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Cloud Computing – Issues, Architecture, Applications: A Review

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***Abstract*—**Cloud computing is a new era technology with high IT infrastructure that provides a means by which user can use and utilize the applications as utilities via the internet. Cloud computing is integration of parallel computing, distributed computing, grid computing and virtualization technologies. In this paper, we will discuss about cloud architecture, cloud deployment model and compares cloud computing with grid computing. We also learn about different characteristics and applications of several popular cloud computing platforms. Aim of this paper is to point the issues of cloud computing.

Key Terms— Cloud computing, hybrid cloud, Grid Computing

I. INTRODUCTION

Cloud computing is rapidly developing technology. Cloud computing is a new era technology with high IT infrastructure that provides a means by which user can use and utilize the applications as utilities via the internet. The computing trend moved toward cloud from the concept of grid computing, particularly when large computing resources are required to solve a single problem. The user who are in need of computing are expected to invest money on computing resources such as hardware, software, networking and storage, this investment naturally costs a bulk currency to the user as they have to buy these computing resources. Cloud computing is integration of parallel computing, distributed computing, grid computing and virtualization technologies. On the other hand Cloud Computing is internet based computing where sharing of information, resources, and software, are provided to terminals. One can compare this situation with the usage of electricity from its producer-cum-distributor. Therefore cloud computing is needed in getting the services of computing resources. Thus one can say as a one-line answer to the need for cloud computing that it eliminates a large computing investment without compromising the use of computing at the user level at an operational cost. Cloud Computing is very economical and saves a lot of money. A blind benefit of this computing is that even if we lose our laptop or due to some crisis our personal computer gets damaged, still our data and files will stay safe and secured as these are not in our local machine. It is classified as Software-as-a-Service(SaaS), Network-as-a-Service(NaaS), Infrastructure-as-a-Service(IaaS) and Platform-as-a-Service (PaaS).

II. ARCHITECTURAL COMPONENTS

Cloud computing is a model that enables the end users to access the shared pool of resources such as network, storage, database and application as an on-demand service without the need to buy or own it.Cloud Services composed of Software-as-a-Service(SaaS), Network-as-a-Service(NaaS),Infrastructure-as-a-Service(IaaS) and Platform-as-a-Service (PaaS).

a) Software-as-a-Service(SaaS):

The ability given to end users to access an application over the internet that is hosted and managed by the service provider. Thus, the end users are exempted from managing or controlling an application, the development platform, and the underlying infrastructure. Generally SaaS services are hosted in service providers managed or service provider hosted cloud infrastructure. The end users can access the services from any client or web browsers. Some of the popular SaaS providers include Saleforce.com, Google Apps and Microsoft office365.

