Exploration of Cloud Computing and its Essential Facets

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Abstract—Cloud computing is all about how we can use external services over network by various resources provided by many different companies that share and access through the internet to perform many commercial essentialities. Cloud computing is combination of software and hardware applications as well as resources. Technological and Non-Functional, both aspects of cloud computing are deeply involved in cloud deployment, as cloud systems are of very powerful commercial nature. In this paper we emphasis on exploring the three major fundamental aspects of Cloud computing and deployment and service models of Cloud computing. We also explored Cloud computing applications in various areas.

Keywords- Cloud Computing, Cloud, Deployment models, Service model

I. INTRODUCTION

Cloud computing is a wide concept of putting the things to the right place by using external resources over the network through internet and to provide various services delivered by numerous IT sectors.

Earlier it was used by us only for our personal experience now it is widely use in the field of business to improve their productivity, cost control etc. cloud computing is quite comfortable in increasing daily productivity of every business man by using their many appropriate applications that are provided by cloud computing through internet by the use of many different resources. The users of cloud computing can be access their data from worldwide through internet and can also edit with same.as far coming years they need not to take pains regarding the maintenance and management of resources, just because of the dynamic nature of Cloud computing. Cloud computing is itself a platform which are not require to another platform for performing their applications. Cloud computing application is provided by Google apps in better manner to access their information on computer through internet.

II. CLOUD COMPUTING: AN INSIGHT

A. Cloud is basically

A cloud is a noticeable mass of droplets and ice-covered minerals that are moving around the sky. A cloud is also a visible mass to attract through gravity [2]. Recently cloud is defined that it is an elastic execution environment of resources which can do multiple task and provide quality services. Cloud computing deals with IT resources through the Internet. These resources are locally operated by some IT firms, colleges and universities. These resources include all services and requests, as well as consider the provided infrastructure too, in which they performs.

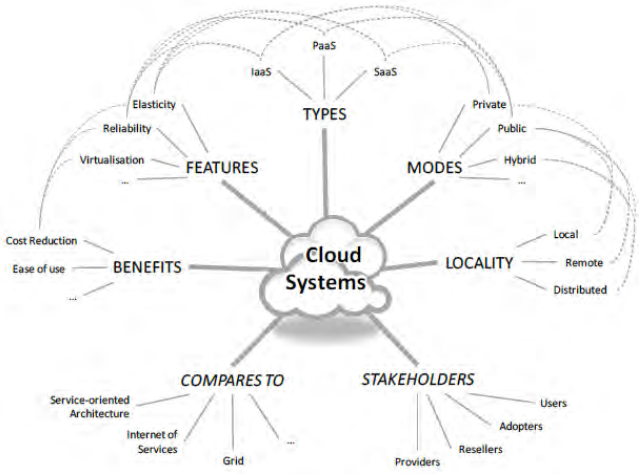

Figure 1. Cloud System

To understand Cloud in more specific manner, it is a platform and an infrastructure which enables in providing code facilities and provides the applications related to that platform in organized and flexible manner, where organize means the reliability and flexibility of the parameter that are actually used in perform the specific task that are maintained the quality issue for the same. It includes bottom up and downward approach of scalability of resources and information related to that resource [4].

B. Cloud Computing

Cloud computing is one of the major concept which offers various kinds of services over network which belongs to many different resources that will shared and access through the internet to perform various business essentiality. In this scenario the user is not aware about the location and physical resources and devices which have been used during the process. It also helps to user to design, develop and maintain their own user application on cloud that is called virtualization of different kind of resources and maintain.

Cloud computing is a computing of hardware and software resources over the network or internet. The name is arises due to the use of cloud-shaped symbol of the cloud computing system diagram. It is also deliver services that are remotely accessible by the users for doing their different kind of computation and to access software's applications.

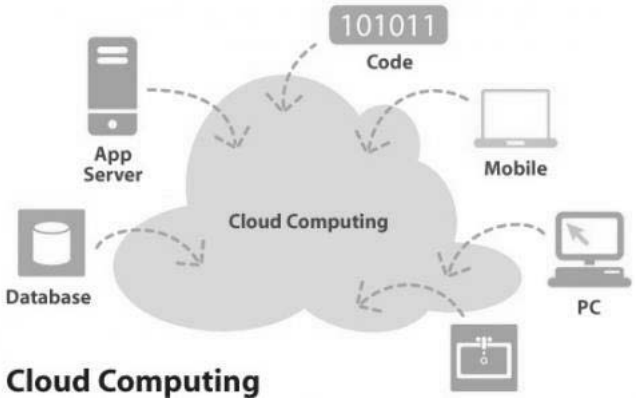

Figure 2. Cloud computing Basics

C. Cloud Computing Benefits

There are many features using Cloud Computing, some are define below:

1. Cloud computing is easy and provides speed development.
2. Cloud computing provides secure storage and management.
3. Cloud computing is a high level computing.
4. Cloud computing always delivered a latest technology.
5. Cloud computing is not depends on location.
6. Cloud computing is utility based and time sharing model.
7. Cloud computing is virtualized and dynamic.

