© 2019 IJSRSET | Volume 6 | Issue 1 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Engineering and Technology
DOI : https://doi.org/10.32628/IJSRSET196120

Cloud Computing : An Overview

Saumitra Singh
Defence Accounts Department, Pune, Maharashtra, India

ABSTRACT

Cloud computing is a technology that allows user to use computation, storage and data access services. Cloud computing is about moving services, computation and data for cost and business advantage. It is a location-transparent, centralized facility. These services are provided on the basis of cast. By making data available in the cloud, it can be more easily accessed often at much lower cost, increasing its value by enabling opportunities for enhanced collaboration, integration, and analysis on a shared common platform. This paper explores the definition, nature and potential of cloud computing and research questions related to cloud computing.
Keywords : Cloud Computing, Grid Computing, Infrastructure Services, Virtulization, Virtual Services.

I. INTRODUCTION

Cloud computing is a future of computing in which we won't compute on local computers, but on centralized facilities operated by third party compute and storage utilities[1]. Before cloud the term grid was introduced to describe technologies that would allow consumers to obtain computing power on demand. Grid computing aims to enable resource sharing and coordinated problem solving in dynamic, multi-institutional virtual organizations. Grid provide distributed computing paradigm or infrastructure that spans across multiple virtual organizations (VO) where each VO can consist of either physically distributed institutions or logically related projects/groups. The goal of such a paradigm is to enable federated resource sharing in dynamic, distributed environment [6]. So can we say Cloud Computing just a new name for grid? On the perspective of vision the answer is YES - to reduce the cost of computing, increase reliability, and increase flexibility by transforming computers from something that we buy and operate ourselves to something that is operated by a third party[3]. The Cloud computing, which was introduced in late of 2007, currently emerges as a hot topic due to its abilities to offer flexible dynamic IT infrastructures, QoS guaranteed computing environments and configurable software services. From the last few years numerous projects within industry and academia have already started on cloud computing, for example the RESERVOIR project{ an IBM and European Union joint research initiative for Cloud computing, Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, scientific Cloud projects such as Nimbus and Stratus, and Open Nebula. HP, Intel Corporation and Yahoo! Inc. recently announced the creation of a global, multi-data center, open source Cloud computing test bed for industry, research and education [4]. There are still no widely accepted definitions for the Cloud computing even though the Cloud computing practice has attracted much attention. Several reasons lead into this situation:

- Cloud computing involves researchers and engineers from various back- grounds, e.g., Grid computing, software engineering and database. They work on Cloud computing from different viewpoints.

- Technologies which enable the Cloud computing are still evolving and progressing, for example, Web 2.0 and Service Oriented Computing.
- Existing computing Clouds still lack large scale deployment and usage, which would finally justify the concept of Cloud computing.

In this paper we attempt to define the concept of Cloud computing, definition, functionality, enabling technology and typical applications. The remaining parts of this paper are organized as follows. Part II discusses the definition of Cloud computing, part III presents the different nature of cloud computing, part IV presents the existing models. In part V we will discuss the functionalities of the Cloud computing, part VI define the benefits of cloud computing, part VII we will discuss about technology and in part VIII concludes the whole.

II. DEFINITION OF CLOUD COMPUTING

Wherever Cloud computing is becoming the future of IT industry users move out their data and applications to the remote Cloud and then access them in a simple and pervasive way. This is again a central processing use case in which a time-sharing computing server served multiple users [4][1]. Nowadays the Cloud computing comes into fashion due to the need to build complex IT infrastructures. Users have to manage various software installations, configuration and updates. Computing resources and other hardware are prone to solution for users to handle complex IT infrastructures. A number of computing researchers and practitioners have attempted to define Clouds in various ways. Based on these observation of the essence of what Clouds are promising to be, we propose the following definition:
A Cloud is a type of parallel and distributed system consisting of a collection of inter-connected and virtual computers that are dynamically provisioned and presented as one or more united computing resources based on service-level agreements established through negotiation between the service provider and consumers.
The set of features that most closely resemble this minimum definition would be scalability, pay-per-use model and visualization. The figure 1 shows the example of cloud model with different service providers [4].