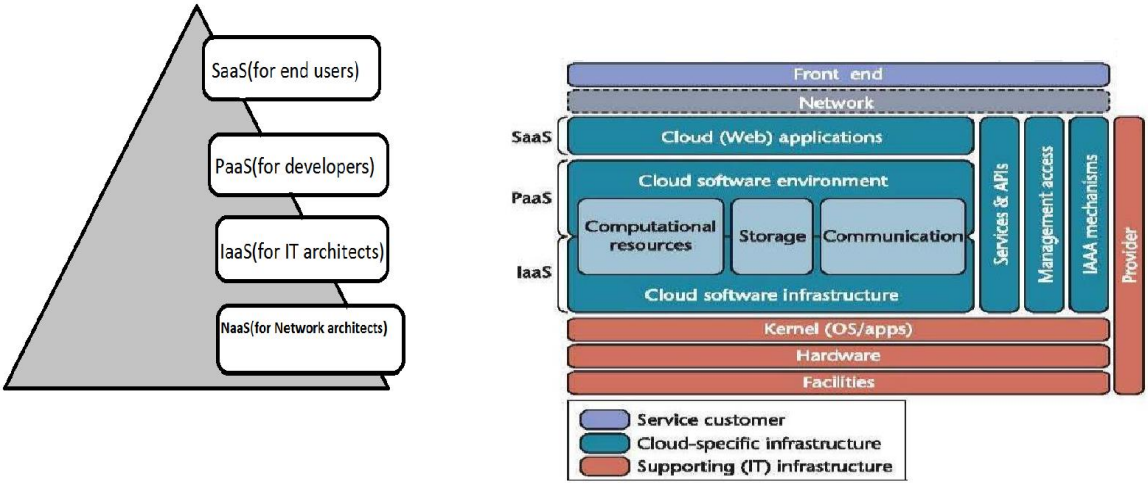


Figure: Basic cloud service models

b) Infrastructure-as-a-Service(IaaS):

The ability given to the infrastructure architects to deploy or run any software on the computing resources provided by the service provider. Here, the underlying infrastructure such as compute, network and storage are managed by the service provider.

Hence, the framework engineers are exempted from keeping up the server farm or hidden foundation. The end clients are in charge of overseeing applications that are running over the specialist co-op cloud foundation. By and large, the IaaS administrations are given from the administration infrastructure. Enabling your association's capacity to arrangement on-request, self administration IT foundation assets using open, private, or half and half cloud designs, Iramari Generally, the IaaS administrations are given from the specialist co-op cloud information center. Enabling your association's capacity to arrangement on-request, self administration IT framework assets using open, private, or cross breed cloud setups, Iramari arrangement draftsmen give truly necessary cloud. The end uses can access the services from their devices through web command line interface(CLI) or application programming interfaces(APIs) provided by the service providers. Some of the popular IaaS providers include Amazon Web Services(AWS), Google Compute Engine, OpenStack and Eucalyptus.

c) Platform-as-a-Service (PaaS):

The ability given to developers to develop and deploy an application on the development platform provided by the service provider. Thus, the developers are exempted from managing the development platform and underlying infrastructure. Here, the developers are responsible for managing the deployed application and configuring the

development environment. Generally, PaaS services are provided by the service provider on an on-premise or dedicated or hosted cloud infrastructure. The developers can access the development platform over the internet through web command line interface(CLI), web user interface(UI), and integrated development environments(IDEs). Some of the popular

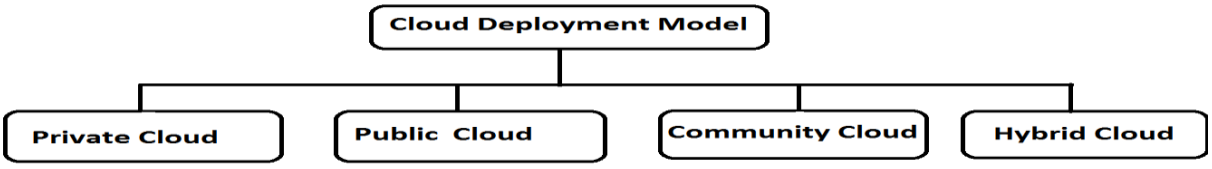
PaaS providers include Google App Engine, Force.com, RedHat OpenShift, Heroku and Engine Yard.

d) Network-as-a-Service(NaaS):

The ability given to end users to access virtual network services that are provided by the service provider. Like other cloud service models, NaaS is also a business model for delivering virtual network services over the internet on a pay-per-use basis. In on-premise data center, the IT industries spent a lot of money to buy network hardware to manage in-house networks. But, cloud computing changes networking services into a utility-based service. NaaS allows network architect to create virtual networks, virtual network interface cards(NICs), virtual routers, virtual switches and other networking components. Additionally, it allows the network architect to deploy custom routing protocols and enables the design of efficient in-network services, such as data aggregation, stream processing and caching. Some of the popular services provided by NaaS include Virtual Private Network(VPN), bandwidth on demand(BoD), and mobile network virtualization.

