

Introduction to Cloud Services

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Cloud computing concept is not as new as you might think, and it has actually been around for many years, even before the term “cloud” was used. If you have ever used Hot Mail, Facebook, an online photo sharing, or online gaming program, then you have been a part of the cloud. The cloud service has expanded rapidly in recent years because of the mobile devices, such as smart phones and tablets. These two types of mobile devices do not have sufficient memory, storage space, or powerful CPUs, which is why the demand for cloud services has increased. The cloud provides storage services, as well as the ability to use large software applications, which cannot possibly be installed on the portable device. For example: A mobile user can access a complete Microsoft Office suite of software applications via the Internet using a small portable device with limited resources such as a tablet.

Recently, the CompTIA created a new certification based upon a new “Cloud Essentials” examination. Also, Microsoft has released new certificates directly related to cloud services and technologies. The newest Microsoft operating system, called Windows 8, is designed to support cloud function on a very limited resource device such as a tablet.

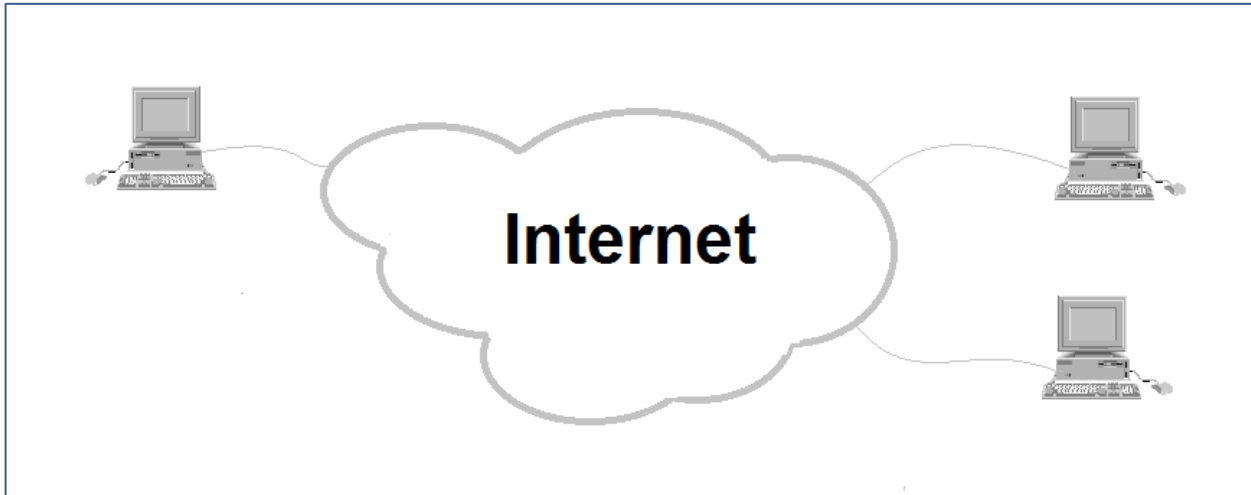
The United States Department of Commerce directed the National Institute of Standards and Technology (NIST) to produce a set of guidelines and standards, as well as definitions relating to cloud technology. You can view all standards as related to cloud technology at the NIST website <http://www.nist.gov/index.html> and also view standards related to many other technologies as well.

Note: Cloud computing terminology is still in its **infancy** and as such, the terminology is still evolving. In learning and working with the Cloud, you will encounter many terms that are coined by private sector companies such as Microsoft, Google and Apple. The terminology encountered on the Internet and in periodicals may vary a great deal. The terminology used in this article is based on the **US Government, National Institute of Standards and Technology (NIST), under the department of Commerce.**

In this article, we will cover the basic terminology and concepts associated with cloud computing which will be found on the Comptia Cloud Essential Certificate. To learn much more in-depth and technical information about the cloud and related technologies, a list of websites will be provided at the end of the article.

