

FACTFILE: GCE DIGITAL TECHNOLOGY

UNIT A21: INFORMATION SYSTEMS



Cloud Computing

Learning Outcomes

Students should be able to:

- Explain what is meant by cloud computing.
- Explain the term virtualisation, hosted instances, hosted solutions and clustering.
- Describe how cloud computing provides services such as:-
 - Data storage;
 - Email;
 - Virtualised software;
 - Backup; and
 - Remotely hosted applications.
- Evaluate the use of cloud computing in terms of business benefits and security issues.

Content in Cloud Computing

- What is meant by the term cloud computing?
- Provision of cloud computing services.
- Benefits and drawbacks of cloud computing.
- Questions.

What is meant by cloud computing?

Cloud computing refers to the use of the internet by large computing companies to provide services normally provided by a LAN. Companies supporting cloud computing services will normally do so through the use of server farms (a central computer centre consisting of a large number of linked file servers) to host the services they provide for other organisations who can access these services from any suitable computer which has an internet connection.

Data used is not necessarily stored locally and the users of cloud computing services are rarely aware of the location of the software they are using or the server used to store their data.

Any public cloud like this one may have a series of data centres at different physical locations. Each geographical location could have many servers, computers storage devices and other components used to support the services being provided by the Cloud Service Provider.

Virtual Servers form the foundation of cloud

platforms. The process of **virtualisation** allows 'virtual servers' to run on a physical server platform. Virtualisation software separates the physical infrastructures to create dedicated resources. It makes it possible to run multiple operating systems and applications on the same server at the same time by making servers. Virtualisation manipulates the hardware used to provide cloud computing as a service to the client users.

A **cloud instance** can be thought of as a location of physical memory on a cloud server which has been allocated to a particular client or owner i.e. it is a block of memory which acts as a virtual server for that client and it will have its own allocation of processing power, storage and other components. Each server will serve multiple clients. This makes it possible to allocate additional capacity to clients when their usage spikes and resource demands increase. Each of the elements in an instance definition is dynamic and can therefore be amended or adjusted. Each instance provides a virtual environment which can be used by the client for the processing of their cloud based task or application. For the end user there is no need to give consideration to how many servers or other resources are being applied to their application, their location is immaterial and the dynamic nature of cloud instance computing means resources can be reassigned as needed without the client experiencing any downtime. If the end user wants to access a particular application or service they create an instance in the cloud for the duration of time they are using that application.

While a cloud instance is based upon the dynamic sharing of resources each time a client needs to access a hosted service, with a **hosted solution** any hardware and software made available to a client is reserved for the servicing of that individual client's needs and no one else. That one client pays for all of the resources made available to them regardless of whether they are used or not. In a situation where a client's usage exceeds the capacity allocated to them then additional investment in resources must be made by the client.

Clusters of dedicated hardware will be hosted at each data centre and used to provide specialised services and processes for clients. Cloud computing capitalises on the principle of virtual clusters which are formed when for example a virtual machine, established to meet the demands of a cloud instance configures the available resources on the network to meet the demands of the client.

Provision of cloud computing services

A range of cloud computing service can potentially be made available to clients. Cloud based technology such as that described above can be used to provide the client with the data, software and a virtual platform they need to meet their application needs. In most instances users will require a secure client login in order to gain access to the services they are accessing. Data transfer between cloud service providers and clients will generally be via an encrypted connection.

Some of the services available to clients include:-

Data storage – cloud storage refers to saving data on an off-site storage system provided by a third party. Rather than storing data on your computer's hard drive or an alternative local storage device it is saved to a remote database and connected to via the internet.

Email – web based services such as Yahoo mail or MS Outlook allow users to access their email from the cloud using any browser or hardware platform with access to an internet connection. Emails sent and received via the client's account are stored on the service provider's server rather than being stored on the user's own computer.

Virtualised software – many applications are now available to users via the web. Popular applications such as financial apps and traditional desktop software such as MS Office have moved in part to the web. By doing so users are able to access application hosting and not having to give consideration to the storage space taken up on their own personal devices. Software is accessible without the need to consider installation and updates are immediately made available to the user. Not only can the user access the software from any location but they are also afforded the advantage of being able to share and access their data files from anywhere they have access to an internet connection.

Backup – cloud backup solutions allow clients to store their data on the internet using a storage service provider rather than storing data locally on a physical hard drive or other device. Data can be stored to the cloud on a scheduled basis or cloud syncing can be used to ensure files will automatically be backed up any time changes are made to them. In order to access the cloud backup service either to create a backup or to restore data the client must use the service provider's specific application or a web based interface provided by the service provider.

Remotely hosted applications – These allow clients to access their business applications from anywhere in the world where they have access to technology and an internet connection. The relevant software and data can be stored on a remote server, accessed as an instance from any location using virtual desktops. Remote hosting of applications in this manner supports multiple concurrent access to applications and data by the organisations staff.

Benefits and drawbacks of cloud computing

Cloud computing offers clients with a range of advantages including:-

- Providers can react more responsively to changes in user requirements
- Collaboration using a wide range of devices from a wide range of locations can be supported
- Updates can be readily made available to all users
- Increased security and system reliability as the supplier only needs to maintain one system
- All users are accessing one software system so cross-compatibility issues are no longer a concern.
- Reduced costs as the client does not have to consider the expense of purchasing and configuring hardware and software to help them meet their business needs
- Increased flexibility in work arrangements. Most cloud computing services are provided on demand so even vast changes in demand for

computing resources can be provided for (often at a cost).

- Increased 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.

Some of the major concerns relating to cloud computing include:-

- You trust someone else to look after your data and supporting applications as the service provider takes responsibility for performing all updates, backups, restorations and the management of security.
- Cyber attacks are problematic where large amounts of data are stored by a wide range of users, often on the same cloud system.
- Insider threats can also pose a problem. Employees with access to your cloud data can often go undetected. By gaining access to the virtual machine hosting your data they do not only have access to your organisations information but they could potentially destroy the entire cloud environment hosting your data or application.
- Many users remain concerned over loss of confidentiality of data which can legally be accessed by government surveillance programs.
- Legal liability remains an issue for organisations who rely on cloud based services with concerns over who becomes liable after a data breach!

Questions

1. Explain how the process of virtualisation can be used to support cloud computing. [4]
2. Explain the following terms associated with cloud computing.
 - a. hosted instances [3]
 - b. hosted solutions [3]
 - c. clustering [3]
3. Describe the main advantages and disadvantages of using cloud computing services to a newly established business organisation. [9]

Bibliography

BCS Academy Glossary Working Party, 2013, *BCS Glossary of Computing and ICT*, 13th Edition, Swindon, BCS Learning and Development Ltd

