

A SURVEY ON LAYERS, CHALLENGES AND TRENDS IN CLOUD COMPUTING

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ABSTRACT

Cloud computing is a set of IT services that are provided to a customer over a network on a leased basis and with the ability to scale up or down their service requirements. Usually Cloud Computing services are delivered by a third party provider who owns the infrastructure. Many industries, such as banking, healthcare and education are moving towards the cloud due to the efficiency of services provided by the pay-per-use pattern based on the resources. This research paper presents what cloud computing is, the various cloud models and the overview of the cloud computing architecture. This research paper also analyzes the key research challenges present in cloud computing which offers comparison of grid and cloud computing, finally this paper also present recent enhancement of cloud technology.

DEPLOYMENT MODELS

Private Cloud: Private cloud is a new term that some vendors have recently used to describe offerings that emulate cloud computing on private networks. It is set up within an organization's internal enterprise datacenter. In the private cloud, scalable resources and virtual applications provided by the cloud vendor are pooled together and available for cloud users to share and use. It differs from the public cloud in that all the cloud resources and applications are managed by the organization itself, similar to Intranet functionality. Utilization on the private cloud can be much more secure than that of the public cloud because of its specified internal exposure. Only the organization and designated stakeholders may have access to operate on a specific Private cloud.

Public Cloud: Public cloud describes cloud computing in the traditional mainstream sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the Internet, via web applications/web services, from an off-site third-party provider who shares resources and bills on a fine-grained utility computing basis. It is typically based on a pay-per-use model, similar to a prepaid electricity metering system which is flexible enough to cater for spikes in demand for cloud optimization. Public clouds are less secure than the other cloud models because it places an additional burden of ensuring all applications and data accessed on the public cloud are not subjected to malicious attacks. Examples of a public cloud include Microsoft Azure, Google App Engine.

Hybrid Cloud: Hybrid cloud is a private cloud linked to one or more external cloud services, centrally managed, provisioned as a single unit, and circumscribed by a secure network. It provides virtual IT solutions through a mix of both public and private clouds. Hybrid Cloud provides more secure control of the data and applications and allows various parties to access information over the Internet. It also has an open architecture that allows interfaces with other management systems. Hybrid cloud can describe configuration combining a local device, such as a Plug computer with cloud services. It can also describe configurations combining virtual and physical, collocated assets -for example, a mostly virtualized environment that requires physical servers, routers, or other hardware such as a network appliance acting as a firewall or spam filter. An example of a Hybrid Cloud includes Amazon Web Services (AWS).

