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A Comparative Study of Cloud Deployment Model

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Abstract-

In the simplest terms, cloud computing means storing and accessing data programs over the internet instead of our computer's hard drive. Although we do not realize that we are probably using cloud computing right now, most of us use an online service to send email, edit documents, watch movies etc. It is likely that cloud computing is making it all possible behind the services. When we speak about the cloud computing it's really necessary to understand the types of cloud computing that customers can adopt and exiting. In this paper we have a deeper look into this. Generally, there are four types of cloud computing that we can see and listed below-

- Private cloud
- Public cloud
- Hybrid cloud
- Community cloud

Keywords: - Cloud computing, cloud deployment model, private cloud, hybrid cloud

Introduction-

Generally speaking, deployment is the process of making software available and ready for use. In cloud context deployment is basically where the software is made available.

There are four cloud deployment models Public, Private, community and hybrid which I have mentioned above. Each deployment model is defined according to where the infrastructure for the environment is located. Now we discuss the four deployment models.

Private cloud →

Private cloud is private to a specific organization. A private cloud resources and services are used exclusively by one business or organization. Unlike public cloud, a private cloud resources are not shared by multiple organizations. All the hardware infrastructure and software are solely dedicated to one organization. The private cloud is physically located on premise that is at our organizations on-site data center or it can also be hosted by a third party service provider. The important point to keep in mind is a private cloud is private that is all the

hardware infrastructure and software are solely dedicated to one and only one organization in a private cloud. It's very easy to customize the hardware and software to meet our organization's specific IT requirements. In general, private cloud is often used by government agencies, financial institutions and any other medium to large sized organizations with business critical operations that want to have enhanced and complete. In private cloud resources are not shared with other organizations.

Benefits-→

Better security-- There is better security with private cloud. Private cloud belongs to a specific organization.

Better control-→ We can customize it to meet our specific business needs.

Predictable cost -→ With private cloud we own all the cloud infrastructure and we are not paying third party cloud services provider. So our monthly cooling maintenance costs, energy and are usually predictable.

Legal compliance-→ When we deal with regulated data, for example financial, health care or credit card data, there are strict rules around where the data is stored, who can handle and process it and how it is protected. With the private cloud we know where our data center is located. So we know where the data is stored and how exactly it is protected.

Limitations-

Limited scalability—With private cloud we have limited scalability. The extent to which we can scale up in a private cloud is limited by the amount of infrastructure we have. Beyond certain point we cannot scale up. So the infrastructure is a limiting factor and we may not be able to scale up as will like in the public cloud. Huge initial capital expenditure. With private cloud we have to procure all the cloud infrastructure, hire the workforce to set up and maintain the cloud.

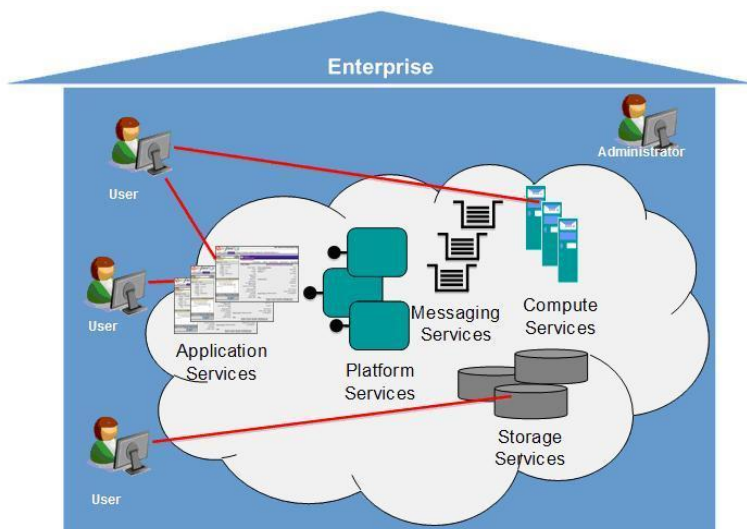
Huge initial capex (capital expenditure) -- So a private cloud is an expensive solution compared to public cloud alternatives, especially for short term projects.

Limited access—A private cloud is usually more secure. We use it for Security sensitive applications, because of these high security measures in place mobile users may have limited access to the private cloud outside of the corporate network. When to use a private cloud well, a private cloud is best suited for highly regulated businesses like financial and healthcare institutions. Tech companies that require robust security and complete control over the cloud infrastructure also benefit from the private cloud.