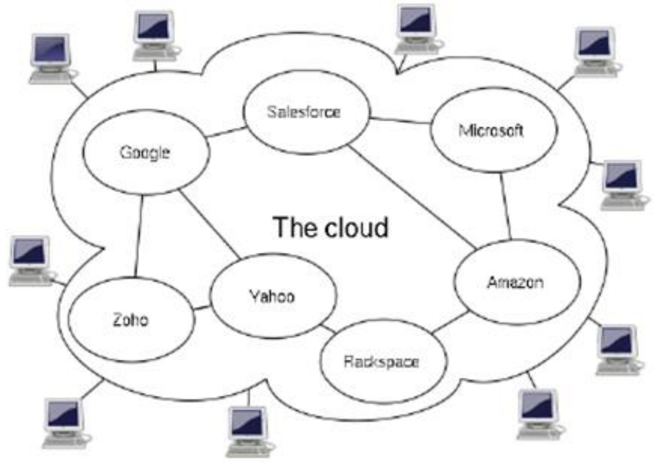

Figure 1: World cloud architecture

III. NATURE OF CLOUD COMPUTING

Cloud computing builds on established trends for driving the cost out of the delivery of services while increasing the speed and agility with which services are deployed. It shortens the time from sketching out an application architecture to actual deployment. Cloud computing incorporates virtulization, on-demand deployment, Internet delivery of services, and open source software. From one perspective, cloud computing is nothing new because it uses approaches, concepts, and best practices that have already been established. From another perspective, everything is new because cloud computing changes how we invent, develop, deploy, scale, update, maintain, and pay for applications and the infrastructure on which they run. In this chapter, we examine the trends and how they have become core to what cloud computing is all about.

A. Virtual Machines

Virtual machines have become a standard deployment object. Virtualization further enhances exibility because it abstracts the hardware to the point where software stacks can be deployed and redeployed without being tied to a specific physical server. Virtualization enables a dynamic datacenter where servers provide a pool of resources that are harnessed as needed, and where the relationship of applications to compute, storage, and network resources changes dynamically in order to meet both workload and business demands. With application deployment decoupled from server deployment, applications can be deployed and scaled rapidly, without having to first procure physical servers. Virtual appliances, virtual machines that include software that is partially or fully configured to perform a specific task such as a Web or database server, further enhance the ability to create and deploy applications rapidly. The combination of virtual machines and appliances as standard deployment objects is one of the key features of cloud computing. Compute clouds are usually complemented by storage clouds that provide virtualized storage through APIs that facilitate storing virtual machine images, source files for components such as Web servers, application state data, and general business data.

B. On-Demand, Self-Service, Pay-by-Use Model

The on-demand, self-service, pay-by-use nature of cloud computing is also an extension of established trends. From an enterprise perspective, the on-demand nature of cloud computing helps to support the performance and capacity aspects of service-level objectives. The self-service nature of cloud computing allows organizations to create elastic environments that expand and contract based on the workload and target performance parameters. And the pay-by-use nature of cloud computing may take the form of equipment leases that guarantee a minimum level of service from a cloud provider [2]. Virtualization is a key feature of this model. IT organizations have understood for years that virtualization allows them to quickly and easily create copies of existing environments sometimes involving multiple virtual machines to support test, development, and staging activities. The cost of these environments is minimal because they can co-exist on the same servers as production environments because they use few resources. Likewise, new applications can be developed and deployed in new virtual machines on existing servers, opened up for use on the Internet, and scaled if the application is successful in the marketplace. This lightweight deployment model has already led to a "Darwinist" approach to business development where beta versions of software are made public and the market decides which applications deserve to be scaled and developed further or quietly retired. Cloud computing extends this trend through automation. Instead of negotiating with an IT organization for resources on which to deploy an application, a compute cloud is a self-service proposition where a credit card can purchase compute cycles, and a Web interface or API is used to create virtual machines and establish network relationships between them. Instead of requiring a long-term contract for services with an IT organization or a service provider, clouds work on a pay-by-use, or pay-by-the-sip model where an application may exist to run a job for a few minutes or hours, or it may exist to provide services to customers on a long-term basis. Compute clouds are built as if applications are temporary, and billing is based on resource consumption, CPU hours used, volumes of data moved, or gigabytes of data stored.