8. Cloud computing provides pay as you used service.
9. Cloud computing provides low cost implementation process.
10. Cloud computing gives scalability of resources.
11. The use of standard technology is encourage and facilitated by cloud computing.

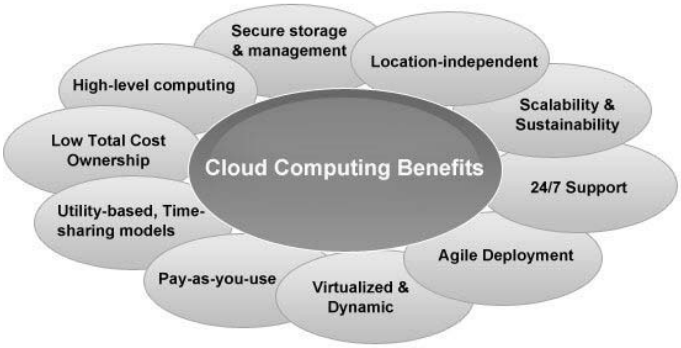

Figure 3. Cloud computing Benifits

III. MODELS FOR CLOUD COMPUTING

There are basically two types of cloud computing models. One is deployment model and another one is service model.

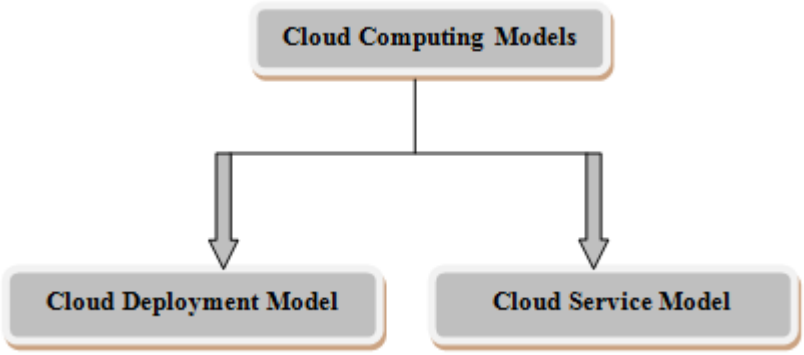

Figure 4. Cloud computing Models

A. Deployment Model

Cloud Computing deployment models includes private or internal model which is known as private cloud that manage all internal infrastructure. The second deployment model of cloud is public clouds in which all external things managed. Third model of deployment is hybrid model; it is a mix of both private model and public model.

The following deployment Models are described below:

1. Private Clouds:

Private Clouds are usually owned by the individual firms and it may be leased by firms. In the private cloud the functioning of the system is not directly shown to the client. Although in many cases the cloud expands the features witch are almost similar to software as service from the clients view. Example: eBay.

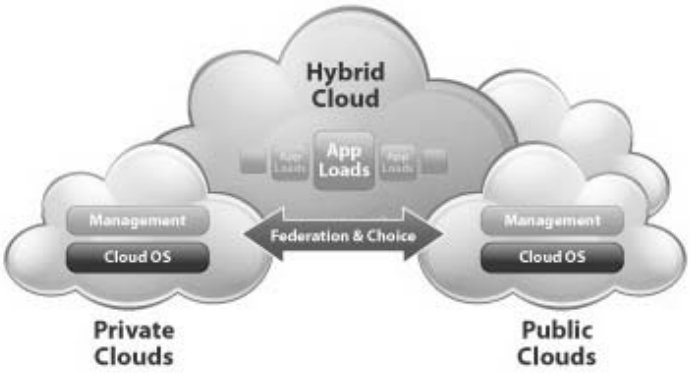

Figure 5. Cloud Deployment Models

2. Public clouds:

Companies or firms may use cloud functionality from other IT companies. Companies may offer their own services to other outside firms [6]. They Provides to client the actual capability to use the cloud features for their own purposes. They also provide the facility that firms can use the services from cloud providers, so the cost may be reduced and they can build up their own infrastructure. For example; Google Apps, Amazon etc.

3. Hybrid Clouds:

Hybrid clouds consist of mixed feature of private and public cloud infrastructures, thus maximum cost can be reduced by using hybrid cloud.it can also maintains the sensitivity issues related to the local private clouds. Although public cloud allows firm to use outsource portions of their own infrastructure to cloud providers, it may be possible that they can lose control over the resources at the same time and the distribution management of code and information [7].