Use cases→ Large organizations that require custom solutions

Tech companies that require complete control.

Private cloud model--



https://www.researchgate.net/figure/Private-cloud-model_fig2_259369032

Public cloud—

As the name implies, a public cloud is public and it is the most common type of cloud. It is easy for anyone that is an individual or an organization to start using public cloud resources and services. There is no upfront huge capital expenditure. We don't have to buy the expensive hardware or worry about setup and maintaining the cloud. This is because with the public all the infrastructure, that is the physical servers, storage, networking etc. are procured and owned by the cloud service provider. It is this cloud services that sets up the cloud and maintain it there on. Microsoft Azure and Amazon Web Service are examples of a public cloud. We access public cloud resources and services over the internet. So to use a public cloud we need an internet connection and to manage the services and resources the cloud services provider a web portal.

The cloud services and resources we use; we pay a monthly fee to the cloud service provider. This monthly fee is like your utility bills, water or electricity. For example, its pay-as-you-go model, meaning we only pay for what we use. Anyone can use the public cloud. In a public cloud our organization share the same hardware, storage and network devices with other organizations. In cloud computing terms this is called multi-tenancy. Our organization data may be stored along with other organizations data on the same storage device.

Benefits –

No upfront capex- We don't have to buy expensive hardware or set up our own data center, that is no upfront capital expenditure.

Pay as you go - It supports pay as you go model. You only pay for what we use, just like our water or electricity monthly bills.

No maintenance headaches - We as a consumer don't have to worry about maintaining the public cloud. That is replacing the failed hardware, installing the security patches updates etc. Our services provider is responsible for maintaining the the public cloud. We only pay a small monthly fee based on the cloud services we use.

Highly scalable - You will almost never run out of resources in a public cloud. Based on our business needs we can scale resources up and down. We can even automate this by setting threshold limits.

Highly reliable – A public cloud is a vast network of servers. So data is always backed up. This means hardware failure, power, failure, natural disaster or other crisis do not result in data loss. So bottom line, public cloud is highly reliable.

Limitations –

Low visibility and control – Public cloud infrastructure is owned by the cloud service provider. So we don't have much visibility and control over it.

Compliance and legal risks – Since we don't have much visibility and control over the public cloud infrastructure, we are relying on the cloud service provider to protect data and adhere to local and international regulations. Our company may still be liable if the cloud service provider fails to live up to the friendly the most and if there is a data breach. So a public cloud may not viable solution for security sensitive or mission critical applications.

Cost concerns – Cloud in general reduces upfront infrastructure costs and its pay as you go model provides more flexibility. Depending on the traffic, the amount of cloud resources we consume, the plan we have chosen, the way we scale resources up and down determines the overall price you pay. Sometimes this overall price tag may be higher than what we anticipated.

Use cases for public cloud ->

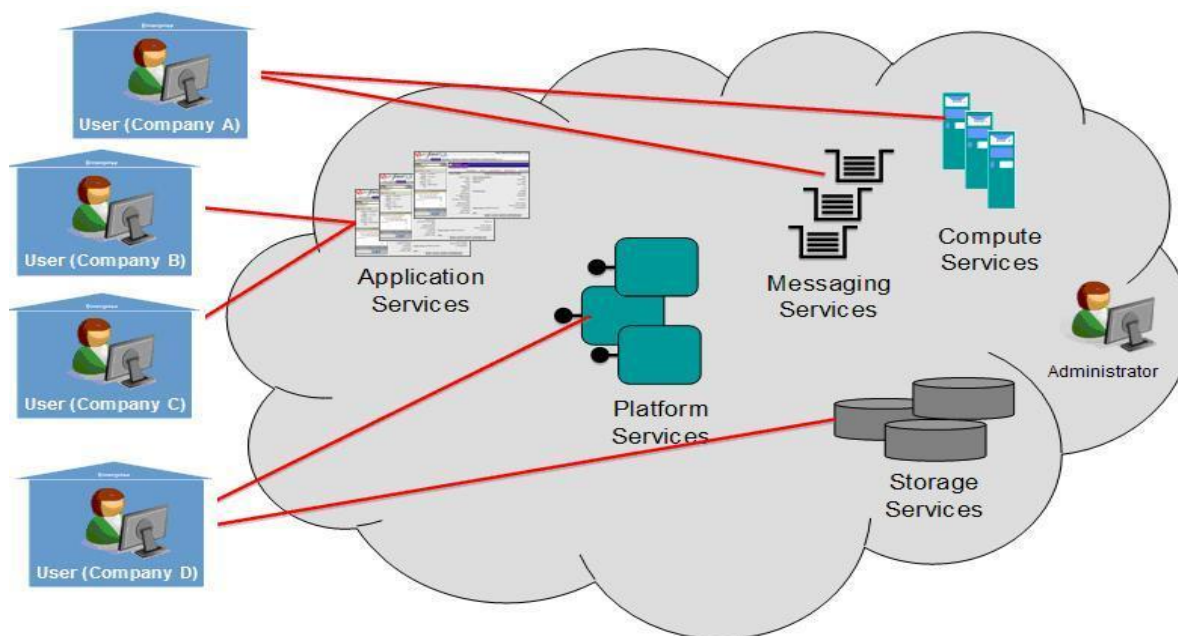
Unlimited scalability - We never run of resources in a public cloud. It provides near unlimited scalability. So if we want to dynamically scale up and down at will, then public cloud is our solution.