C. Composed Applications

Another consequence of the self-service, pay-by-use model is that applications are composed by assembling and configuring appliances and open-source software as much as they are programmed. Applications and architectures that can be refactored in order to make the most use of standard components are those that will be the most successful in leveraging the benefits of cloud computing. Likewise, application components should be designed to be composable by building them so they can be consumed easily. This requires having simple, clear functions, and well-documented APIs. Building large, monolithic applications is a thing of the past as the library of existing tools that can be used directly or tailored for a specific use becomes ever larger.

D. Service Delivery

It almost goes without saying that cloud computing extends the existing trend of making services available over the network. Virtually every business organization has recognized the value of Web-based interfaces to their applications, whether they are made available to customers over the Internet, or whether they are internal applications that are made available to authorized employees, partners, suppliers, and consultants. The beauty of Internet-based service delivery, of course, is that applications can be made available anywhere, and at any time [3].

II. INFRASTRUCTURE MODELS

Here are many considerations for cloud computing architects to make when moving from a standard enterprise application deployment model to one based on cloud computing. There are public and private clouds that offer complementary benefits, there are three basic service models to consider, and there is the value of open APIs versus proprietary ones. IT organizations can choose to deploy applications on public, private, or hybrid clouds, each of which has its trade-offs. The terms public, private, and hybrid do not dictate location. While public clouds are typically “out there" on the Internet and private clouds are typically located on premises, a private cloud might be hosted at a co-location facility as well.

A. Public Clouds

Public clouds are run by third parties, and applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks (Figure 2). Public clouds are most often hosted away from customer premises, and they provide a way to reduce customer risk and cost by providing a exible, even temporary extension to enterprise infrastructure [4].

If a public cloud is implemented with performance, security, and data locality in mind, the existence of other applications running in the cloud should be transparent to both cloud architects and end users. Indeed, one of the benefits of public clouds is that they can be much larger than a company's private cloud might be, offering the ability to scale up and down on demand, and shifting infrastructure risks from the enterprise to the cloud provider, if even just temporarily.

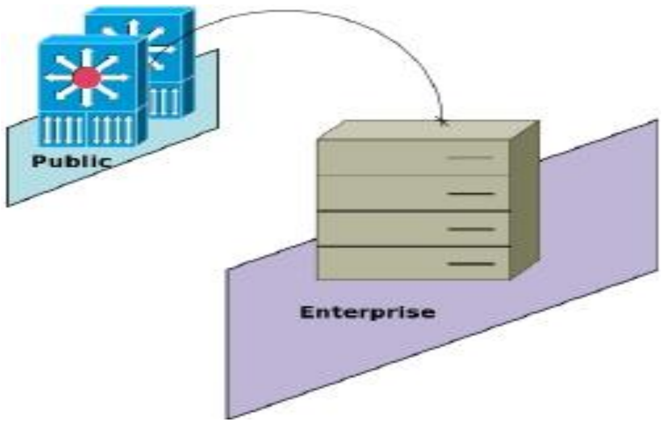

Figure 2: Public cloud

B. Private Clouds

Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service (Figure 3). The company owns the infrastructure and has control over how applications are deployed on it. Private clouds may be deployed in an enterprise datacenter, and they also may be deployed at a co-location facility [4]

Private clouds can be built and managed by a company's own IT organization or by a cloud provider. In this “hosted private" model, a company such as Sun can install, configure, and operate the infrastructure to support a private cloud within a company's enterprise datacenter. This model gives companies a high level of control over the use of cloud resources while bringing in the expertise needed to establish and operate the environment.