4. Community Clouds

Cloud systems do not possible in the local infrastructure to their customers. So providers of public cloud suggest their own infrastructure to customers. In that case the provider could actually resell the infrastructure of another provider [8]. Community clouds are aggregate public clouds and provide dedicated resource infrastructures to the customers.

We could distinguish in that way between private and public community clouds. For example small establishments may come together only when their resources are used in building a private community cloud.

B. Service Model:

Service model of cloud system includes Services such as Infrastructure, Platform or Software and Application services; there is no boundary to use multiple services at the same time period, so we can use multiple services at same time. These services are known as PaaS (Platform as a Service), Infrastructure as a Service (IaaS), Software as a Service (SaaS).

These services are discussed as follows:

1. Platform as a Service (PaaS)

In Platform as a Service provides resources are used for the computation and by the used applications and services are to be developed. PaaS is usually make use of dedicated APIs to control the nature of a server hosting engine that executes and replicates the execution according to the requests of user. Every provider disclosed their own API according to the separate key capabilities; when applications are developed for one particular cloud provider so it cannot be forwarded to another cloud host [9] e.g. Google App Engine, Windows Azure (Platform), force.com.

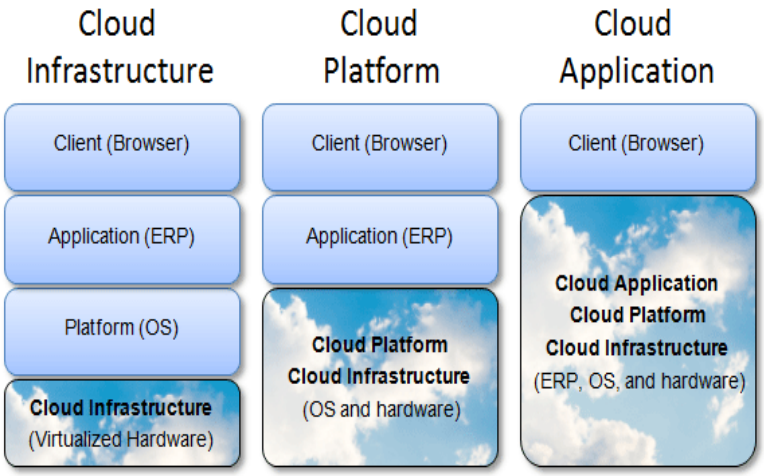

Figure 6. Service Models of Cloud

2. *Infrastructure as a Service (IaaS):*

IaaS also referred to as resource Clouds, it provides resources as services to the customers. It basically provides enhanced virtualization. Accordingly different resources could be provided through a service interface such as Data and Storage. Clouds deal with a reliable access of information. IaaS (Infrastructure as a Service) offers additional capabilities over a simple computational service [10]. Examples: Rackspace, Amazon.

3. Software as a Service (SaaS):

SaaS sometimes referred to as Service and Application Clouds are offering implementations of particular corporate functions and business processes that are provided with particular cloud capabilities, they provides applications and services using a cloud infrastructure and platform rather than providing cloud features themselves. Cloud Computing is not controlled to Infrastructure, Platform, Software as Service systems, even though it provides enhanced capabilities which act as vertical enablers to these systems [8]. Examples: Google Apps, Salesforce.com

IV. FUNDAMENTAL ASPECTS FOR CLOUD COMPUTING

In this section states the real abilities related with clouds that are measured crucial which are required in any cloud environment and relevant ideally supported, but may be restricted to specific use cases. We can thereby differentiate nonfunctional, economic and technological aspects for cloud computing. Those are to be defined by cloud systems.

A. Non-Functional Aspects

Non-functional aspects indicate capabilities of a system, rather than specific technological requirements. Non-functional aspects are one of the key reasons why clouds differ so strongly from other services. It includes following aspects that are described as follow:

1) Reliability: Reliability is key for all cloud systems in order to support information center type applications in a cloud, reliability is considered one of the main features to exploit cloud capabilities. Reliability denotes the capability to ensure constant operation of the cloud system without disturbance that are. no loss of information, no code reset during the execution of process. Reliability is usually achieved through utilization of redundant resource[12].

2) Quality: Quality of Service sustenance is a relevant capability that is crucial in many cases where particular requirements have to be met by the subcontracted services and resources. In corporate cases, basic Quality of Service points like response time, throughput are must be guaranteed at least, that's way to ensure that the quality and guarantees of the cloud customers are met. Reliability is a specific QoS feature of cloud aspect which make a particular quality needs[12].

