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The Cloud Environment and its Basics: A Review

Neha Sethi,
Research Scholar, IKGPTU

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Abstract

Cloud computing is an emerging model of business computing that consists of developing parallel computing, distributed computing, grid computing as well as virtualization technologies. In this paper, we explore the concept of Cloud architecture, its components along with Cloud Models.

Keywords—**Cloud, Servers, Cloud Models,Providers.**

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I. INTRODUCTION

Cloud computing has appeared as a rapidly growing paradigm in IT industry. It is based on multi tenacy approach which facilitates enormous data processing over network by sharing resources like networks, services etc. Moreover it attracts the user much due to pay-as-use method. So with multiple users using available resources from a pool, the multiplexing and demultiplexing of assets carries on and gives impression to user as if huge infrastructure is always available on their disposal.

Table I: Definitions of cloud computing from literature

S. N.	Organizations	Definition
1	*Wikipedia*	*According to Wikipedia "Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software and information are provided to computers and other devices as a utility over a network".*
2	*Gartner Group*	*Gartner Group defines "Cloud computing as "a style of computing in which massively scalable IT-related capabilities are provided 'as a service' using Internet technologies to multiple external customers.*
3	*NIST*	*NIST defines "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".*
4	*Investopedia*	*Investopedia defines "Cloud computing is a method for delivering information technology (IT) services in which resources are retrieved from the Internet through web-based tools and applications, as opposed to a direct connection to a server".*
5	*IBM*	*IBM defines "Cloud computing, often referred to as simply "the cloud," is the delivery of on demand computing resources -everything from applications to data centers, over the internet on a pay-for-use basis".*

6	*Microsoft*	*Microsoft defines "Cloud computing as the ability and capability to leverage a pool of resources to deliver applications and services. It is about moving past managing applications and services at a specific resource level, such as computers or servers or even memory & disk space, but managing at an application capability level and being able to expand or shrink that level on demand, using that shared resource pool".*
7	*Dimension Data*	*Dimension data defines" Cloud computing as a means to meet the increasing technology needs of your business. It can reduce the costs and time required to deploy and support IT infrastructure – and lower the risk".*
8	*Joyent*	*Joyent says "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".*
9	*HP*	*HP describes" Cloud technology that allows you to use a given pool of equipment (often called resources) to run many workloads. This allows for more efficient use of the hardware you have".*
10	*CISCO*	*Cisco defines "Cloud computing as follows:* *IT resources and services that are abstracted from the underlying infrastructure and provided "on-demand" and "at scale" in a multitenant environment".*

II. CLOUD COMPUTING ARCHITECTURE

Cloud computing architecture includes parts and subparts which are necessary for cloud computations. It includes

a) Front end platform: Front end platform popularly known as clients. The clients can be fat client, thin client or mobile device.

b) Back end platform: Back end platform refers to cloud itself. It includes storage and servers. It is online network storage through which stored data is accessible to many clients. The storage facilities of cloud are available in three configurations namely: hybrid cloud, public cloud, private cloud and community cloud.

c) Cloud based delivery: Cloud based delivery includes the cloud service models which are discussed in detail in section 1.5.

d) Network: Cloud network is the medium that connects the users with the accessible cloud service providers. It gives access of services and resources to consumers.

The architecture of cloud computing is build on certain features which are as follows:

a) Multi-tenancy: The various cloud providers have services located in a single data center, which is called multi-tenancy. In cloud computing the layered framework naturally divides the responsibilities, where each layer concentrates only on their particular goal.

b) Multi-tenancy along with its advantages, also have the problems related to handling and coordinating communications with different involved stake-holders.

c) Shared resource pooling: The cloud infrastructure provider's resources are pooled for serving multiple users with varied virtual as well as physical resources which are assigned dynamically according to users demand. This provision of dynamically assigning resources provides abstract view regarding location of the available resources (Country, state or data center).

