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Analysis of Cloud Computing Utilization from user's perspective using intelligent tool

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ABSTRACT- *Cloud computing is a way of computing which includes sharing computing resources rather than having local servers or some personal devices to handle applications or store data. It is a prime need of today's IT world and in order to increase benefits, organizations are rapidly shifting to cloud computing. In this form of computing resources such as servers, storage and applications are made available to organizations through Internet. The vendor complete the request of the user through a package, the user procure the resources in the beginning and they don't know how much they are using ,so they end up paying for the whole package. In this paper we have made a novel attempt to propose a technique to calculate the real time utilization of cloud resources. Further, in this paper we have proposed an algorithm/tool for continuous updating of cloud resource's use and thus increasing the user's profit.*

Index Terms- Cloud Computing, Cloud Resources, Cloud Resources allocation, Cloud Resources analysis

I. INTRODUCTION

Cloud computing is the most prevailing technology that relies on sharing computing resources rather than having local servers or personal devices to handle applications. Users of cloud computing request for different computing resources and the cloud service providers pick up the required resources from cloud resource pool and provide these as per the requirement of individual user. In order to accomplish as many requests as possible, it is very much necessary to utilize cloud resources effectively and wisely. A calculated use of cloud resources helps the organization or an individual user to save their money by using resources only they required and also enhances the performances.

Cloud computing [1] is one of the prime need of today's IT world. Organizations are shifting to the cloud rapidly in order to increase their overall benefits. Cloud computing has Virtualization as its backbone. Cloud resources are provided on demand using the Internet and an on-running migration of resources is done by the cloud service provider.

So it is very important to monitor the cloud resource allocation and utilization. The very basic motivation behind this is a particular user procure certain resources from any vendor as per their use [2], but at the vendor end only that much resources are deployed which the user is actually using, so it is a notable loss at users end and user is unaware of it.

The major problem with the traditional monitoring system is that, they provide only domain specific information. For example, a networking tool monitors only the network packets. Therefore, these performance tools report resource utilization statistics and good view of individual components. But they fail to give a good view of entire cloud infrastructure.

The end users look for intelligent reports to actually point to what, where and when action is needed. So, it is essential to have a monitoring system that correlates all the components and give a consolidated report about the resource availability and consumption of resources in a cloud infrastructure so that, customers believe that they pay only for what they are getting.

This brings us to the problem how to measure the actual resource utilization as per user prospective, so as to provide user with an insight of their actual requirement which would in turn not only minimize their cost overhead and maximize their profit margins but also save them from probable exploits [3].

In this paper we have proposed algorithm to continuously monitor the utilization of cloud resources as per utilization and also provided with a solution, a tool, which would monitor the actual use of resource and provide user with useful insights.

II. RELATED WORK

This section discusses prior work related to our research.

i) Cloudyn

Cloudyn is able to complete various aspects of the proper cloud computing utilization. It optimizesthe cloud and ensure that the cloud deployment is optimally priced and utilized, it has also helped in cutting the costs and eliminating the shocking monthly bills. Gaining insight and visualizing the usage and performance trends all in one place is the new feature of the Cloudyn and it also helps in comparing clouds and research the deployment's performance.

ii) CloudCheckr

CloudCheckr is able to cover many of the use cases of the problem. It's able to provide Infrastructure security and Event altering which fulfill the shared security responsibilities through in class Cloud Trail support, it provides continuous monitoring and audibility for assets, users and configurations. The main tasks performed by the CloudCheckr Spend Optimization, cost allocation and resource reporting

iii) Cloudability

Cloudability provides the data-driven Cloud cost management. It monitors the spending by tracking critical trends and spikes with customizable dashboards, reports and alerts. It also optimizes costs by right sizing spending analytics and reserved instance portfolio management which helps in governing the finances of the client

III. FINDINGS

This section discuss the information related to the research

i) Factors Affecting the Cost

For cost computation analysis, it is better to know your requirements from cost stand point. The services [4] that are charged in public clouds are:-

- Machine - compute power (computer in terms EC2 instances for Amazon). It includes the number of hours you are going to need particular machine without shutting it down.
- The amount of persistent storage.
- The data movements in and out of provider's network.
- The other cost factors could monitoring services.

ii) User Characteristics

There will be the three classes of users who will be using this tool to check the cloud utilization.