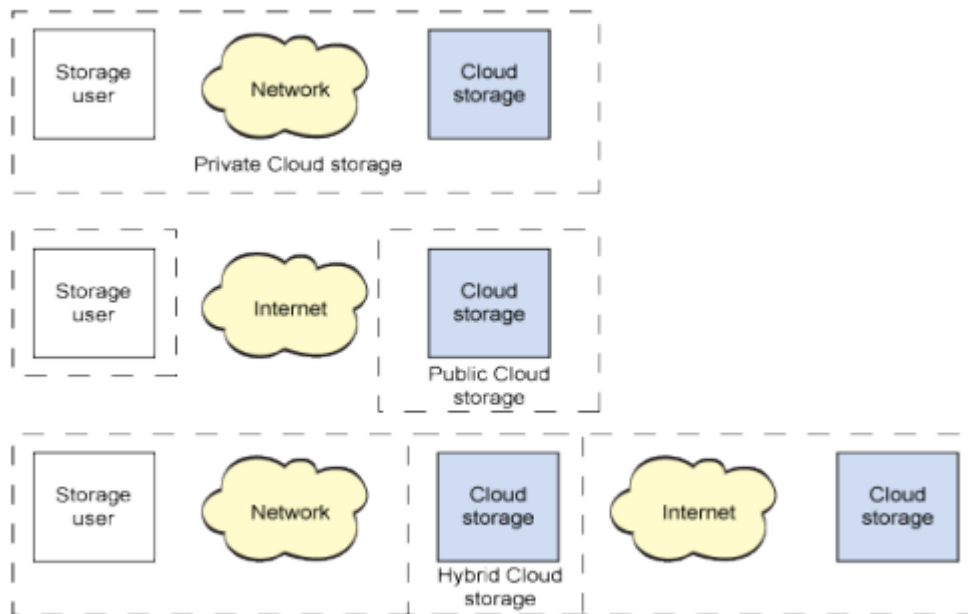


Fig: Cloud storage models

BASIC LAYERS IN CLOUD COMPUTING

Software as a service (SaaS)

Cloud-based applications or software as a service (SaaS) run on distant computers in the cloud that are owned and operated by others and that connect to users' computers via the Internet and, usually, a web browser. software-as-a-service portfolio for enterprises includes offerings for social business (US), business process management (BPM), business analytics, web analytics (US) and more. The advantages of SaaS cloud applications includes There's no software to purchase, install, update or maintain, which is handled by the service providers.

- You can sign up and rapidly start using cloud apps.
- Apps and data are accessible from any connected computer.
- No data is lost if your computer breaks, as data is in the cloud.
- The service is able to dynamically scale to the usage needs of your organization.

Infrastructure as a service (IaaS)

With IaaS, you get on-demand computing and storage to host, scale, and manage applications and services. Using data centers means you can scale with ease and speed to meet the infrastructure needs of your entire organization or individual departments within it, globally or locally.

Platform as a service (PaaS)

Platform as a service provides a cloud-based environment with everything required to support the complete life cycle of building and delivering web-based (cloud) applications without the cost and complexity of buying and managing the underlying hardware, software, provisioning and hosting. The Platform-as-a-service offers, IBM SmartCloud Application Services, enable users to deploy and migrate applications to both public and private clouds. With PaaS one can:

- Develop applications and get to market faster
- Deploy new web applications to the cloud in minutes
- Reduce complexity with middleware as a service

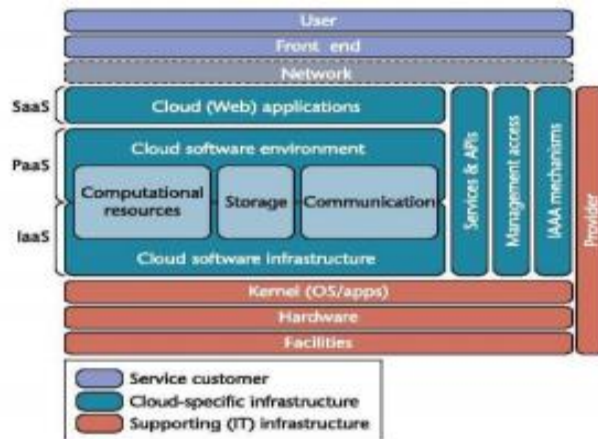
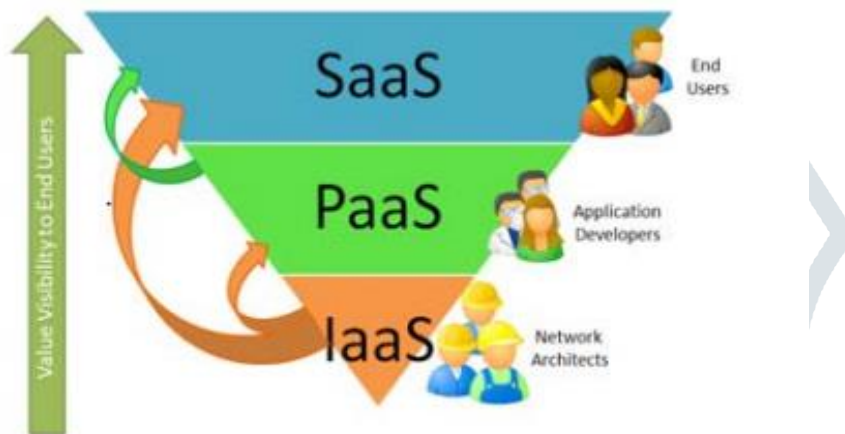


Fig: The cloud reference architecture.



