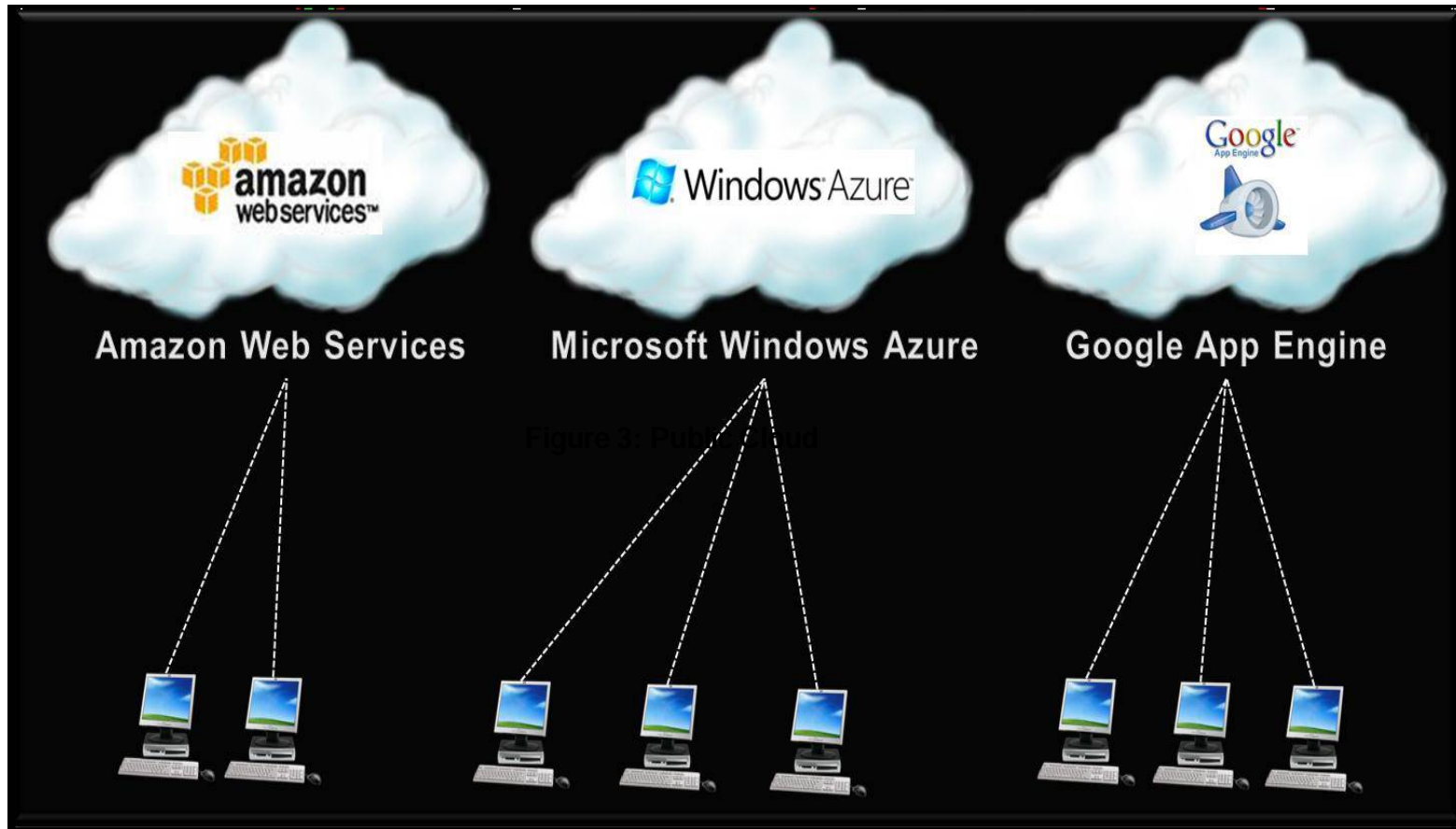# Cloud Computing

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Meaning

- One of the major components of this digital age is a move towards "cloud computing".

- In simple terms, this means the replacement of packaged software generally bought on CD load onto PC's, with a variety of applications in the "cloud".

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- Software-as-a-service (SaaS) applications are examples of cloud computing. Google, Amazon, salesforce.com, and others all have successful SaaS offerings.

