

Cloud Computing: Architecture and Services

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ABSTRACT

Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid. It is a method for delivering information technology (IT) services where resources are retrieved from the Internet through web-based tools and applications, as opposed to a direct connection to a server. Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database.

Companies providing cloud services enable users to store files and applications on remote servers, and then access all the data via the internet. This Paper highlight architecture , services, pros and cons of using cloud computing.

1. Introduction

Cloud computing is Internet based computing where virtual shared servers provide software, infrastructure, platform, devices and other resources and hosting to customers on a pay-as-you-use basis. All information that a digitized system has to offer is provided as a service in the cloud computing model.

Users can access services available on the "Internet cloud" without having any previous know-how on managing the resources involved. Thus, users can concentrate more on their core business processes rather than spending time and gaining knowledge on resources needed to manage their business processes.

Cloud computing customers do not own the physical infrastructure; rather they rent the usage from a third-party provider. This helps them to avoid huge. They consume resources as a service and pay only for resources that they use. Most cloud computing infrastructures consist of services delivered through common centers and built on servers. As long as an electronic device has access to the web, it has access to the data and the software programs to run it. It's called cloud computing because the information being accessed is found in "the cloud" and does not require a user to be in a specific place to gain access to it. This type of system allows employees to work remotely.

2. Architecture of Cloud Computing

Cloud Computing architecture consist of many cloud components and subcomponents, which comprise on-premise and cloud resources, services, middleware, and software components, Geo-location, the externally visible properties of those, and the relationships between them.

The Basic Cloud Computing architecture is divided into two mains parts.

Architecture of Cloud Computing

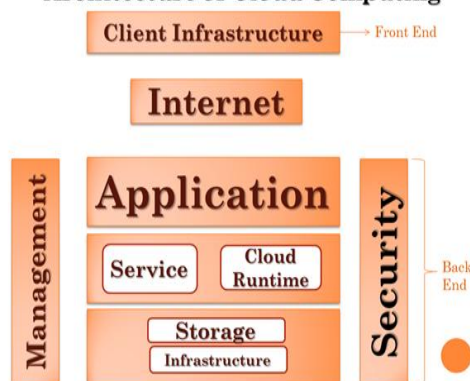
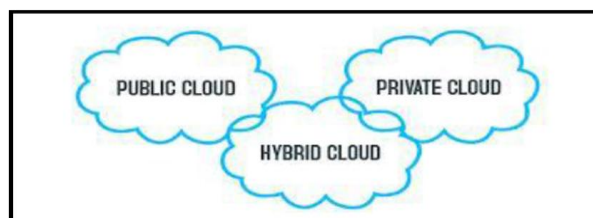


Figure 1: Architecture of Cloud Computing

Front End:- The Front end is the client part. Its consists of interfaces and applications required to access cloud computing system. The cloud computing resources can be accessed through front end devices such as desktop computers, mobile phones, tablets, laptops, smart phones and workstations. The front end is connected to back end via internet. For examples: web browser are front ends.

Back End:- It is the cloud section containing servers, huge data storage, security, deployment models, service, cloud infrastructure that create the 'cloud' of computing services. It is the responsibility of the back end to provide built-in security mechanism, traffic control and protocols. Back end control and optimize resource depending on user requirements for type of services (e.g. storage, processing, bandwidth and active user accounts).

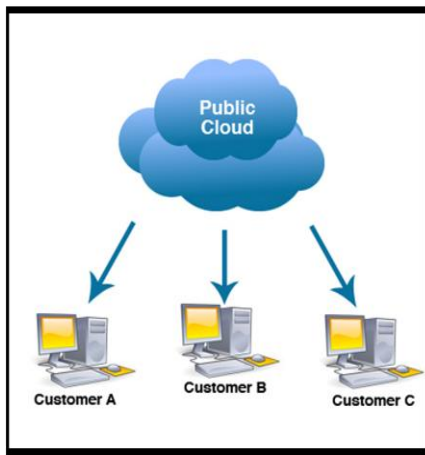
3. Types of Cloud Computing



I. Public cloud

Public clouds are made available to the general public by a service provider who hosts the cloud infrastructure. Generally, public cloud providers like Amazon AWS, Microsoft and Google own and operate the infrastructure and offer access over the Internet. With this model, customers have no visibility or control over where the infrastructure is located. It is important to note that all customers on public clouds share the same infrastructure pool with limited configuration, security protections and availability variances.