III. Cloud Deployment Models

Deployment models describe the ways with which the cloud services can be deployed or made available to its customers, depending on the organizational structure and the provisioning location. One can understand it in this manner: cloud(Internet)-based computing resources- that is, the locations where data and services are acquired and provisioned to its customers. Four deployment models are public, private, community and hybrid cloud service usage.



a) Private Cloud: The cloud foundation is provisioned for restrictive use by a solitary association containing various consumer(e.g. specialty units). It might be claimed, oversaw and worked by the association, an outsider or a blend of them and it might exist on or off premises.

b) Public Cloud: The cloud framework is provisioned for open use by the overall population. It might be claimed, overseen and worked by a business, scholarly or government association or a blend of them. It exists on the premises of the cloud supplier.

c) Community Cloud: The cloud framework is shared by a few associations and backings a particular network that has shared concerns(e.g. security, prerequisites, arrangement contemplations). It might be overseen by the associations or an outsider and may exist on reason or off reason.

d) Hybrid Cloud: This cloud is a structure of at least two particular cloud infrastructures(private, network or open) that stay one of a kind elements yet are bound together by institutionalized or restrictive innovation that empowers information and application portability(e.g. cloud blasting for burden adjusting between mists).

IV. COMPARISION BETWEEN CLOUD AND GRID COMPUTING:

1) Construction of the framework is to finished a predetermined undertaking, for example, science network, Geography matrix, national instructive lattice, while Cloud registering is intended to meet general application and there are not network for an exceptional field.

2) Grid underscores the "asset sharing" to frame a virtual association. Cloud is regularly claimed by a solitary physical association (aside from the network Cloud, for this situation, it is possessed by the network), who assigns assets to various running occasions.

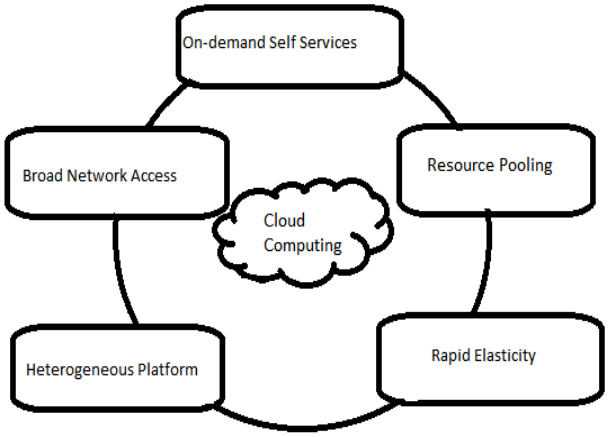
3) Grid expects to give the most extreme figuring ability to an immense assignment through asset sharing. Cloud means to get the job done however many little to-medium errands as would be prudent dependent on clients' continuous necessities. Consequently, multi-occupancy is a critical idea for Cloud figuring

4) Grid exchanges re-convenience for (logical) elite figuring. Distributed computing is specifically pulled by quick client needs determined by different business necessities.

5) Grid endeavors to accomplish most extreme figuring. Cloud is after on-request figuring – Scale here and there, in and out in the meantime upgrading the general processing limit.

V. Characteristics

1) On-demand Self Services: The cloud applications offer service to the user, on demand, that is whenever the user requires it. The cloud service would allow the users to access web applications usually without any restrictions on time, duration and type of devices used.
2) Heterogeneous platform: The cloud platform supports heterogeneity, wherein any type of application can be deployed in the cloud. Because of this property, the cloud is flexible for the developers, which facilitates deployment. The applications that are usually deployed can be accessed by the users using a web browser.
3) Rapid Elasticity: Capabilities can rapidly and elastically provision, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchase in any quantity at any time.



4) Broad Network Access: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous client platforms(e.g. mobile phones, laptops, personal digital assistants[PDAs]).
5) Resource Pooling: The provider's computing resources are pooled to serve multiple consumers using a multitenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.