- General User(Individual) :-
  1. General users don't know where the money can be saved, they just think it will be easy to use resources of the cloud rather than building own data center.
  2. They underutilize the resources of the cloud and end up paying more [5]. They think using a cloud will save their money, it does but they don't know that they can save even more money by using this feature, which will save their money as well under utilization of the resources.

- Companies or Groups :-
  1. Most of the companies prefer to use cloud than creating own data centers, as they know that will cost them a huge sum of money and time in maintenance, plus they have to provide their own security in that.
  2. Well money is the important factor of any business and it's important for them to control their investment in the cloud. Adding this feature the company will be able to control lot of money and will know how much resource they are using and which resource is being under-utilized.

- Service providers :-
  1. By providing this extra feature by the cloud service provider [6], company will be able to get the added facility to their service. Trust of customers will also be earned.
  2. As the user will be able to monitor and manage its own resources, wastage will be minimized and the service provider will be able to provide services to a greater number of users with the existing hardware.

IV. IMPLEMENTATION

This section discuss the implementation of our research.

i) Resource Description

This project works on analyzing main resources of cloud computing. Following is the little description of these resources.

- CPU

Most of the time, processes altogether only use a small fraction of the CPU power allocated tothem. In fact, many applications use less than 5 % of their CPU the majority of the time [7]. For example, when you open an application, play a video game, or encode media file, the CPU usage will rise or spike temporarily. Once the CPU intensive process completes, the CPU usage should once again drop down to lower level. Most applications will not use up more than 50 % of your CPU for an extended period of time. So allocating a high processing power for a small job is just a

waste of money.
Typically, most servers have very low overall CPU usage (less than 10%), which is why virtualization is a great solution to maximize your hardware resources and reduce the number of physical servers in your environment [8]. Average processor utilization is the best metric to use to measure how busy a server actually is. It will give you an overall indication of how much processor the physical server is using. Most of the time, processes altogether only use a small fraction of the CPU power allocated to them. In fact, many applications use less than 5 % of their CPU the majority of the time. For example, when you open an application, play a video game, or encode media file, the CPU usage will rise or spike temporarily. Once the CPU intensive process completes, the CPU usage should once again drop down to lower level. Most applications will not use up more than 50 % of your CPU for an extended period of time. So allocating a high processing power for a small job is just a waste of money. Typically, most servers have very low overall CPU usage (less than 10%), which is why virtualization is a great solution to maximize your hardware resources and reduce the number of physical servers in your environment. Average processor utilization is the best metric to use
to measure how busy a server actually is. It will give you an overall indication of how much processor the physical server is using.

- Memory

As reading and writing to file storage is terribly slow, RAM (Random Access Memory) is used as storage place to hold data. The bus (a pathway for the electrical signals to travel along) between the CPU and the RAM is fast, and everything is kept orderly and easy to retrieve [9]. It's also resource friendly to read and write to it. Application running on the cloud use some part of processor and RAM. And as said "unused RAM is a waste RAM", memory should be used in a efficient way with complete analysis of
Memory usage by the application.

- Network

The explosive growth in Internet and intranet deployment for a constantly growing variety of applications has created a massive increase in demand for bandwidth, performance, predictable Quality of Service (QoS), and differentiated network services. Simultaneously, the need has emerged for measurement technology that will support this growth by providing IP network managers with effective tools for monitoring network utilization and performance. Bandwidth and latency are clearly the two key performance parameters and utilization indicators for any modern IP network [11]. Knowledge of the up-to-date bandwidth utilizations and path latencies is critical for numerous important network management tasks, including application and user profiling, proactive and reactive resource management and traffic engineering, as well as providing and verifying QoS guarantees for end-user applications

- Storage

For many organizations today, storage, and how storage is managed, represent major opportunities to improve. For instance, organizations typically want to provision storage more quickly to fulfill business needs. They also want to simplify and standardize the way storage is administered, in areas like quota management, access management, and user monitoring. In the real world, of course, cloud storage is dramatically more complex [14]. It typically involves hundreds, or thousands, of such servers; they create redundant copies of data, shared across servers, to help protect that data against loss, and they also distribute data geographically among data centers so that it can more quickly or easily support organizational needs.

