

CLOUD COMPUTING AND ITS CONTRIBUTION TO GREEN IT

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Abstract

Cloud here resembles to the Network i.e Internet. Flexible, on-demand, and low-cost usage of computing resources are provided by cloud computing, the data is outsourced to the cloud servers, and privacy and security concerns emerge from it. Cloud computing is often defined as a computing where computing wanted by one party are often outsourced to a different party. Cloud mainly depends on resource sharing instead of handling applications by local servers or individual devices. Cloud computing allows the function of application software using the internet enabled devices. Storage and virtual servers; applications and authorization for desktop applications are different range of functions over Internet provided by Cloud computing . Cloud computing is able to achieve consistency and economies of scale by taking advantage of resource sharing. It is one step further solution to have all virtualized IT resources as per need on rental Basis for the users. Different cloud deployment methods have came according to the need of users. Enabling optimal usage of information technology resources is achieved through virtualization . This paper described Cloud Computing, IT's Architecture, Characteristics, and its advantages and disadvantages. It also focuses on two critical elements of a green IT approach: energy efficiency and resource efficiency and how cloud computing helps greening.

Keywords

Cloud Computing, Cloud Service Models, Essential characteristic, Green IT.

Introduction

The term ‘cloud’ is referred to as ‘central store’ where information, application and storage are placed and access depending on the need. When ‘computing’ is merged with ‘cloud’, information, application and storage generally referred as services are provided by the service provider depending on the users demand. User of the cloud need to access the required service via the browser or specialized interface from anywhere anytime. Hence no need to establish the physical environment, licensing, maintenance, etc.

The cloud model promotes availability of resources and is composed of five essential characteristics, three service models, and four deployment models. *Example*, Gmail offers a same service, as Outlook stored on the PC hard drive, but the data is stored on the providers’ servers and accessed via a browser. Client need to be concerned about the computing service being asked for, as the underlying details of how it is achieved are hidden from the user.

Architecture

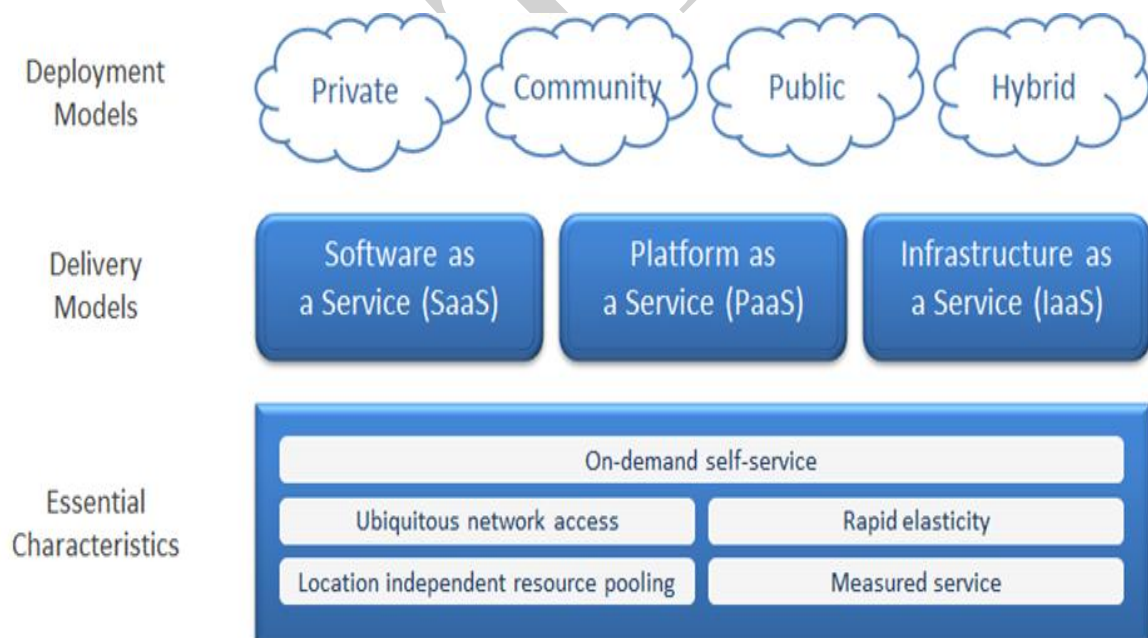


Figure 1. overall aspect of cloud computing

Essential Characteristics

1. On-demand service

A consumer can access computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

2. Pervasive network access

Different thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations) can access the capabilities that are available over the network through standard mechanisms.

3. Resource Sharing

The provider's computing resources serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically reassigned according to consumer demand. The customer generally has no control over the exact location of the provided resources but may be able to specify location at a higher level of. Examples of resources include storage, processing, memory, and network bandwidth.

4. Rapid flexibility

Capabilities can be flexibly provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

5. Measured service

Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

Delivery

Model

A cloud services delivery model is falls into three generally accepted services:

1. Software as a Service – SaaS

All the software and its associated data are located centrally and accessed by the user on demand through the help of web browser. User only need to plug into cloud and consumes the software whenever required. *For eg:* Gmail.

2. Platform as a Service- Paas

Cloud platform services or "*Platform as a Service (PaaS)*" Provide a development environment to application developers . It facilitates deployment of applications without the cost and complexity of buying and managing the hardware and software layers. The provider typically develops standards for development, and channels for distribution and payment. The provider typically receives a payment for providing the platform and the sales and distribution services. *Forexample:* Microsoft Azure, Google App Engine.