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- Web 2.0 applications have already shifted much of the personal computer usage to the cloud. It has facilitated millions of the users to get rid of bookmarks from the desktop by storing them on social bookmarking websites such as Delicious. It also allows to upload and share videos on YouTube, use services such as Slideshare to host presentations, work collaboratively on Google Docs, and adopt web-based email services such as Gmail it even enables to design applications for popular platforms such as Facebook.

Types of Cloud

- **Public Cloud:** This is what people normally end up talking about whenever the term cloud computing comes up. This is essentially an external cloud, provided by a service provider. It refers to the resources (hardware, software, applications) that a service provider offers over the Internet. Email, if hosted with an ISP is the most basic and oldest type of service offered on the public cloud. Now, just about every kind of service one can think of is available in the public cloud. The public cloud follows the 'pay as you go' model. One only pay for the services he consumes. The benefits of moving to a public cloud are many-one has not to worry about managing the underlying IT infrastructure-no security patches or updates to apply, no software upgrades, etc. All these are the service provider's headache.

Figure 3: Public Cloud

**Private Cloud:** A private cloud refers to having your own, private cloud computing infrastructure. Therefore, instead of relying on an external, public cloud service provider's infrastructure, one would have his own. A private cloud is more suited for a large enterprise because it has already invested heavily in its IT infrastructure, data center, apps, etc. A private cloud typically involves optimizing the existing IT infrastructure, so that it can deliver services to the users faster and more effectively. A private cloud would allow the IT team to provision for new hardware, software, and services for users as and when required. It would provide better control over the entire process of information processing. This helps reduce