Introduction to cloud computing

Cloud computing is internet based computing. Cloud computing was coined for what happens when applications and services are moved into the internet "cloud." Simply put, it is the delivery of computing services (servers, storage, networking, software e.t.c.) over the internet. Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you are billed for using airtime.

Many companies are delivering services from the cloud. Some notable examples include:

- **Google** Has a private cloud that it uses for delivering Google docs and many other services to its users, including e-mail access, document applications, maps e.t.c.
- Microsoft Has "Microsoft office 365" online service that allows for content and business intelligence tools to be moved into the cloud, and Microsoft currently makes its office applications available in the cloud.
- Others include Yahoo, salesforce.com e.t.c.

Uses of cloud computing

Currently, everyone uses cloud computing, even if we don't realize it. If you ever use an online service to send email, edit documents, watch movies or TV, listen to music, play games e.t.c., it is likely that cloud computing is making it possible behind the scenes.

- Create new applications and programs
- Store, backup and recover data
- Host websites and blogs
- Stream audio and video
- Deliver software on demand
- Analyze data for patterns and make predictions

Characteristics of cloud computing

- Shared infrastructure: Uses a virtualized software model, enabling the sharing of physical services, storage, and networking capabilities. The cloud infrastructure, regardless of deployment mode, seeks to make the most of the available infrastructure across a number of users.
- **Dynamic provisioning:** Allows for the provision of services based on current demand requirements. This is done automatically using software automation, enabling the expansion

and contraction of service capability, as needed. This dynamic scaling needs to be done in maintaining high levels of reliability and security.

- Network access: Needs to be accessed across the internet from a broad range of devices such as PCs, laptops, and mobile devices. Deployments of services in the cloud include every thing from using business applications to the latest application on the newest smart phones.
- Managed metering: Uses metering for managing and optimizing the service and to provide reporting and billing information. In this way, consumers are billed for services according to how much they have actually used during the billing period.

Cloud service models

These are sometimes called the cloud computing stack because they build on top of one another.

Infrastructure as a service (IaaS)

This is the most basic category of cloud computing services. With IaaS, you rent IT infrastructure (servers and virtual machines, storage, networks, operating systems) from a cloud provider on a pay as you go basis.

Platform as a service (PaaS)

Platform as a Service refers to cloud computing services that supply an on-demand environment for developing, testing, delivering and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile applications without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development.

Software as a service (SaaS)

This is a method for delivering software applications over the internet, on demand and typically on a subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure and handle any maintenance, like software upgrades and security patching. Users connect to the applications over the internet, usually with a web browser on their phone, tablet or PC.

Cloud Deployment models

1. **Private cloud:** This cloud infrastructure has been deployed and is maintained and operated for a specific organization. The operation may be in-house or with a third party on the premises; and cloud computing resources are used exclusively by that organization.

- 2. Community cloud: The cloud infrastructure is shared among a number of organizations with similar interests and requirements. This may help the capital expenditure costs for its establishment as the costs are shared among the organizations.
- **3. Public cloud:** The cloud infrastructure is available to the public on a commercial basis by a cloud service provider. This enables a consumer to develop and deploy a service in the cloud with very little financial outlay compared to the capital expenditure requirements normally associated with other deployment options.
- **4. Hybrid cloud:** The cloud infrastructure consists of a number of clouds of any type, but the clouds have the ability through their interfaces to allow data and/or applications to be moved from one cloud to the other. This gives businesses greater flexibility and more deployment options.

Benefits of cloud computing

- Cost saving: cloud computing eliminates the capital expenses of buying hardware and software and setting up, and running on-site data centers – the racks of servers, and the IT experts for managing the infrastructure
- 2. Speed: Most cloud computing services are provided self service on demand, so even vast or big amounts of computing resources can be provided in minutes, typically with just a few mouse clicks. This gives businesses a lot of flexibility.
- **3. Global scale:** The benefits of cloud computing services include the ability to scale elasticity that is delivering the right amount of IT resources e.g. more or less computing power, storage, bandwidth as soon as it is needed.
- 4. Productivity: On-site data centers typically require a lot of racking and stacking meaning hardware setup, software installation and other time consuming IT management chores. Cloud computing eliminates the need for many of these tasks, so the IT teams can spend time on achieving more important business goals.
- **5. Performance:** The biggest cloud computing services are run on a world wide network of secure data centers which are regularly upgraded to the latest generation of fast and efficient computing hardware. This offers several benefits over a single corporate data center, including reduced network latency for applications and greater economies of scale.
- 6. Reliability: Cloud computing makes data backup, disaster recovery and business continuity easier and less expensive, because data can be mirrored at multiple redundant sites on the cloud provider's network

- 7. Scalability/flexibility: Companies can start with a small deployment and grow to a large deployment fairly rapidly, and then scale back if necessary. Also, the flexibility of cloud computing allows companies to use extra resources at peak times, enabling them to satisfy consumer demands.
- **8. Maintenance:** Cloud service providers do system maintenance, and access is through APIs that do not require application installations onto PCs, thus further reducing maintenance requirements.
- **9. Mobile accessible:** Mobile workers have increased productivity due to systems accessible in an infrastructure which is available anywhere.

Challenges faced with cloud computing

- 1. Security and privacy: The most crucial issues surrounding cloud computing relate to storing and securing data, and monitoring the use of the cloud by the service providers. Some times there is lack of data confidentiality because forexample over a public network, some one'z accounts can be easily hacked into.
- 2. Lack of standards: Clouds have documented interfaces; however, no standards are associated with these, and thus it is unlikely that most clouds will be interoperable
- **3. Continuously evolving:** User requirements are continuously evolving, as are the requirements for interfaces, networking and storage. This means that a cloud especially a public one does not remain static and it is continuously evolving.

Factors to consider when choosing a cloud service provider

Security

- Find out how the service measures security for your files, its data centers and servers
- Find out how they handle potential security breaches
- Look for features that could be helpful e.g. encryption, password protection and real time backups

Service provision

- Look into their customer service, what kinds of services do they provide, how quickly do they respond to emails in case of a problem e.t.c.
- Cloud providers should provide solutions for all O.Ss
- You should not pay for more space than you need

Reliability

• If you are able, ask someone you know about their experience with the service i.e. do the servers ever go down? Does data ever get lost? E.t.c.

Reputation

• Look at the company's reputation with in the industry and the users.

Innovation

• Make sure they are up to date on the latest technologies and they can continue to update their services as technologies change.