Public Cloud customers benefit from economies of scale, because infrastructure costs are spread across all users, allowing each individual client to operate on a low-cost, "pay-as-you-go" model. Another advantage of public cloud infrastructures is that they are typically larger in scale than an in-house enterprise cloud, which provides clients with seamless, on-demand scalability. These clouds offer the greatest level of efficiency in shared resources; however, they are also more vulnerable than private clouds.



II. Private cloud

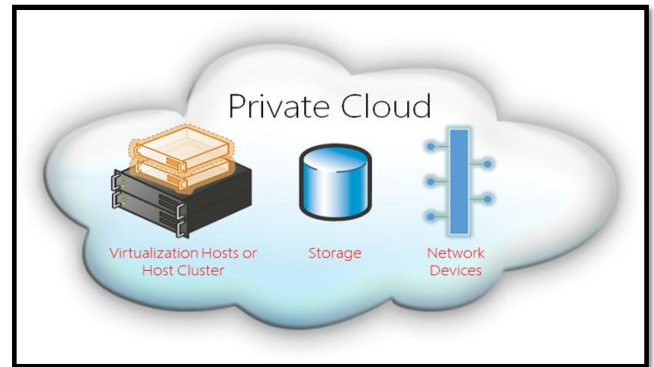
Private cloud is cloud infrastructure dedicated to a particular organization. Private clouds allow businesses to host applications in the cloud, while addressing concerns regarding data security and control, which is often lacking in a public cloud environment. It is not shared with other organizations, whether managed internally or by a third-party, and it can be hosted internally or externally.

There are two variations of private clouds:

1. On-Premise Private Cloud: This type of cloud is hosted within an organization’s own facility. A businesses IT department would incur the capital and operational costs for the physical resources with this model. On-Premise Private Clouds are best used for applications that require complete control and configurability of the infrastructure and security.

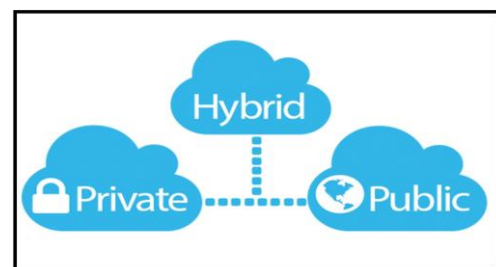
2. Externally Hosted Private Cloud: Externally hosted private clouds are also exclusively used by one organization, but are hosted by a third party specializing in cloud infrastructure. The service provider facilitates an

exclusive cloud environment with full guarantee of privacy. This format is recommended for organizations that prefer not to use a public cloud infrastructure due to the risks associated with the sharing of physical resources. Organization to reevaluate decisions about existing resources. Private clouds are more expensive but also more secure when compared to public clouds.



III. Hybrid cloud

Hybrid Clouds are a composition of two or more clouds (private, community or public) that remain unique entities but are bound together offering the advantages of multiple deployment models. In a hybrid cloud, you can leverage third party cloud providers in either a full or partial manner; increasing the flexibility of computing. Augmenting a traditional private cloud with the resources of a public cloud can be used to manage any unexpected surges in workload. Hybrid cloud architecture requires both on-premise resources and off-site server based cloud infrastructure. By spreading things out over a hybrid cloud, you keep each aspect of your business in the most efficient environment possible. The downside is that you have to keep track of multiple cloud security platforms and ensure that all aspects of your business can communicate with each other.



4. Cloud Computing Services

- **SaaS (Software as a Service):** SaaS refers to software that’s made available as a web-based service. Because you can access the software remotely, you don’t need additional hardware to use or run it. Furthermore, you don’t have to worry about the software’s installation, setup, maintenance or upgrades. An example of SaaS is a site that allows you to create, save and access documents online.

- **Utility computing:** The predecessor of cloud computing, utility computing provides the ability to access storage and virtual servers on demand.
- **Cloud-based web services:** Similar to SaaS, web services in the cloud allow you to offer services online, such as credit card processing services, employee payroll processing or viewing an interactive map.
- **MSP (Managed Service Providers):** The grandfather of cloud computing, an MSP delivers applications to IT instead of end-users. An MSP example includes an email virus-scanning service.
- **IaaS (Infrastructure as a Service):** IaaS refers to computer infrastructure (e.g., virtualization) that's delivered as a service. A data center that offers outsourced software and servers may use IaaS for its operations.