costs, improves response time, and provides greater flexibility. Private Cloud borrows some of the best practices of Public Cloud but is limited to an organizational boundary. Private Cloud can be setup by using a variety of offerings from vmWare, Microsoft, IBM, SUN and others. There are also some of the Open Source implementations like Eucalyptus and Ubuntu Enterprise Cloud.
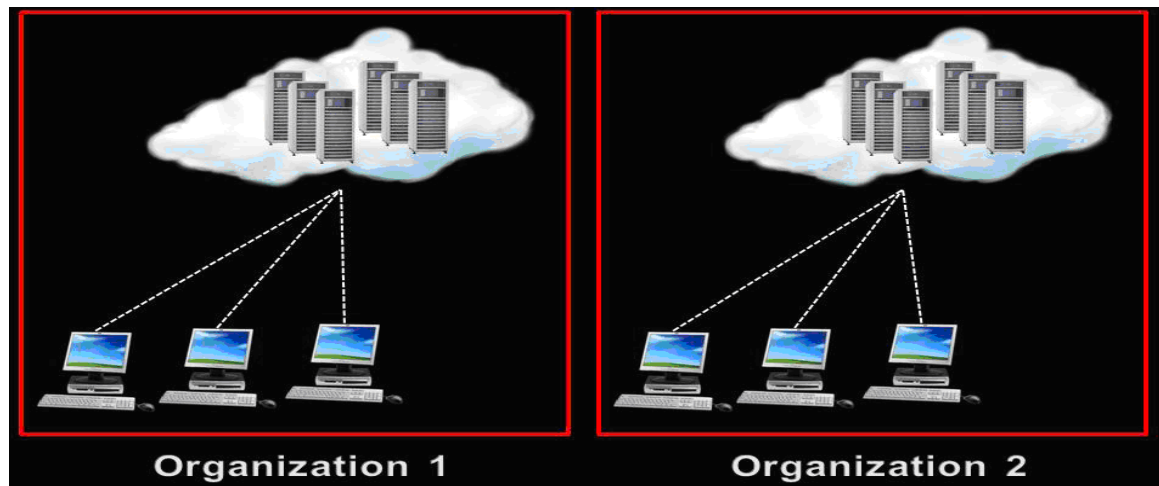
Hybrid Cloud: As the name implies, it is a cloud computing environment that consists of internal/ external providers, viz. a mix of private and public clouds. Secure and critical applications are hosted by organizations in the private cloud while not so critical ones are hosted in the public cloud. This combination is known as a hybrid cloud. The cloud infrastructure remains as a unique entity, which is bound by a standard technology thus enabling data and application portability. A very good example of this is cloud bursting, wherein the organization for its normal usage uses its own infrastructure but moves to the cloud for peak loads. Realizing the importance of hybrid cloud, Amazon Web Services has announced Virtual Private Cloud (VPC) that securely bridges Private Cloud and Amazon Web Services. Microsoft's announcement of Windows AppFabric brings the concept of Hybrid Cloud to Microsoft's future customers.
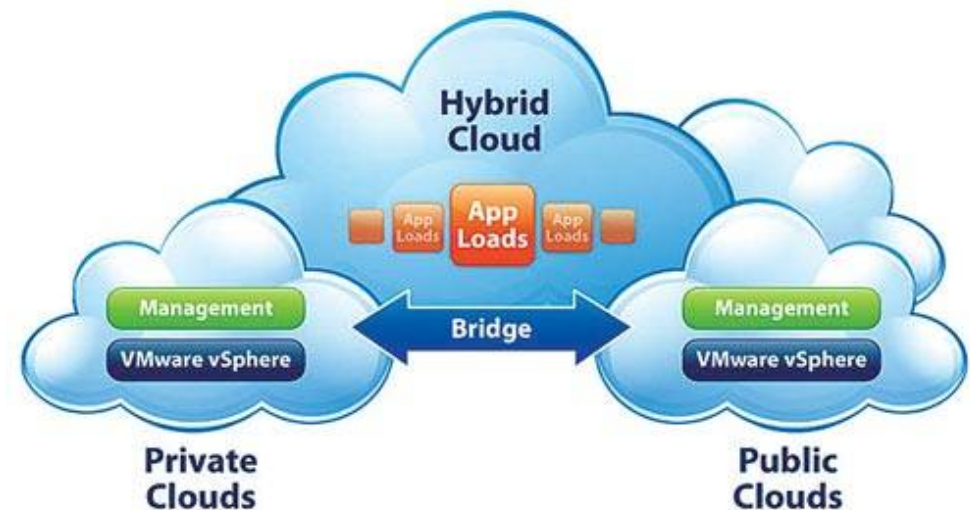
- **Community Cloud:** Community Cloud is implemented when a set of businesses has a similar requirement and shares the same context. This would be made available to a set of select organizations. For example, the Government of India may decide to setup a government specific Community Cloud that can leverage by all the Indian states. Through this, individual local bodies like state governments will be freed from investing, maintaining and managing their local data centers. Similarly, the National Library of India may setup a Community Cloud for all the public libraries that share common goals and requirements. Therefore, a Community Cloud is a sort of Private Cloud but goes beyond just one organization.
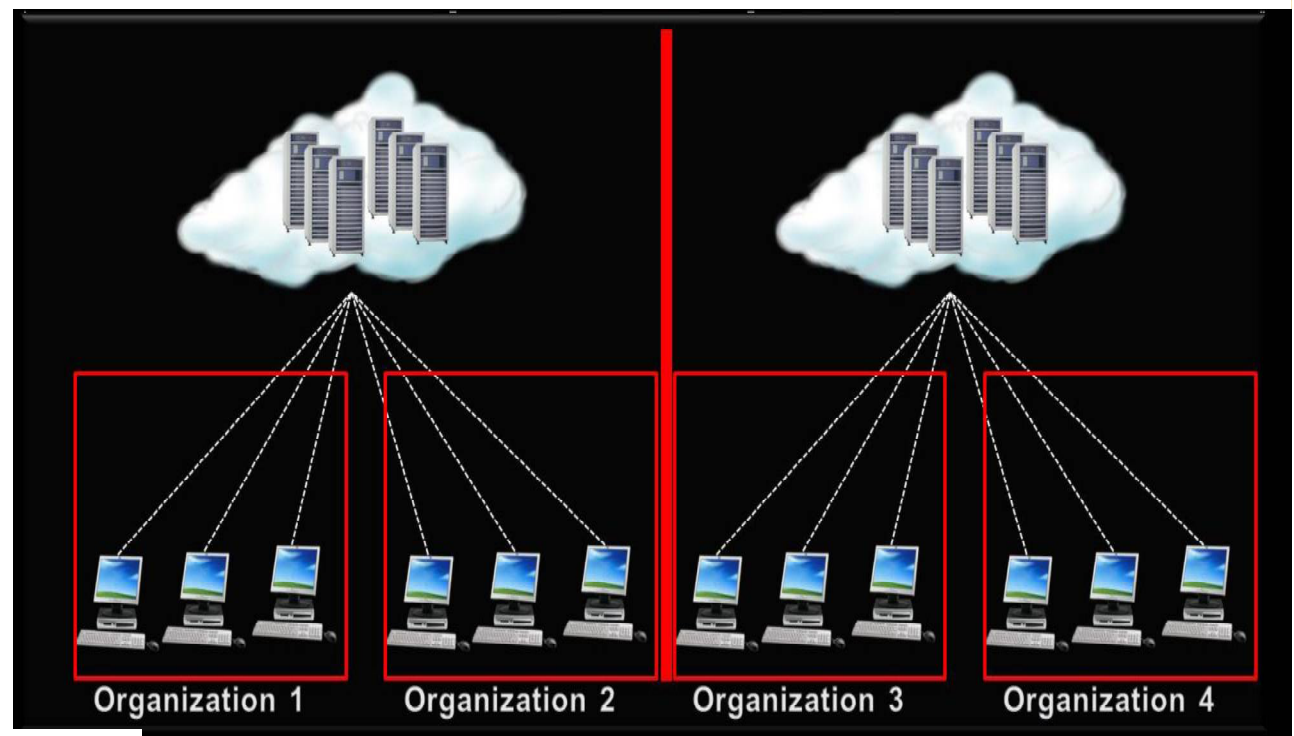
Types of Cloud Services