3) Adaptability: Adaptabilty are vital features of cloud systems which are strongly related to the flexible abilities of cloud system. Adaptabilty includes on time reaction that change in request or size of resources. Adaptation also change the environment circumstances. that required different kinds of resources, different quality and different ways [9].

4) Availability: Availability of services and information is an vital ability of cloud systems. It is one of the main aspect which gives increase to clouds in the first occurrence. Availability lies in the ability to present redundancy for services and data so failures can be marked with transparency,to increasing simultaneous access,

availability is particularly achieved by duplication of information and services and distributing them through dissimilar resources to achieve load balancing. [12].

B. Economic Aspects

Economic apprehensions are one of the main clarifications that present cloud systems in a corporate environment in the first occurrence. It includes following aspects that are described as follow:

1) Cost Reduction: Cost reduction is one of the main apprehensions to make a cloud system which can adopt to change in consumer nature and deduct cost of infrastructure maintenance. Scalability and Remuneration are given as per use of resources are crucial aspects of this issue.

2) Pay per use: The ability to made cost, giving according to the real consumption of resources is a significant feature of cloud systems. Pay per use solidly related to quality of service provider where particular requirements are to be met through the system and then to be paid for task.

3) Improved Time: Improved time to market is vital in specific for small to medium organizations those are want to sell out their services quickly and easily with slight delays caused by attaining and setting up the infrastructure in exact manner, in a scope well-matched and competitive by huge companies.

4) Return of Investment (ROI): Return of Investment is crucial for all investors. They could not give guaranteed about the cloud systems that are currently fails in this part. A cloud system has to assure that the cost and effort vested in it, is offset by its profits to be commercially. This may involve straight example that more users and indirect benefits from ROI advertisement [10].

C. Technological Aspects

Technological Aspects is second cloud aspect which is one step ahead from the non-functional and economical aspects. It includes following aspects that are described as follow:

1) Virtualizations: Virtualization is an main technological characteristic of cloud system that disclose the technological complexity from the customers which enables and enhanced flexibility through accumulation, direction-finding and transformation. More precisely, virtualization gives the following features; such as ease of use, by hiding the complexity of the infrastructure that include management, configuration etc[10]. Virtualization can make it easier for the customer in developing new applications and also reduces the overhead of controlling the system.

2) Infrastructure Independency: virtualization allows the customers to making the platform independent. Flexibility and Adaptability through revealing a virtual execution environment the infrastructure can be change more flexibly according to different situations and requirements. Location independence services can be accessed independently for physical location of the customer and the resource [10].

3) Multi-tenancy: Multi-tenancy is very important matter in cloud systems, in which location of code are not given and it might be possible that same resource may be assigned to many users at the same time. This thing affects to infrastructure resources and data, applications and services that are hosted by shared resources [10]. Basically all information is maintained and stored in distinct databases and database tables, even in complicated situation data may be altered simultaneously.

4) Data Management: Data Management is an essential side of storage clouds in this information is more flexible and distributed across many resources [11]. Internally data consistency requires more maintenance over a large distribution of duplicated data resources. So every time the system should be always aware about data location. In many cases the size of information could be change at any point of time.

V. CLOUD COMPUTING APPROACHES AND APPLICATIONS

These are the companies Amazon, Google, and Microsoft are not alone investing in computing as a service. Other organizations to test the waters include Dell, IBM, Oracle, and some universities. IBM is providing a variety of cloud-based services by using existing functionality and is a collection of products and software services that can be used as building blocks to support IBM Service Management software [16]. IBM's cloud-based services, which target independent software vendors (ISVs), offer design of cloud infrastructures, use of worldwide cloud computing centers, and integration of cloud services.

