

# Virtualization, Resource Allocation and Security Measures in Cloud Computing

Bhaavan M<sup>#</sup>, K C Gouda<sup>\*</sup>, Ananda Kumar K R<sup>#</sup>

<sup>#</sup>Department of Computer Science and Engineering, SJB Institute of Technology (VTU)  
BGS Health & Education City, Kengeri, Bangalore-60, India

<sup>\*</sup>CSIR Centre for Mathematical Modeling and Computer Simulation (C-MMACS)  
Wind Tunnel Road, Bangalore-37, India

**Abstract**— Cloud Computing mainly aims for the next generation data centers and it also enables the application service providers to lease data center capabilities for deploying applications depending on user QOS requirements and different composition configuration as well as deployment requirements, these are related cloud applications. Cloud Computing also provides virtualization, which is a computing technology that enables single user to access various multiple physical devices i.e. resources. Cloud Computing deals with various resource allocation model, task allocation model, dynamic allocation in which the resources are efficiently allocated to the end users dynamically. Various security aspects of cloud are also dealt in this paper with measures which should be taken in cloud for proper security.

**Keywords**— Cloud Computing, Virtualization, Resource Allocation, Security Measures.

## I. INTRODUCTION

In recent years, as technology is advancing most of the people are having their own PC's so Cloud Computing has become more popular than ever before. Most of the top companies like Google, Amazon and products like Windows 8 are making use of Cloud Computing. In this paper a brief introduction on cloud computing and its types, virtualization, resource allocation and security measures are discussed.

## II. CLOUD COMPUTING

Cloud Computing will deliver platform, Infrastructure and software as a services(SaaS) available as the subscription based services in a pay-as-you-go model for the consumers like Software as a service(SaaS), Infrastructure as a service(IaaS), Platform as a service(PaaS). It is defined as distributed system which consists of a collection of interconnected and virtualized computers which dynamically are provisional and will meet service level agreements.

In the system level layer massive physical resources exists like storage and applications that powers the data centers and these are transparently managed by higher level virtualization services and toolkits that allow sharing of their capacity among virtual instances of servers. These virtual machines are isolated from each other which will aid in achieving fault tolerant behaviour and isolated security aspects.

## III. TYPES OF CLOUD

### A. Public Cloud

Public clouds are accessed by the public in general. These clouds are open to everyone who requests the services which are offered by Service Provider E.g. can be gmail by Google. Most of the customers share the same infrastructure and security over a public cloud. It is less costly and more efficient when compared to other cloud networks but those are more prone to cyber attacks.

### B. Private Cloud

Private clouds are used by a single individual organization and can be hosted by a third party vendor externally or by the same company internally. These clouds are very expensive when compared to public clouds but are more secure and less prone to attack.

### C. Hybrid Cloud

Hybrid clouds are the combination of two or more clouds. The clouds can be public, private or community cloud. The clouds are independent of each other and are bound together to provide the advantages offered by various clouds and can also be hosted externally or internally.

## IV. CLOUD MODELING

Core hardware infrastructure services related to the cloud are modeled in simulator by a datacenter component for handling service requests. The requests can be application elements which are sandboxed within the virtual machines and need to be allocated a share of processing power on datacenters host components for example virtual machine creation, virtual machine destruction and virtual machine migration.

One datacenter is composed by a set of hosts which are responsible for managing virtual machines. Host is a component that represents a physical computing node in a cloud with assigned processing, memory storage and allocating scheduling policy to VM's. Each host component will implement interfaces that will support modeling and simulation of both single and multicore nodes.

Specific virtual machines application allocation to hosts is the responsibility of the VM provisioner component in a cloud based datacenter. Every host component will have the allocation of processing core to virtual machine and it is done based on host allocation. Many processing cores will be delegated to each VM and how much of processing core's capacity will effectively be attributed for a given VM

will be taken into account by the policy. Therefore it is possible to assign specific cpu cores to specific virtual machines or to dynamically distribute capacity of a core among many virtual machines and to assign cores to virtual machines on demand or to specify other policies. Every host component instantiates a VM scheduler component which implements space shared or time shared policies for allocating cores to virtual machines. Cloud scheduler component are used for experimenting with more custom allocation policies.

## V. VIRTUALIZATION IN CLOUD COMPUTING

Virtualization is an important aspect in cloud computing environment. Virtualization is a computing technology which will enable a single user to access multiple physical devices on a cloud. It is also defined as a single computer which controls multiple machines or also defined as one operating system utilizing multiple computers to analyze a database. With cloud computing, the software programs used does not run from your personal computer but rather are stored on servers placed anywhere around and accessed via Internet.

## VI. MODEL FOR RESOURCE ALLOCATION

The Resource Allocation Model presents an efficient and easy resource allocation in a cloud computing Environment. Various parameters like Number of processor request, user count, time, cost, resource availability, resource allocated and many can be considered to develop a model for efficient resource allocation. The service requests will run or execute in cloud server in the resource allocation model. Server in cloud computing environment is the cloud service provider which will run the tasks or jobs submitted by the client. The cloud administrator will play a key role in efficient resource allocation because he the one who decides the priority among the different user request. This priority based resource allocation considers the parameters like Number of processor request, user count, time, cost, Resource availability, Resource allocated. For example as shown in fig1 below, number of resources will be connected to cloud and then the resources are allocated based on the priority or so.