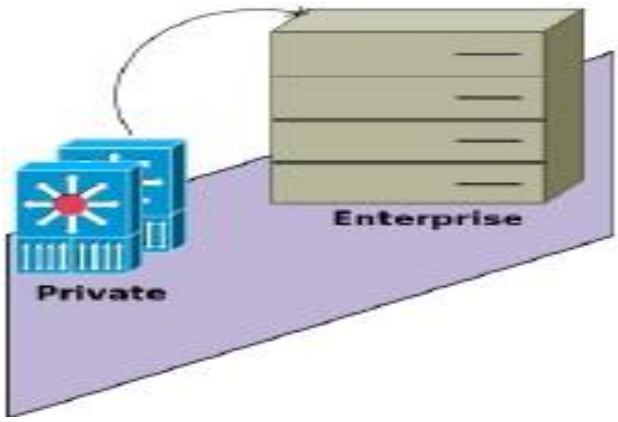

Figure 3 : Private cloud

C. Hybrid Clouds

Hybrid clouds combine both public and private cloud models (Figure 4). They can help to provide on-demand, externally provisioned scale. The ability to augment a private cloud with the resources of a public cloud can be used to maintain service levels in the face of rapid workload fluctuations. This is most often seen with the use of storage clouds to support Web 2.0 applications. A hybrid cloud also can be used to handle planned workload spikes. Sometimes called "surge computing," a public cloud can be used to perform periodic tasks that can be deployed easily on a public cloud [4].

Hybrid clouds introduce the complexity of determining how to distribute applications across both a public and private cloud. Among the issues that need to be considered is the relationship between data and processing resources. If the data is small, or the application is stateless, a hybrid cloud can be much more successful than if large amounts of data must be transferred into a public cloud for a small amount of processing.

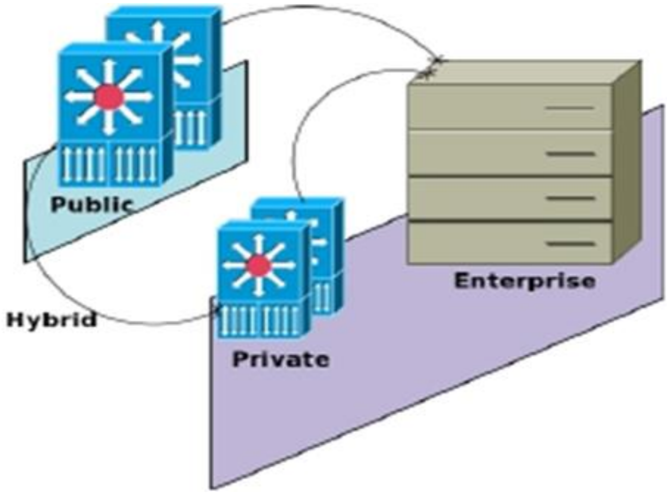

Figure 4 : Hybrid cloud

III. FUNCTIONAL ASPECTS OF CLOUD COMPUTING

Conceptually, users acquire computing platforms or IT infrastructures from computing Clouds and then run their applications inside. Therefore, computing Clouds render users with services to access hardware, software and data resources, thereafter an integrated computing platform as a service, in a transparent way:

A. Hardware as a Service (HaaS)

Hardware as a Service is the result of rapid advances in hardware virtualization, IT automation and usage metering & pricing, users could buy IT hardware, or even an entire data center, as a pay-as-you-go subscription service. The HaaS is exible, scalable and manageable to meet our needs. Examples could be found at Amazon EC2, IBM Blue Cloud project, Eucalyptus and Enomalism, Nimbus.

B. Software as a Service (SaaS)

Software or an application is hosted as a service and provided to customers across the Internet. This mode eliminates the need to install and run the application on the customer's local computers. SaaS therefore alleviates the customer's burden of software maintenance, and reduces the expense of software purchases by on-demand pricing. An early example of the SaaS is the Application Service Provider (ASP).