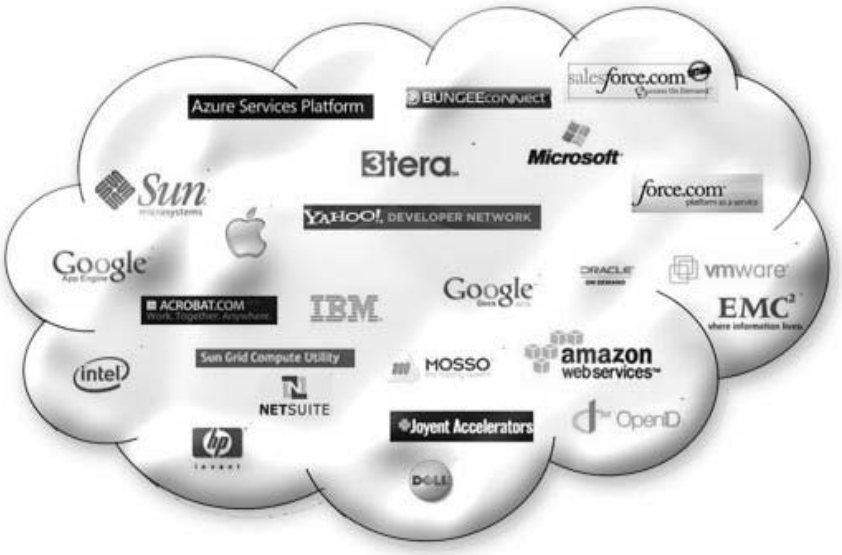

Figure 7. Cloud Computing Application provider Companies

VI. CONCLUSIONS

Cloud computing gives the opportunity to access the variety of data through internet to perform many tasks that are related to the various fields to fulfill their technical or non- technical needs by accessing many different recourses over internet. Cloud computing creates a revolution in the industrial state to enhance their productivity and scalability as well as it will help out in cost reduction also. By using cloud services many economic problems have been solved now a day.

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REFERENCES

[1] Chow, R., Golle, P., Jakobsson, M. Controlling data in the cloud: Outsourcing computation without outsourcing control', Fujitsu Laboratories of America, Chicago: Illinois, 2009.
[2] Rejda, G. E. Principles of risk management and insurance. 11th Edition, New Jersey: Prentice Hall, 2011.
[3] Awati, K. Cox's risk matrix theorem and its implications for project risk management, from http://eight2late.wordpress.com/2009/07/01/cox%E2%80 %99s-risk-matrix-theorem-and-its-implications-for-project-risk-management accessed 18 Dec 2011.
[4] Cox, L. A. What's wrong with risk matrices? Risk Analysis, 2008. 28(2): p. 497-515.
[5] Lim, S. H. Risks in the North Korean special Economic Zone: Context, Identification, and Assessment. Emerging Markets Finance & Trade, 2011. 47(1): p. 50-66.
[6] Picado, F., Barmen, G., Bengtsson, G. Cuadra, S., Jakobsson, K., and Mendoza, A. Ecological, groundwater, and human health risk assessment in a mining region of Nicaragua. Risk Analysis: An International Journal, 2010. 30(6): p. 916-933.
[7] Pintar, K. D. M., Charron, D. F., Fazil, A., McEwen, S. A., Pollari, F., Waltner-Toews, D. (2010) A risk assessment model to evaluate the role of fecal contamination in recreational water on the incidence of Cryptosporidiosis at the community level in Ontario. Risk Analysis: An International Journal, Jan2010. 30(1): p. 49-64.
[8] Aven, T. and Renn, O. The role of quantitative risk assessments for characterizing risk and uncertainty and delineating appropriate risk management options, with special emphasis on terrorism risk. Risk Analysis: An International Journal. 2009. 29(4): p. 587-600.
[9] Subashini, S. and Kavitha, V. A survey on security issues in service delivery models of cloud computing. Journal of Network and Computer Applications, 2011. 34:p. 1-11.
[10] Casale, J. Social networking, cloud computing bring new risk exposures. Business Insurance, 2010. 44(38):p. 17.
[11] Bublitz, E. (2010). Catching The Cloud: Managing Risk When Utilizing Cloud Computing. National Underwriter P & C, 2010. 114(39):p. 12-16.
[12] Paquette, S., Jaeger, P. T. and Wilson, S. C. Identifying the security risks associated with governmental use of cloud computing. Government Information Quarterly, 2010. 27:p. 245-53.
[13] Jaeger, P. T., Grimes, J. M., Lin, J. and Simmons, S. N. Where is the cloud? Geography. Economics, Environment, and Jurisdiction in Cloud Computing, 2009. 14(5):p. 4-15.
[14] Svantesson, D. and Clarke, R. Privacy and consumer risks in cloud computing, Computer Law & Security Review, 2010. 26:p. 391-397.
[15] Armburst, M., Fox, A., Griffith, R. Joseph, A. D., Katz, R. and Konwinski, A. et al. Above the clouds: a Berkley view of cloud computing, from http://radlab.cs.berkekey.edu/, accessed 5 Dec 2011.
[16] Saaty T. L. Decision making with dependence and feedback: The analytic network.
[17] Harris, D. (2008), 'Grid vs. Cloud vs. What Really Matters' - available at http://www.on- demandenterprise.com/blogs/Grid-vs-Cloud-vs-What-Really-Matters.html
[18] Barroso, L. A.; Hoelzle, U (2009), "The Datacenter as a Computer", Morgan and Claypool Publishers.