5. Advantages of Cloud Computing

Sharing resources amongst can improve, as servers are not unnecessarily left idle, which can reduce costs significantly while increasing the speed of application development. The following are some of the possible advantages of cloud computing:

Flexibility

There is a high rate of flexibility when using cloud computing because people can opt out of using it whenever they want too. One of the major benefit of cloud computing is that there is no limitation of place and medium. We can access our applications and data anywhere in the world, on any system.

Low Cost

Companies can save big by employing cloud computing as it eliminates cost for hardware and software. With cloud computing, company uses the resources of the hosting company to store their data and applications. Companies also pay for use of the software and programs by paying a subscription fee.

The cost of using cloud resources is very economical for resources such as centralized, real estate, bandwidth, and power. Users will also save money on software updates, management costs, and data storage costs. It is a cheaper way to maintain the software and it will save time, as the developers keep track of updates and maintain user's programs while user use them.

Speed & Scales

Traditional methods to buy and configure hardware and software are time consuming. There is no need to purchase and setup hardware manually when using the cloud computing method. Cloud computing provides a rapid deployment model that enables applications to grow quickly to match increasing usage requirements. Depending upon their needs the user can quickly scale up or scale down.

Easier Management of Data and Information

Since all data are located on a centralized location, data are more organized making it easy to manage. All transactions are

also recorded so management can easily track activities of their employees.

Device Diversity

User can access their applications and data anywhere in the world, on any system. Cloud Computing Services can be accessed through various different electronic devices that are able to have access to the internet. These devices includes i pad, Smartphone, Laptop, or desktop computer.

Increased Storage Capacity

Increased Storage Capacity is another benefit of the cloud computing, as it can store more data as compared to a personal computer. So it saves us from the upgrading computer memory that helps reduce the cost for companies and users.

Easy to Learn and Understand

Thus allowing you to save hundreds and thousands of dollars in implementing any new system and making arrangements for training on the same. Since people are quiet used to cloud applications like Gmail, Google Docs, so anything related to the same is most likely to be understood by the users.

Automatic Updating

It saves companies time and effort to update multiples server. On the other hand, it also helps users to download updates for the software. Once the server gets updated the users can get the updates without doing anything.

Customize Setting

Cloud computing also allows you to customize your business applications. This is a great benefit because the world of online business is very competitive.

6. Disadvantages of Cloud Computing

The following are some of the possible disadvantages of cloud computing:

Dependency

One major disadvantages of cloud computing is user's dependency on the provider. Internet users don't have their data stored with them.

Risk

Cloud computing services means taking services from remote servers. There is always insecurity regarding stored documents because users do not have control over their software. Nothing can be recovered if their servers go out of service.

Requires a Constant internet connection

The most obvious disadvantage is that Cloud computing completely relies on network connections. It makes the business dependent on the reliability of Internet connection. When it's offline, user's are offline. If user don't have an Internet connection, user can't access anything, even user's own data. A dead internet connection means no work.

Similarly, a low-speed Internet connection, such as that found with dial-up services, makes cloud computing painful at best and often impossible. Web-based apps often require a lot

of bandwidth to download, In other words, cloud computing isn't for the slow connection.

Security

Security and privacy are the biggest concerns about cloud computing. Companies might feel uncomfortable knowing that their data is stored in a virtual server which makes responsibility on the security of the data difficult to determine and even users might feel uncomfortable handing over their data to a third party.

Privacy is another big issue with the cloud computing server. To make cloud servers more secure to ensure that a client's data is not accessed by any unauthorized users, cloud service providers have developed password protected accounts, security servers through which all data being transferred must pass and data encryption technique.

Migration Issue

Migration problem is also a big concern about cloud computing. If the user wants to switch to some other Provider then it is not easy to transfer huge data from one provider to another.

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7. Conclusion

While cloud computing is really great and users are probably already using it, either for business or for personal means. It is a really cheap way for companies to have all the resources they need in one place. It's a much better way to spread resources and easier to access things from longer distances. But... Is cloud computing really all that safe? For instance, while cloud computing has backups, if something was to go wrong... do users have their own personal backup?... Is cloud computing as private as you think it is? Is your data secured or can anyone access it? These are things user need to think carefully before using cloud computing services.