The ASP approach provides subscriptions to software that is hosted or delivered over the Internet. Microsoft's "Software + Service" shows another example: a combination of local software and Internet services interacting with one another. Google's Chrome browser gives an interesting SaaS scenario: a new desktop could be offered, through which applications can be delivered (either locally or remotely) in addition to the traditional Web browsing experience.

C. Data as a Service (DaaS)

Data in various formats and from multiple sources could be accessed via services by users on the network. Users could, for example, manipulate the remote data just like operate on a local disk or access the data in a semantic way in the Internet. Amazon Simple Storage Service (S3) provides a simple Web services interface that can be used to store and retrieve, declared by Amazon, any amount of data, at any time, from anywhere on the Web. The DaaS could also be found at some popular IT services, e.g., Google Docs and Adobe Buzzword. Elastic Drive is a distributed remote storage application which allows users to mount a remote storage resource such as Amazon S3 as a local storage device.

D. Infrastructure as a Service (IaaS)

Infrastructure as a service delivers basic storage and compute capabilities as standardized services over the network. Servers, storage systems, switches, routers, and other systems are pooled and made available to handle workloads that range from application components to high-performance computing applications. Commercial examples of IaaS include Joyent, whose main product is a line of virtualized servers that provide a highly available on-demand infrastructure [2].

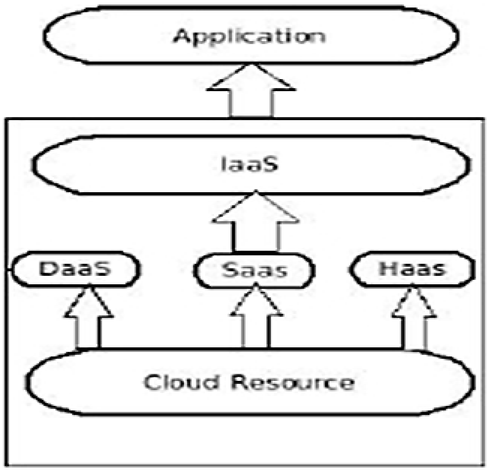

Figure 5 : Functional Units of Cloud

IV. CLOUD COMPUTING BENEFITS

In order to benefit the most from cloud computing, developers must be able to refactor their applications so that they can best use the architectural and deployment paradigms that cloud computing supports:

A. Reduce Run Time and Response Time

For applications that use the cloud essentially for running batch jobs, cloud computing makes it straightforward to use 1000 servers to accomplish a task in 1/1000 the time that a single server would require. The New York Times example cited previously is the perfect example of what is essentially a batch job whose run time was shortened considerably using the cloud. For applications that need to offer good response time to their customers, refactoring applications so that any CPU-intensive tasks are farmed out to 'worker' virtual machines can help to optimize response time while scaling on demand to meet customer demands. The Animoto application cited previously is a good example of how the cloud can be used to scale applications and maintain quality of service levels.

B. Minimize Infrastructure Risk

IT organizations can use the cloud to reduce the risk inherent in purchasing physical servers. Will a new application be successful? If so, how many servers are needed and can they be deployed as quickly as the workload increases? If not, will a large investment in servers go to waste? If the application's success is short-lived, will the IT organization invest in a large amount of infrastructure that is idle most of the time? When pushing an application out to the cloud, scalability and the risk of purchasing too much or too little infrastructure becomes the cloud provider's issue. In a growing number of cases, the cloud provider has such a massive amount of infrastructure that it can absorb the growth and workload spikes of individual customers, reducing the financial risk they face. Another way in which cloud computing minimizes infrastructure risk is by enabling surge computing, where an enterprise datacenter (perhaps one that implements a private cloud) augments its ability to handle workload spikes by a design that allows it to send overflow work to a public cloud. Application life cycle management can be handled better in an environment where resources are no longer scarce, and where resources can be better matched to immediate needs, and at lower cost.

