CLOUD COMPUTING: BEGINNING OF A NEW TECHNICAL ERA

Neha Jain[1],Shipra Dubey[2]ander.Rajesh Kumar

[1]Master of Technology(IT)
nehash9@gmail.com

[2]Master of Technology(CS)
shipradubey2010@gmail.com

Banasthali VidyaPith ,jaipur, Raj ,India

*A*BSTRACT

With the arrival of new era of technology , incremental use of gadgets such as smart phones loaded with camera , tablets ,music players, hand held game consoles etc. has led to a continuous requirement to store , share and access digital data .Thus massive digital data born every day requires a huge storage which can only be fulfilled by cloud.. [13]. Cloud computing allows the storage and processing of data over huge data centres and facilitates an on demand delivery of services over a computer network (typically Internet) . With the development of IC technology and advancement of VLSI andULSI technologies, consumers are made available modern day computes with high processing capability which could not be utilized to its fullest .In this paper we have explained how this problem is solved with use of Virtualization technique.This paper is a brief survey based on reading of cloud computing and it tries to explains how services are delivered in cloud computing , gives the basic concepts, general architecture of cloud, and fundamental software for virtualization called hypervisor.[2]

.**Keywords:***cloud computing, cloud architecture, hypervisor, virtualization*

I. INTRODUCTION

Cloud computing proved a boon to small scale industries who could not afford to have expensive powerful computers by making them available cheap and easy access to IT resources [1]. With the increasing popularity of applications such as YouTube,drop box , yahoo etc. ,the concept of cloud computing is becoming stronger in not only big organizations but common people also . In such internet based applications your data is not stored on your desktop or portable personal computers ,rather, it is stored in data centers via the application .We can also say that data is in cloud and we can only access and view it.

II. CLOUD DEPLOYMENT STRATEGIES

Cloud computing can be deployed by an agency in many ways depending on various factors.

- Location of hosted cloud services.
- Security concern
- Whether cloud service to be shared or not.
- Capability of management of all or some of the services.
- Capabilities to customize. [4]

There are 4 common deployment models for cloud services which to an extent are determined   by

who has access to services.

1. Private cloud**:** The cloud services are owned or leased by single organization. Computing

resources are available to single organization through a multitenant hosting model and managed by the organization or a third party regardless of its location whether premise or off premise [12],[5]

Why private cloud

- For maximum utilization and optimization of existing resources within the organization

- For the sake of privacy of data and trust.

- Sending data from local IT infrastructure to a public cloud is expensive.

- The critical and confidential task are protected through firewalls and controlled through private cloud.

- Used for academic purposes so that research and teaching can be safely carried out   [5]

2. Public cloud: Public cloud services are made available to clients by an organization selling cloud services. Client for public cloud can be general public or large group of industry. This is currently most dominant form of cloud deployment models. The cloud service provider has full control over public cloud and apply his own policy ,value , profit ,costing and charging model over the service he provide to cloud clients . Examples of public cloud includes Amazon EC2 , S3, Google AppEngine, Force.com   [1],[8]

3. Community cloud:A community cloud is used by several organizations as a group. The group share common computing concerns such as specific security requirement, policies , values , concerns jurisdiction, compliance s.a. audit requirements [5],[7]. Cloud can be near vendor of owned by one of the organization in the group.

4. Hybrid cloud: A hybrid cloud is a combined cloud service which use both public and private clouds to perform distinct functions within the same organization.

    Hybrid cloud models can be implemented in one of the following ways

    - Different cloud vendors team up to provide combination of services (private, public, community) they own

    - Individual cloud service provider makes available a complete hybrid package.

- Organization or group of organization who manage or control its own private cloud itself signup to services of public cloud and then it integrate into thin own infrastructure.
    [8]

5   Virtual Private Cloud (VPC): This cloud is the mixture of private cloud and public cloud. It

is like a bridge between organization's existing IT infrastructure and Amazon public cloud

which secure. This deployment strategy is started by Amazon Web Services (AWS) .It uses

computing resources of Amazon for general public; this shows its public cloud nature. While

 it is virtually private because cloud and IT infrastructure are securely connected through

Virtual Private Network (VPN) also all the security policies are applied on Public cloud. AWS

will dedicate a set of isolated services to VPC which will be utilized as "pay per use "basis.[9]

III.   KEY CHARACTERISTICS OF CLOUD

1. On demand self service: consumer can himself do the setup(infrastructure) and configuration of his environment without any one 's help , he only pay rent for the   setup . Also consumers can avail computing resources such as server time , network storage ,software as needed automatically.[5]

2. Ubiquitous Network Access:User has facility to access cloud from anywhere ,any thing , any device (laptop, phone, desktop etc) after connecting to web (through 3G ,2G or broadband etc) [5],[1]

3. Location independent resource pooling: Multitenant model and virtualization model used [5].Location Independent means user can request for services from any place in this world. Resource pooling cover three concepts: access transparency, location transparency and naming transparency.

4. Rapid elasticity: User can mould his requirements. They can scale-in or scale-up computing resources as and when required [5]

5. Measured   services: Cloud   system automatically monitors and control efficient use of resources. Services utilized by consumers are tracked with usage metrics and consumers have to pay according to different payment models. Payment depends on usage

and type of service and not on the cost of underlying hardware. [9]

6. Holistic security and management: The holistic view analyzes the system as a whole rather than individual components or system. This approach to security and management reduce complexity and risk of data in cloud. [9]

7. Sustainability : It minimizes e-waste and carbon foot prints from IT operations by recycling commodity components through continually evolving architectures [9]

IV. CLOUD DELIVERY MODELS:

1. Infrastructure as a service (Iaas) : This cloud computing provides a virtualization is extensively used to integrate or decompose physical resources to meet growing or shrinking resource demand from cloud consumers. Consumers can use IT infrastructures s.a. processing, storage, network and other computing resources in Iaas cloud [5]. Example Amazon EC2.