3. Infrastructure as a Service- IaaS

Cloud infrastructure services or "*Infrastructure as a Service (IaaS)*" delivers computer infrastructure, typically a platform virtualization environment as a service. Instead of purchasing servers, software, data center space or network equipment, clients buy those resources as a fully outsourced service. The service is billed on a utility computing basis and amount of resources consumed will typically reflect the level of activity. It possible to offer a pay-per-use model. It is an evolution of virtual private server offerings.

For example :AmazonEC2.

Deployment Models

1. Private cloud

The cloud infrastructure is used by a single organization. It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.

2. Community cloud

The cloud infrastructure is used by a specific community of consumers from organizations that have shared concerns.

e.g., mission, security requirements, policy, and compliance considerations.

It may be owned, managed, and operated by one or more of the organizations in the community, a third party.

3. Public cloud

The cloud infrastructure is for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.

4. Hybrid cloud

The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability .

Benefits

- ✓ One can access applications as utilities, over the Internet easily.
- ✓ Manipulate and configure the application online at anytime, anywhere.
- ✓ No software installation is required to access or manipulate cloud application.
- ✓ It offers online development and deployment tools, programming runtime environment through Platform as a Service model.
- ✓ Cloud resources are available over the Internet in a manner that provides platform independent access to any type of clients.
- ✓ Cloud Computing offers on-demand self-service. .
- ✓ Cloud Computing is cost effective because it operates at higher efficiencies with greater utilization. It just requires an Internet connection.
- ✓ Cloud Computing offers load balancing that makes it more reliable.

Challenges

✓ Security & privacy

Security and Privacy of information is the challenge to cloud computing. IT can be overcome through encryption, security hardware and security applications.

✓ Portability

Other challenge to cloud computing is that applications should easily be migrated from one cloud provider to another. There should not be vendor lock-in.

✓ **Interoperability**

Application on one platform should be able to incorporate services from other platform, which is made possible via web services. But such web services are very complex to write.

✓ **Computing performance**

To deliver applications on cloud requires a high network bandwidth, which results in high cost.

✓ **Reliability and availability**

It is necessary for cloud systems to be reliable and robust because most of the businesses are now becoming dependent on services provided by third-party.

Cloud computing as green IT

Cloud computing has helped greening our technologies and is labeled itself as an environmental-friendly approach in delivering IT. According to some industry regarding the effects of cloud computing technology, hypothetically we all have agree that it helps in keeping environment green. Even though consumption of technology and computational power is increasing everywhere and is becoming an important part of the lives of the people across the world, Green computing is being discussed as important concept, considering the effect of IT infrastructure on environment. Though It and environment are discussed separately, the increasing impact of information technology on the environment cannot be ignored. It is estimated that 1 gig ton of emissions a year, is produces which contribute to about 2 percent of total global emissions. By the year 2020 it is estimated to become about 1.54 gig tons or 3 percent of global emissions. Although we cannot control the rising demand for computing, we can find out ways through which we can deliver computing in a more resourceful, ecologically welcoming way. Cloud computing technology can contribute to such efficiencies but still as it is theoretical, giving rise to the expected query: Does shifting more of our computational load to the cloud help keep the environment safe and greener? The changing IT trends towards cloud computing resembles the changing trends during the manufacturing uprising. In the recent trends we have even advanced to concept of XAAS i.e. everything as a service in delivery of IT. Here these centralised factories in information technology are being established by Amazon, Google and Microsoft who produce and deliver everything as a service in IT. The modernization that lies behind cloud computing factories is

—virtualization technology. Before the development of virtualization, each server was used to a given task. An e-mail server, for example, cannot act as a file server as well as a database server because different server software's tended to mix with each other and race for system resources. To keep performance and reliability the practice was to dedicate a server for a particular service. It is found that resources are idle most of the time yet they consume power when conventional data center uses dedicated servers for particular services. According to a Some study server utilization is only 6 percent on an average and rest 94 percent of the time servers are unused yet they continue to consume considerable amounts of power. This unused and power consuming IT infrastructure leads to lot of IT waste and is responsible for carbon emission which is dangerous to environment. Virtualization through cloud computing enables many machine to be run on a single physical server by using the physical infrastructure. If one virtual machine stop working, the other virtual machines will remain totally unaffected. IBM started the concept of virtualization in 1960s but it has been fully used recently when conventional data centers migrated and advanced to be virtualized data center. This was the first step in the journey of cloud computing set up. It has changed computing as a utility like electricity which can be provided on demand as a service. According to the report from market research firm IDC expected nearly 40 million servers in operation by 2011, up from 19 million in 2001. With the help of virtualization and cloud computing the computational needs of same 40 million servers could be met with a simple 2.4 million servers operating at 100 percent capacity. Virtualization enables servers to operate at levels nearer to their speculative upper limit. Cloud service providers automatically power down servers and resources that aren't needed to meet current demand levels.

Conclusion

So, while cloud computing is really great and we are already using it, either for business or for personal use, we've seen that: Cloud computing is really cheap way for not only for companies but also other organization to have all the resources they need in once place at any time. It's a better way to spread your resources, and it becomes easier to access things from longer distances. It helps in reducing E-waste through IAAS as well as conserve energy contributing to green IT. Reducing the E-waste can contribute in greening our environment. Using cloud computing is really a best option to contribute to the Environment in a positive manner.

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Bio

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