Varying peak demand - Business with varying peak demand greatly benefit from the public cloud. When there is high demand, we scale up and when the demand subsides, we scale down and pay only for what we use.

Fast growing business – Fast growing business also greatly benefit from the public. They can use the public cloud and quickly scale up their operations rather than having to build their own private cloud which not only has huge upfront capital expenditure but also time consuming.

Backup & disaster recovery solutions - Business can also benefit from the public cloud by using it for backup and disaster recovery solutions.

Public cloud model -



https://www.researchgate.net/figure/Public-cloud-model_fig1_259369032

Hybrid cloud—A hybrid cloud is a combination of both the private cloud and the public cloud. It is not a different cloud all together. Both the private and public cloud work together to meet our organization requirements. It offers the best of both the worlds. For exam example, we can use the private cloud for security sensitive business critical operations like financial reporting and the public cloud for high volume low security needs such as web-based email. In a hybrid cloud, we have a concept called cloud bursting. It is a technical term have an application or a service. Its hosted and running in our own private cloud.

The application continues to run in our private cloud until there is a spike in the demand. When there is a demand, burst through to the public cloud to tap into the additional computing resources provided by the public cloud, and when the spike in demand subsides, we scale down just to our private cloud and no longer use the public cloud.

Benefits of hybrid cloud --

Better control - With the hybrid cloud we have better control on what runs where.

Cost effective - With the hybrid cloud only use public cloud resources when need them, That is when there is a sudden spike in demand we burst through to the public cloud to use that additional computing power provided by the public cloud. When the demand subsides we scale down just to our private cloud.

The limitations of hybrid cloud -

Low visibility and control - Just like a public cloud even in a hybrid cloud we don't have much visibility and control over the infrastructure that is owned by the public cloud service provider. Additional