d) Geographic distribution & broad network access: The services of the cloud are accessible through internet and hence the internet is used as medium for providing the services to cloud users. Moreover, in order to enhance network performance, many of the cloud data centers are widely scattered. Hence cloud vendors can get advantage from this geo-diverseness and thus achieve optimisation of services.

e) Service oriented - The cloud paradigm employs a service-driven operating model and therefore strongly emphasizes on the service management. Each service provider provides IaaS, PaaS&SaaS cloud services according to the negotiated Service level agreement (SLA) with the clients. So, each cloud service provider promises integrity along with service provisioning with the commitment of SLA.

f) Dynamic resource provisioning: This is a major feature of cloud computing, where the computational facility can be added and freed dynamically. The resource provisioning in cloud environment considers SLA (Service level agreement) for providing users with the services. The dynamic resource allocation facilitates cloud users in acquiring the resources according to

the need and helps in decreasing the operating costs.

g) Self-organized: The resource assignment and de-assignment is done on demand basis, facilitating the service providers to handle the resource utilization according to the requirement. The feature of resource management which is programmed let the service vendors to quickly react to the fast changes in the requested service.

h) Usage based pricing - A major feature of cloud is that it is usage based pricing model. Although, the usage based pricing schemes vary according to the requested services by the clients but it has drastically decreased the operating costs because the users are charged on usage basis. This feature of cloud computing introduces complexities in controlling the operating cost.

III. CLOUD COMPONENTS

Following are the components of Cloud:-

a) Client: Clients are the consumers who use the various resources and are charged according to the usage.

b) Data centers: It is repository with numerous types of servers where data, information and the different applications are stored. The user can subscribe to particular application for its access.

c) Cloud broker: It is middleware between client and provider. The client broker is responsible to schedule the tasks on available computing resources. Moreover broker keeps the check about the status and availability of the resources.

d) Cloud providers: Cloud service providers provides the service to clients. They not only have to manage the resources but also have to ensure the integrity and security of the cloud.

e) Servers: Servers are scattered over different locations, so the service providers need to be more vigile in terms of control and security. As the servers are widely dispersed over different locations so providers have more flexibility but they need to maintain the integrity of data too.

f) Cloud network: Cloud network is the medium that connects the users with the accessible cloud service

providers. It gives access of services and resources to consumers. It includes internet, intranet and intercloud. Undoubtedly the networks of networks i.e. Internet is the most used and popular choice that act as the cloud network

g) Cloud API: The application programming interface (API) of cloud consists of a set of programmed instructions and methods that provides a high level abstraction over a cloud provider. It encompasses a customized or a discrete provider call which may be used to increase the amount of control over an implementation of cloud. API calls are used to build software for exploring and communicating the cloud services.

IV. CLOUD SERVICE MODELS

Service means facilities provided by servers to access different applications across the cloud. It is generally known as “”as a service”. Services in a cloud are of following types.

a) Software as a Service (SaaS): It is application model, used by clients (user) via a middleware (which can be a web browser or thin client). On subscription, it offers wide variety of applications ready for use to users. This model offers flexibility and scalability by reducing the expenditure to procure the additional hardware and software and option of accessing deployed services.

b) Desktop as a Service (Daas): This model gives virtual desktop access to third party vendor. It provides on demand services for clients and organizations. In DAAS the Cloud data centers have servers where desktop Operating system runs on VM’s.

c) Infrastructure as a Service (Iaas): It is a part of cloud computing which provides virtualized computing infrastructure. It curtails the cost incurred to procure and manage servers, data centers and other required infrastructure. The benefit of this service is rent scheme. Users are flexible to scale up and down the infrastructure and pay only for subscribed component. E.g. Amazon Web Services and Google Cloud Platform.

d) (Data as a Service (Daas): This model Ensures timely availability of data to client on demand regardless of geographic distance between vendor and the client.

e) Platform as a service: It is complete development kit which comprises of hardware and software tools that are required by users for application development and management without procuring the platform required for developing an application e.g. Java runtime.

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