Comparative study of Cloud Computing with Grid Computing

Grid Computing	Cloud Computing
Aim: Resources are shared in collaboration manner.	Aim: Resource sharing depends upon use of service.
Abstraction: In this, the level of abstraction is very low.	Abstraction: level of abstraction is high
Security: The security in grid computing is low because it depends upon grid certificate service.	Security: The security in cloud computing is high because of virtualization.
Ownership: Multiple owners can take ownership.	Ownership: Single ownership.
Users: Few numbers of users can use it.	Users: More numbers of users can use at same time.

Recent trends in cloud computing

Massive Growth

This is more one of the Cloud Computing Trends 2019 which has just carried over to 2019. With the development of new services in the SaaS, PaaS and IaaS fields, and the evolution of new services such as **function as a service (FaaS)** and **backend as a service (BaaS)**, the Cloud market is expected to grow aggressively. SaaS alone is expected to grow at 18% CAGR. PaaS has already been performing remarkably with an adoption rate of 32% in 2017 and expected to reach 56% by 2020. The IaaS market, even with its limited features is predicted to go over \$17B in 2018. Even when related industry shows a definite slowdown, the future trend in cloud computing is definitely towards growth.

Increase in Storage Capacity

Another aspect of the growth-related cloud computing trends is the increase in storage capacity. In 2017 alone, the global cloud storage capacity stood at around 600 EB (Exabytes). We can certainly expect this to become one of the Cloud Computing Trends 2019, as the capacity is set to double to an approximate 1.1 ZB (Zettabyte) by the end of 2018. Regular people are boosting these numbers thanks to their increased sharing of personal information online via services like Google Drive and Dropbox.

Cheaper Storage Solutions

The Cloud Computing Industry is going through a lot of changes. Massive Growth and Cheaper Prices were two of the main Cloud Computing Trends 2017. Usually, when demand increases, the price also increases, but since there is so much competition in the market today it seems that the prices are continuing to fall; thanks to so much investment in storage capacity increase. To put this in context, at present it costs less than 10 cents to maintain 1 TB of cloud storage. This price dive has given companies the ability to offer ridiculously cheap cloud storage solutions, which is, in turn, driving the growth further.

Server-less Cloud Computing

When cloud computing first became popular, the entire ecosystem had to include servers in their processing as they were the places where data was initially stored. But now that most companies store their data online, there is no need for server integration. Which is why Server-Less Technology was developed that allows developers to build and run application services without any infrastructure. These new types of applications will definitely be one of the major Cloud Computing Trends in 2019, thanks to improving efficiency, less effort, and cost.

Start-ups have been the main driver of this Cloud Trend, as it lets them indulge in early cloud adoption, for better security and easier development. Even older organizations have started replacing their existing application to take advantage of this opportunity.

Cloud-Based Container Systems

It is common for Cloud Computing Trends to replace existing hardware-based systems, but it is not often that we see them taking out software-based systems as well. We are talking about virtual machines, which are being rapidly replaced by Cloud-Based Container Systems. These containers contain the entire package: an application, plus all its dependencies, libraries and other binaries, and configuration files needed to run it.

This package can be deployed quickly on different systems, irrespective of their personal complexities. This is great for software and app developers who now don't have to worry about the load of the entire software package that is required for the virtual machines to run as well as the time it will take for it to boot up. This makes the containers smaller and faster than virtual machines.

Conclusion

In this review paper we have discussed about the cloud computing, its layers and comparative study with grid computing. And then we discussed about different approaches of cloud computing and some of their advantages. As we have studied about the cloud computing and its approaches, we got to know that the study of this topic is recent trends in cloud computing. So, we understand that the cloud computing have a major impact on society.

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