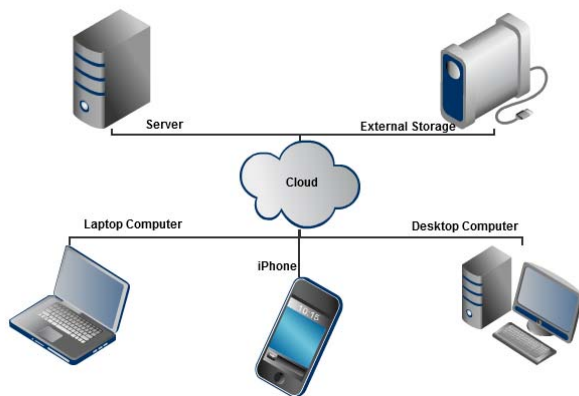


Fig. 1 Resource Allocation in Cloud Infrastructure

In dynamic cloud environment different users will submit different requests and each request consists of

different task. For each task different parameters are considered like time, processor request, cost etc. Time refers to computation time which is needed to complete the assigned task, Processor request refers to number of processors which is needed to run the task and more the number of processor, faster will be the rate of execution of tasks.

Flexibility can be increased by allocating the resources according to their needs and demands in cloud [1]. Task scheduling problems mainly are load balancing, scalability, reliability, performance, and re-allocation of resources dynamically to the computing nodes. Internal and external resource requirement are maintained in the cloud environment and not in the primary environment. Efficient scheduling algorithms can be used for the efficient use of the resources by users. In earlier days there were various methods and algorithms to solve resource scheduling problem [3] in cloud environment. A task is an action that takes resources as an input to produce the efficient output in computation nodes. In the cloud environment resources are allocated to the customers as pay per use on demand. Algorithms used in the allocation of the resources in cloud computing environment differ according to schedule of task in different environment under different circumstances. Dynamic load balancing [2] in cloud allocates resource to computational node dynamically. Task Scheduling algorithms aims at minimizing the execution of tasks with maximizing resource usage efficiently. Rescheduling is needed only when the customer requests the same type of resource. Each and every task is different and requirements like response time, resource expenses, and memory also differs. Efficient scheduling algorithms maintain load balancing of task in efficient manner. Efficiency of cloud environment only depends on the type of scheduling algorithm used for task scheduling.

All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

## VII. CLOUD SECURITY MEASURES

As the cloud services growth are increasing day by day, the security of cloud computing is becoming a prominent issue in the Cloud era. Cloud offers many benefits but it is also vulnerable to several threats. So security is becoming a major concern in Cloud Computing technology.

Various security techniques can be used in Cloud Computing like-

### A. Service Level Agreement (SLA)

All the services offered should have the level of service defined. The SLA may specify different levels like availability, security, scalability etc. The level of service can also be specified as minimum which allows customers to be informed what to expect i.e. minimum value while providing average target value that shows the level of performance of the organization. Penalties can be imposed in case of non-compliance of the SLA.

SLAs commonly include service definitions, measure of performance, management of problem, disaster recovery, agreement termination [7]. So in order to ensure that SLAs are met, these agreements are often designed with specific

lines of demarcation and the parties involved are required to meet regularly to create an open forum for communication. Contract enforcement such as rewards and penalties should be enforced but most SLAs also leave room for revalidation so that it is possible to make changes based on new information.

The entire document should be in Times New Roman or Times font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes.

### B. Secure Socket Layer (SSL)

SSL is a standard security technology used to establish an encrypted link between server and client like server and web browser. SSL also allows sensitive information like SSN(social security number),CCN(credit card number) and login credentials to be securely transmitted. Usually eavesdropping will occur when data is sent between web browsers and web servers are sent in plain text. If an attacker is able to intercept all data being sent between a web browser and web server they can see and use that information. SSL is a security protocol which describes how algorithms should be used and in this case it determines variables of the encryption for both the link and data being transmitted. SSL secures millions of data on the Internet every day especially during online transactions or when transmitting confidential information over web.

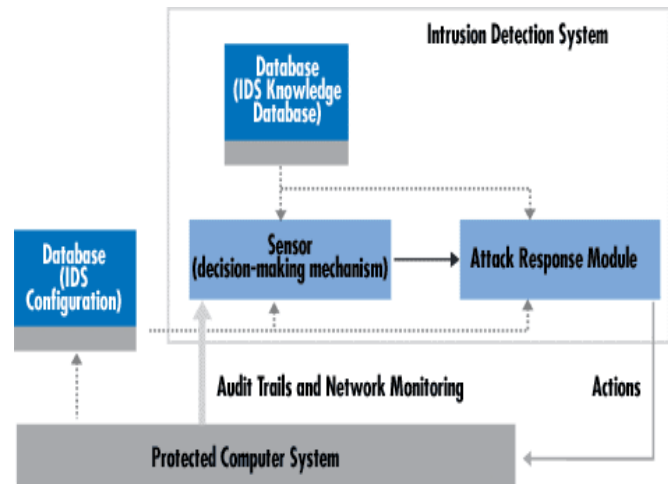
Various techniques can be used to secure data on cloud from unauthorized access like:

#### A. Multi tenancy based access control

Various privileges, roles, dynamic and static data scopes can be user defined by the end user and all these access control configurations should be stored in tenant wise when the single application serves multiple customers. So during run time, we should not only resolve the dynamic and static data scopes, privileges, roles instead it can also be applied to the tenant context and look up for the appropriate tenant specific access control settings before deciding to allow or disallow a particular action in the application. Privilege mapping can be done in various levels like entity, form, field and also in page level so that the end customer has full control and flexibility in defining and modifying the system.

#### B. Intrusion Detection system

Day by day the cloud computing usage is increasing and it has two approaches leading to expansion of cloud development industry in the Knowledge-based IDS and Behavior-Based IDS to detect and research work on intrusion detection as shown in the intrusion detection system architecture diagram below. Behavior-Based IDS objective is to design a set of unified identity management and an intrusion can be detected by observing a deviation from normal privacy protection frameworks across applications in the system. Knowledge-based IDS computing services techniques apply knowledge accumulated about specific attack. Knowledge-based IDS cannot detect unknown attacks but it uses rules and monitors a stream of events to find malicious characteristics and set the new rules for unknown attacks.



#### C. Virtual private network(VPN)

Virtual private network is a secure private network enabled over a public infrastructure like Internet. On acquiring VPN services on cloud, the system will be connected to the remote server which is located in another country through an encrypted tunnel and all the information routed through the tunnel is encrypted before it is being allowed inside the network. It keeps all the data beyond the reach of hackers because users need validation before being authorized to access the tunnel. Both the ends of the VPN tunnel are secured by tunneling protocols like PPTP, IPsec etc so a new IP address generated will be assigned from a remote server located in the other country. The data and its privacy will remain protected as no one would know the real online identity when browsing with the server generated IP address.

## VIII. RELATED AND FUTURE WORK

Cloud computing technology is facing many challenges based on the security of data but also on the other hand modification of this technology helps to secure the data and also many research on this technology are taking place which would eventually help this technology to expand its scope in future and it leads to more secure data and more advance clouds structure and architectures. So it will help to grow the IT industry and as well as advancement of this technology would help in many organizations to fulfill the public industries requirements. As day by day the cloud computing is advancing, the technology will eventually expand and its scope would certainly increase and leads to the expansion of cloud development industry and many more works in future and also the details of components and resource allocation and load balancing are studied by many researchers [4][5][6].

## IX. CONCLUSIONS

Using Cloud Computing the complexity and cost of owning and operating computers and networks can be significantly reduced. Customization of Cloud services can be done and it is also flexible to use, advanced services can be offered by the providers so that an individual company might not have to spend money or expertise to develop. It also provides virtualization, which is a computing technology that enables single user to access various

multiple physical devices i.e resources. It also deals with various resource allocation model, task allocation model, dynamic allocation in which the resources are efficiently allocated to the end users dynamically. Various security aspects of cloud are also dealt in this paper with measures which should be taken in cloud for proper security.

#### ACKNOWLEDGMENT

The first author Bhaavan acknowledges to SPARK program of CSIR C-MMACS, HOD Computer Science and Engineering & Principal, SJB Institute of Technology, Bangalore for providing the necessary infrastructures to carry out the work.

#### REFERENCES

- [1] Mrs.S.Selvarani; Dr.G.Sudha Sadhasivam, "Improved Cost -Based Algorithm For Task Scheduling In Cloud Computing",IEEE 2010.
- [2] S. Mohana Priya, B. Subramani, "A New Approach For Load Balancing In Cloud Computing", In: International Journal Of Engineering And Computer Science (IJECS-2013) Vol 2, PP 1636-1640(2013).
- [3] Jiayin Li, Meikang Qiu, Jian-Wei Niu, Yu Chen, Zhong Ming,"Adaptive Resource Allocation for Preempt able Jobs in Cloud Systems", in 10th International Conference on Intelligent System Design and Application, Jan. 2011, pp 31-36.
- [4] Gouda K C, Radhika T V, Akshatha M, Priority based resource allocation model for cloud computing, International Journal of Science, Engineering and Technology Research (IJSETR), ISSN: 2278 - 7798, pp 215-219.
- [5] Gouda, K. C., and Dwaipayan Acharjee. "An Outlook of cloud computing." International Journal of Science, Engineering and Technology Research 2.6 (2013): pp-1403-1406.
- [6] Jamunarani M R., Gouda, K. C., & Nirmala, H. Load Balancing Technique for Climate Data Analysis in Cloud Computing Environment, International Journal of Computer Science, Engineering and Technology, 3(5) (2013): pp-183-185.
- [7] F. A. Alvi1; B.S Choudary; N. Jafery; E.Pathan, "A review on cloud computing security issues & challenges.