2. Platform as a service (Paas) : This cloud computing provides development environment as a service . The consumer can develop his own program using service provider's equipments and deliver it to to users through internet and servers. Consumer can control the application running in the environment but has no control over the operating system, network or hardware infrastructure on which they are running .[6]Example Google App Engine.

3. Software as a service (Saas): It can also be called "on demand software" supplied by Application Service Providers .[10] It is software distribution model in which applications are centrally hosted on cloud and utilized by customers over the internet through web browser .The maintenance , updating work and security plans , disaster recovery etc of software service are looked upon by cloud vendors or service providers . Cloud consumers do not have control over the cloud infrastructure.

V. CLOUD ARCHITECTURE

Cloud significantly maintains a pool of resources which could be repeatedly allocated or reallocated to different purposes with in no time or very less time frames. This allows cloud vendors to gain profit from economics of scale and statistical multiplexing. The entire time of requesting and receiving resources is typically automated and completed in minutes [1]. Cloud architecture runs

to fulfill such dynamic demands of consumer. Architecture is divided in to two sections: the front end and back end, both ends communicate via network (usually internet). Front end is the side seen by client through computer Back end is the cloud section. Front end includes the client computer connected to computer and application required to access the cloud computing system. Back end follows the concept of virtualization. It is a technique of masking or abstracting physical resources as a result utilization and capacity of IT resources (servers , network ,storage) are increased beyond their physical limits .[11]

Following is the cloud architecture which is being used while providing different type of services to the consumers.
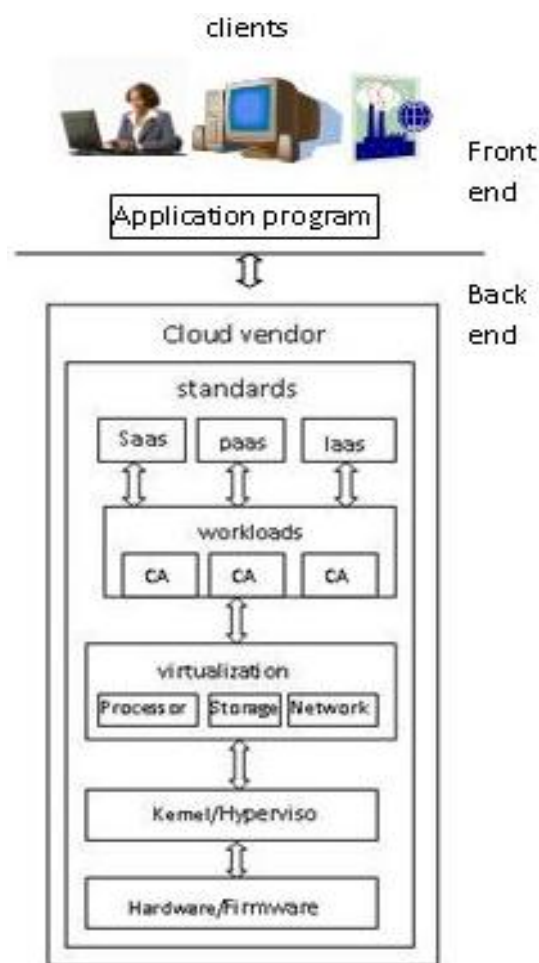

Figure.1.[1]

VI. HYPERVISORS:

To provide virtualization hypervisor has being used as a fundamental software which is known as VMM (Virtual Machine Monitor) whose function is to monitor virtual machines (VMs)that are running on top of it.[2] VMM can be classified into two types:

Type1 Hypervisor: Also known as native or bare metal. VMM is directly running on top of underlying hardware. It is difficult to implement.[3]

Type 2 Hypervisor: Also known as hosted VMM. Hypervisor run as an application on a normal operating system which is known as hosted operating system. Host OS does not have knowledge about type 2 VMM , it treats it as other process. Easy to implement but less efficient.[3]
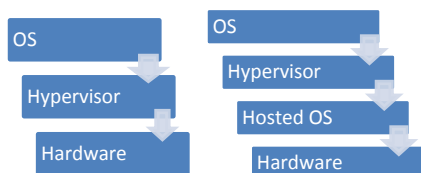

Figure 2. Type 1 HypervisorFigure 3. Type 2 Hypervisor

VII. CONCLUSIONS

This paper discusses the concept of cloud computing, architecture and several forms and characteristics of cloud computing. Cloud computing is computing paradigm over Internet .It is most emerging technology of today. Many organizations are using this network based computing paradigm to increase the performance and throughput and to reduce the induced cost. Cloud is based on virtualization technology in which VMM has evolved which allows simultaneous hosting and processing of multiple applications.

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Authors

Neha jainis pursuing M Tech in Information TechnologyFrom Banasthali Vidyapith jaipur. Her special field of interest includes Cloud computing , Natural Language Processing

Shipradubey is pursuing M Tech inComputer ScienceFrom Banasthali Vidyapith jaipur. Her special field of interest includes Cloud computing , Natural Language Processing