VI. APPLICATIONS

There are a couple of uses of distributed computing as pursues:

1) Cloud processing gives trustworthy and secure information stockpiling focus.

2) Cloud processing can understand information sharing between various types of gear.

3) The cloud gives almost boundless plausibility to clients to utilize the web.

4) Cloud processing does not require great gear for the client and it is anything but difficult to utilize.

VII. ISSUES IN CLOUD COMPUTING

Increasingly more data on people and organizations is put in the cloud; concerns are starting to develop about exactly how safe a domain it is? Issues of distributed computing can abridge as pursues:

A. Protection: Cloud computing utilizes the virtual computing innovation, clients' close to home information might be dispersed in different virtual server farms as opposed to remain in the equivalent physical area, clients may release shrouded data when they are gotten to distributed computing administrations. Assailants can dissect the basic errand rely upon the processing assignment put together by the clients.

B. Reliability: The cloud servers additionally experience downtimes and stoppages as our nearby server.

C. Legal Issues: Stresses stay with wellbeing measures and privacy of individual completely through administrative dimensions.

D. Compliance: Various guidelines relate to the capacity and utilization of information requires standard announcing and review trails. Notwithstanding the necessities to which clients are subject, the server farms kept up by cloud suppliers may likewise be liable to consistence prerequisites.

E. Freedom: Distributed computing does not enable clients to physically have the capacity of the information, leaving the information stockpiling and control in the hands of cloud suppliers.

F. Long-Term Viability : You ought to make sure that the information you put into the cloud will never end up invalid even your distributed computing supplier lose everything or get procured and gobbled up by a bigger organization.

G. Issues in Cloud Interoperability

1) Intermediary Layer: A number of ongoing works address the interoperability issue by giving a delegate layer between the cloud purchasers and the cloud-explicit assets (for example VM).
2) Open Standard: Institutionalization gives off an impression of being a decent answer for location the interoperability issue. Nonetheless, as distributed computing just removes, the interoperability issue has not showed up on the squeezing motivation of significant industry cloud sellers.
3) Open API: SUN has as of late propelled the Sun Open Cloud Platform under the Creative Commons permit. A noteworthy commitment of this stage is the proposed (in-advance) the cloud API. It characterizes a lot of clear and straightforward Restful Web administrations interfaces, through which cloud shoppers can make and oversee cloud assets, including process, stockpiling, and systems administration parts unified.
4) SaaS and PaaS Interoperability: While the previously mentioned arrangements for the most part handle with IaaS interoperability issues, SaaS interoperability regularly includes distinctive application areas, for example, ERP, CRM, and so on. A gathering of specialists in the field of information mining raises the issue of setting up an information mining standard on the cloud, with a specific spotlight on "the down to earth utilization of factual calculations, solid generation sending of models and the combination of prescient examination" crosswise over various information mining-based SaaS mists. PaaS interoperability not yet found Since PaaS includes the whole programming advancement life-cycle on the cloud, it would be increasingly hard to achieve the consistency with respect to the manner in which customers create and convey cloud applications.

VIII. Conclusion:

Cloud computing forms the base for many things in today's world. Cloud computing composes of four basic services and four deployment models. The service models include IaaS, PaaS, SaaS, NaaS and deployment models include private, public, community and hybrid clouds. The deployment models form the base and need to know before starting with other aspects of the cloud. These models based on several properties such as size, location and complexity. Each type of deployment model has its own characteristics and its suitability to different kind of needs is provided. A smart choice of deployment model always proves to be beneficial, avoiding heavy losses. All the cloud service models have essential

characteristics of cloud computing: on-demand, self-service, broad network access, resource pooling, rapid elasticity and measured service. Even though cloud services are used by many individuals and start-up industries, adaptability from large enterprises is very low. We cannot use cloud services in all places. Cloud services can be used in start-up companies where the initial investment capital is very low. Cloud services cannot be used when the application uses more sensitive and confidential data.

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