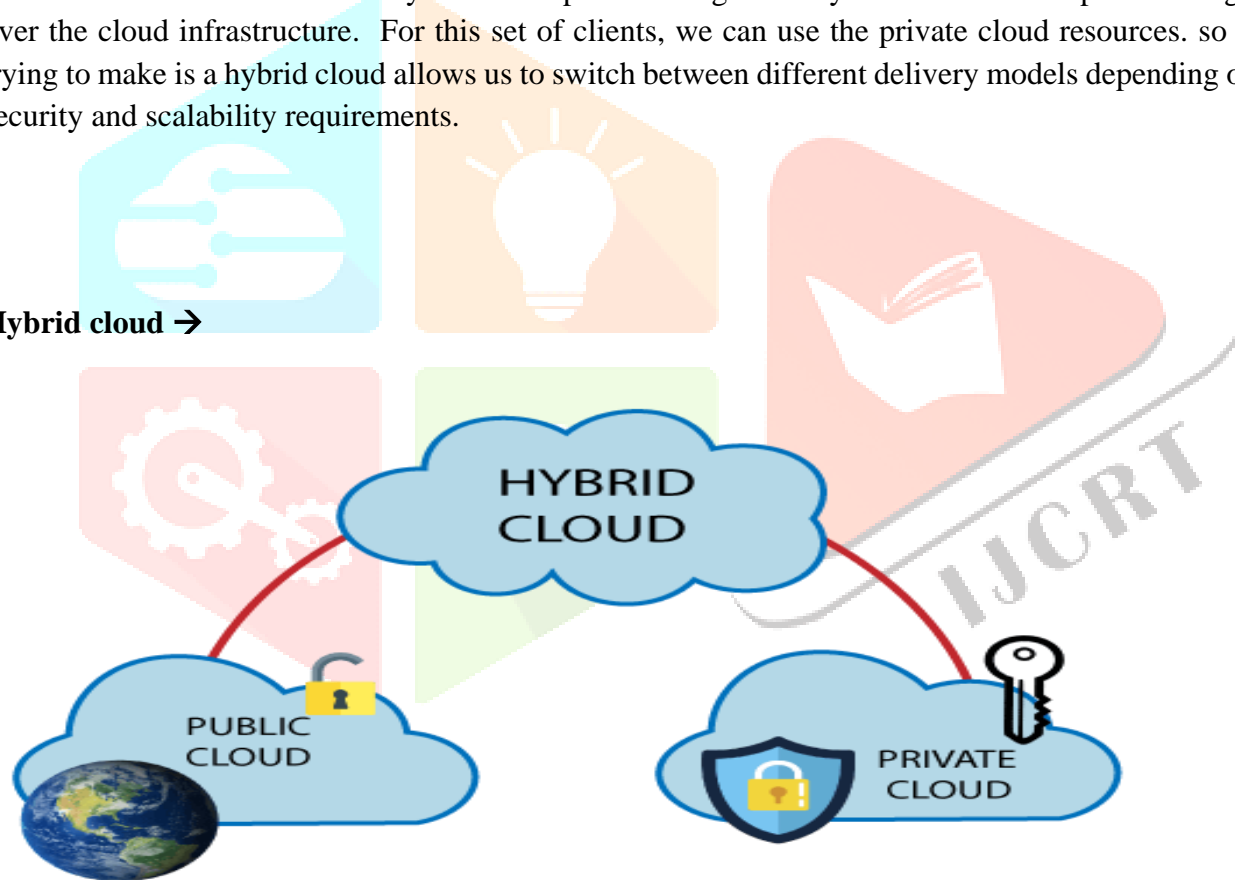
Complexity - It involves considerable effort, time and complexity to maintain and evolve these two different types of cloud as the organization needs change.

Compliance and legal risks - Since we don't have much visibility and control over the public cloud infrastructure we are relying on the public cloud service provider to protect data and adhere to local and international regulations.

Use cases – Hybrid Cloud provides best of both worlds that is private and public clouds. For example, we are an IT company and provides services to two different sets of clients. For one set of clients, security is not a massive concern. They just want to scale up and down at will. For this set of client, we can use the public cloud resources.

For the other set of client security is most important thing and they want to have complete and rigorous control over the cloud infrastructure. For this set of clients, we can use the private cloud resources. so the point that trying to make is a hybrid cloud allows us to switch between different delivery models depending on our clients' security and scalability requirements.

Hybrid cloud →



<https://www.javatpoint.com/hybrid-cloud>

Community cloud: It falls the category of private and public cloud allows system and services to be accessible by group of organizations.

Benefits of community cloud→

-Low cost than private cloud.

- Sharing among organization security. (more secure then public but less then private)

Limitations of community cloud: -We need to be careful in storing data [data segregation].

-Responsibilities among organization.

Generally speaking deployment is the process of making software available and ready for use .In cloud context deployment is basically where the software is made available in other words where it is running

There are four cloud deployment models Public, Private, community and hybrid. Each deployment model is defined according to were the infrastructure for the environment is located. There are three main cloud service and infrastructure as a service.

Use cases of community cloud→

- Customer support with self-service portals. Salesforce is a great way for our business to improve our customer service using online portals and help centers.
- Sales channel acceleration.
- Higher Education.



<https://www.pinterest.com/pin/425238389796617646/>

Conclusion → Definitely, each cloud deployment model has an limited service offering and can immensely add value to our business.

- For small to medium-sized businesses: a **public cloud** can work ideally to start with.
- Further, as our requirements develop, we can easily switch to another deployment model.

An effective deployment strategy can be developed relying on our needs using the above-mentioned cloud deployment models. So in this paper the deployment model not only determines the specific infrastructure and features available, but also sets parameters for access, infrastructure ownership, and how much storage space is available.

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