C. Lower Cost of Entry

There are a number of attributes of cloud computing that help to reduce the cost to enter new markets:

- Because infrastructure is rented, not purchased, the cost is controlled, and the capital investment can be zero. In addition to the lower costs of purchasing compute cycles and storage "by the sip," the massive scale of cloud providers helps to minimize cost, helping to further reduce the cost of entry.
- Applications are developed more by assembly than programming. This rapid application development is the norm, helping to reduce the time to market, potentially giving organizations deploying applications in a cloud environment a head start against the competition.

D. Increased Pace of Innovation

Cloud computing can help to increase the pace of innovation. The low cost of entry to new markets helps to level the playing field, allowing start-up companies to deploy new products quickly and at low cost. This allows small companies to compete more effectively with traditional organizations whose deployment process in enterprise datacenters can be significantly longer. Increased competition helps to increase the pace of innovation and with many innovations being realized through the use of open source software, the entire industry serves to benefit from the increased pace of innovation that cloud computing promotes.

V. TECHNOLOGIES BEHIND CLOUD COMPUTING

A number of enabling technologies contribute to Cloud computing, several state-of-the-art techniques are identified here:

A. Virtualization Technology

Virtualization technologies partition hardware and thus provide exible and scalable computing platforms. Virtual machine techniques, such as VMware and Xen, offer virtualized IT-infrastructures on demand. Virtual network advances, such as VPN, support users with a customized network environment to access Cloud resources. Virtualization techniques are the bases of the Cloud computing since they render exible and scalable hardware services.

B. Service Flow and Work Flow

Computing Clouds offer a complete set of service templates on demand, which could be composed by services inside the computing Cloud. Computing Clouds therefore should be able to automatically orchestrate services from different sources and of different types to form a service ow or a work ow transparently and dynamically for users.

C. Web Service and Service Oriented Architecture (SOA)

Computing Cloud services are normally exposed as Web services, which follow the industry standards such as WSDL, SOAP and UDDI. The services organization and orchestration inside Clouds could be managed in a Service Oriented Architecture (SOA). A set of Cloud services furthermore could be used in a SOA application environment, thus making them available on various distributed platforms and could be further accessed across the Internet.

VI. CONCLUSION

In this paper we have discussed about the definition of cloud, the cloud architecture, different functionalities of cloud and the benefits of cloud. but as we find that clouds do not have a clear and complete definition in the literature yet, which is an important task that will help to determine the areas of research and explore new application domains for the usage of the Clouds. The problem can be tackle by the analysis of existing definitions. The main enabled feature in cloud is virtulization as it is the basis for the features such as on demand sharing of resource, security by isolation. Usability is also an important feature of cloud.

VII. REFERENCES

[1] Mladen A. Vouk, "Cloud Computing" Issues, Research and Implementations, 30 Int. Conf. on Information Technology Interfaces, 2008.

[2] Ian Foster, Yong Zhao, Ioan Raicu, Shiyong Lu, " Cloud Computing and Grid Computing 360-Degree Compared", IEEE, 2008.

[3] Rajkumar Buyya, Chee Shin Yeo, and Srikumar V enugopal, " Market Oriented Cloud Computing: Vision, Hype, and Reality for Delivering IT Services as Computing Utilities" Grid Computing and Distributed Systems (GRIDS) Laboratory, 2008.

[4] Luis M. Vaquero, Luis Rodero-Merino, Juan Caceres, Maik Lindne, " A Break in the Clouds: Towards a Cloud Definition", ACM SIGCOMM Computer Communication Review, 2009.

[5] Macros Dias de Assuncao, Alexandre di Costanzo, Rajkumar Buyya, " Evaluating the Benefits of Using Cloud Computing to Extend the Capacity of Clusters", HPDC, ACM 2009

[6] Foster, C Kesselman, " The Grid: Bluprint for a new Computing Infrastracture", Morgan Kaufmann Publishers, San Francisco, USA, 1999

Cite this article as :

Saumitra Singh, "Cloud Computing : An Overview", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), ISSN : 2456-3307, Volume 6 Issue 1, pp. 63-70, January-February 2019.
Available at doi : https://doi.org/10.32628/IJSRSET196120
Journal URL : http://ijsrset.com/IJSRSET196120