Server after once the authentication process is completed with the provided credentials. If a user makes a request for the auditing or monitoring the services then the request will first go the Cloud Controller Server and then this request would be transferred to the node controller server where the virtual machines are running and from where different instances are provided to the different users which is shown in Figure 4. The monitoring agent would be continuously monitoring all the activities of virtual machines. The users when requests for the details it will be provided with audit and monitoring details of the services on demand.

VII. CONCLUSION

As Cloud Computing is new area for research and development, third party audit and authentication algorithm and Virtual Machine Monitoring is a big challenge for the cloud provider for ensuring data. The parameters like CPU Monitoring, Process Monitoring, Disk monitoring, Ram usage Monitoring, Thread monitoring etc. will bring all the monitoring requirement of cloud in one roof including the user notification for the monitoring results.

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