ii) CPU analysis

This section focus on techniques that are used in this project to track actual CPU utilization. We can use these techniques to determine how close to the "edge" a specific project is performing.
Here is the small algorithm that we have used for calculating CPU utilization:-
1. Start
2. Initialize variable uptime = 0 and cycle = 0
3. If cycle = 10,000 go to step 6 else go to step 4
4. If main task is running uptime++ cycle++
5. If idle task is running cycle++
6. % utilization = (uptime/10,000)*100
7. Go to step 3
8. End

Defining CPU utilization:-
For our purposes, we define CPU utilization, U, as the amount of time not in the idle task, asthe idle task is the task with the absolute lowest priority in a multitasking system. This task is also sometimes called the background task or background loop. This logic traditionally has a while (1) type of loop. In other words, an infinite loop spins the CPU

waiting for an indication that critical work needs to be done [15]. Once you know the average background-task execution time, you can measure the CPU utilization while the system is under various states of loading. Obviously there's no way (yet) to measure CPU utilization directly. You'll have to derive the CPU utilization from measured changes in the period of the background loop. You should measure the average background loop period under various system loads and graph the CPU utilization.

iii) Network Analysis

Understanding network bandwidth and resource utilization is the key to network utilization.

Bandwidth Monitoring:-

Bandwidth usage for a given (sub) set of (a) links, and (b) aggregate packet flows between ingress-egress routers in the network [16]. Link-bandwidth utilization information is obviously critical for a number of network management tasks, such as identifying and relieving congestion points in the network.

Latency Monitoring:-

Path latencies for a given (sub) set of (possibly overlapping) source-destination paths in the network. Once again, knowledge of the delays that packets experience along certain routes isimportant, e.g., in determining effective communication paths for applications with low-latency

QoS requirements or dynamically routing the clients of a replicated service to their "closest "replica.

iv) Storage Analysis

Storage utilization is a measure of how well the available data storage space in an enterprise is used.

NAS and SAN:-

When the amount of stored data and management requirements exceed the limitations of a direct-attached storage, a network-attached storage (NAS) or storage area network (SAN) allows for increased storage space, flexibility and recoverability. NAS provides a single storage device that is directly attached to a LAN and offers shared storage to all clients on the network [16]. A NAS device is simple to install and easy to administer, providing a low-cost storage solution. However, it provides limited throughput for incoming data because it has only one network connection, which can become problematic in high-performance systems.

Redundant storage:-

SAN systems build redundancy into the storage device Redundancy in a storage system allows video, or any other data, to be saved simultaneously in more than one location. This provides a backup for recovering video if a portion of the storage system becomes unreadable [17]. There are a number of options for providing this added storage layer in an IP-Surveillance system, including a Redundant Array of Independent Disks (RAID), data replication, server clustering and multiple video recipients.

Our approach:-

There are a number of variables that can be used to determine the storage utilization in a system. The relative priorities assigned to each variable can also affect the utilization figure. Variables that are sometimes used to determine storage utilization include:

- The total available storage space in the entire system.
- The time-averaged percentage of raw storage used.
- The percentage of raw storage used at times of peak demand.
- The time-averaged percentage of storage used in each volume.
- The peak-demand percentage of storage used in each volume.
- The time during peak-demand periods required to store or retrieve a file of a given size.
- The average size of files stored or retrieved.
- The ease with which data can be shared among the servers in a network.
- The random-access memory (RAM) capacity at each server.
- The nature and economic value of data handled by the business.

The storage is bought in the beginning and available space can be calculated subtracting total storage to the space used and total space used will be calculated using the summation of all the elements present currently in the storage.

Space used = sigma (from 1 to n) [size of obj];

Available space = total space - space used;

V. CONCLUSION

Cloud environment needs to provide reliable services to the cloud users. The proposed technique can be used to analyze the availability and utilization of various cloud resources as per user's perspective. These algorithms can be used for reliable scheduling of cloud resources. The generation of the allocation matrix has been done in a simulated environment. We will continue our work by simulating the analysis on various cloud platforms like amazons ec2.Further, we will apply these scheduling technique in a real cloud environment.

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