- **SaaS (Software as a Service):** This is the most familiar and prolific cloud service of all. As the name suggests, it provides any software application as a service through the cloud. We've all been using software as a service for years in the public domain, with the free email services being the most classic example. Today there's a whole range of software applications available through SaaS, be it ERP, CRM, workflow systems, document management, and much more. The cloud service provider offers these services, and the users pay as they use the same. This could be on a subscription model, wherein they pay an annual or a monthly fee for the services. Some of these Web-based applications are free such as Hotmail, Google Apps, Skype, and many 2.0 applications. There is usually little customization or control available with these applications. However, subscribers benefit from low initial costs, have access to (usually 24/7) support services, and needn't worry about hosting, installing, upgrading, or maintaining the software. Everything is accessible from a web browser, so the users don't need anything more than that.

- **Infrastructure as a Service:** As the name implies, IaaS is a service delivery model in which an organization is given control over different resources and applications. These resources comprise of storage, hardware, servers, networking components, etc. The consumer need not manage or control the underlying cloud infrastructure in this service model. On demand principle is used in this case as the infrastructure is provided to the user as per his requirements. It often takes the form of virtualized computing environment thus giving freedom to consumers wherein they can configure & deploy the applications in a virtual image locally. Then without the need to worry about the network infrastructure they can also execute it within the remote environment. Some of the prime examples of it are Amazon's Elastic Compute Cloud [EC2] that provides computing resources and Simple Storage Service (S3) for data storage.

- **Platform as a Service:** This component of cloud computing can be defined as a set of software and product development tools that allows developers to create applications on the provider's platform. In other words it allows you to build applications that are delivered to users through the Internet and are run on the provider's infrastructure. Cost effectiveness is one of the prime benefits of PaaS as organizations don't need to spend extra bucks for buying and managing the underlying hardware and software. PaaS offerings include facilities for application development and design, testing, deployment and hosting. Web service integration, database integration, security, storage, etc that comes under application services is also included. The prime examples are Salesforce.com's Force.com , Microsoft's Azure and Google's App Engine.

- Google's App Engine is a way for developers to run their web applications on Google's infrastructure. With Google App Engine, developers can write web applications based on the same building blocks that Google uses, such as the Google File System (GFS) and BigTable (its distributed storage system for structured data).

Advantages of Cloud Computing

- **Scalability:** Cloud computing allows an organization to scale up or down its IT requirements quickly and efficiently, without hampering productivity. It cuts down the time involved in buying & setting up additional hardware, software and other necessary resources every time a new service is required.

- **Reduced infrastructure cost:** Pay as you go is the mantra of cloud computing. One pays only for the duration that he uses the service for. This helps cut down unnecessary capital expenditure. Since the resources can be pulled out and restored dynamically, a lot of cost related to maintenance, administration, etc is reduced.

- **Usability:** As the IT infrastructure is nothing but a pool of resources; it reduces wastage and improves resource utilization. It also cuts down the downtime.

- **Reliability:** Reliability is improved if multiple redundant sites are used, which makes well designed cloud computing suitable for business continuity and disaster recovery. Nonetheless, many major cloud-computing services have suffered outages, and IT and business managers can at times do little when they are affected.

- **Maintenance:** Cloud computing applications can easily maintained since they don't have to be installed on each user's computer. They are easier to support and to improve since the changes reach the clients instantly.

- **Portability:** Cloud computing enable users to access systems using a web browser regardless of their location or what device they are using (e.g., PC, mobile). As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.

Any Question

Thanks