Cloud Essentials

Cloud computing is accessing a shared pool of resources such as storage, application software, and specialized services such as instant messaging, email, database support. The term “cloud” is synonymous with the symbol for the Internet symbol used in network drawings.



The Internet is represented as a cloud sketch on network drawings.

The “cloud” in network drawings represents the remote location of the service on some Internet location other than the individual user’s computer. Typically, users install the entire software application such as Microsoft Office, on own their individual computer. After installation, they have complete access and control over the use and configuration of the software application. The user can also store files on their computer as related to the software application. For example, a computer user might have Microsoft Office (Word, Power Point, Excel, etc.) installed on their computer and store all generated data, such as document, on that same computer.

In a cloud computing setting, the user would install a very small software application (app) that allows the user to access the larger software application on the remote cloud service Internet location. The user computer is then referred to as a “**thin client**”. A thin client depends on the remote location software application to do most of the work. Then, the user has the option to store the document on the remote Internet cloud location, or on their own computer.

The cloud service can be provided free of charge, or as a pay service. Free services generally provide fewer services, and have less storage space as compared to pay services. Today, there are many cloud service providers such as Google, Apple, Microsoft, Android Amazon, VMware, IBM, and many more private companies.

Characteristics of Cloud Service

The five characteristics of cloud service have been identified by the **NIST** are:

1. **on-demand service**,
2. **broad network access**,
3. **resource pooling**,
4. **rapid elasticity**, and
5. **measured service**.

These common characteristics are used to identify cloud service, as compared to traditional on-site network systems.

On-demand self-service –The cloud service is readily accessible, and requires no real expertise or onsite technical support personal as in a traditional network model. A network technician is not required to setup the cloud service as is a self-service oriented system.

Broad Network Access – The Cloud, by its very nature, can be accessed from most anywhere through a variety of devices, such as, but not limited to, work stations, laptops, PDAs, cell phones and tablets. Cloud services are accessed by thin-client type of software. Thin client software is a minimal software application, and does not require a hardware device, designed with a large amount of RAM or high speed CPU.

Resource Pooling – The real strength of cloud service is the resource pooling and sharing of resources. Computer resources such as documents, pictures, videos and other types of files can be easily shared with other members of the Cloud service. In addition to sharing resources, the cloud provider typically provides software applications appropriate for the type of cloud membership. For example, word processing, data base, email, digital photo software applications may be provided as a service. The cloud member does not need to install the software application on their individual device but instead, they are able to connect to the host cloud as a thin client. A thin client can be connected to the cloud hosting service, and then use the software application on the remote server.

For example, the word processing application need not be installed on the cloud-member computer or portable device. The actual software application is installed on the cloud hosting server. The cloud member has a relatively very small software application installed on their own personal device which supports communication with the cloud host provider software application. The advantage of the software application being installed on the cloud service server means that the software application will be available now , no matter which device the user decides to utilize. They can run the software application from their desktop, or their tablet, or their cell phone. Another advantage is the fact that the cloud hosting provider is also responsible for updating the software application, and making backup files, and providing the necessary technical support.

When software applications are provided through cloud services, it is often referred to as **virtualization**. The software appears to the user as though it is installed entirely on their PC or portable device, when in reality the software application is installed on the cloud server. The user is utilizing the features of the software application through the thin client, thus the “virtualization” of the software application.

Rapid Elasticity – The cloud services can be rapidly expanded or contracted as needed. For example, when more server disk space is required for the storage of a user’s additional documents or images, the additional space can be added instantly. In a traditional onsite network model, a technician would have to allocate more space or even add additional hardware, such as additional disk drives for storage.

Measured Service – The cloud service can be measured to match pricing of services. For example, the amount of storage space, bandwidth, or number of user accounts can be used to determine the price of the service. The amount of resources consumed by the user(s) can be monitored and reported to the user by the provider, thus determining cost.

Infrastructure or Deployment Models

Cloud infrastructure is basically how users access the network cloud service. There are four major infrastructure or deployment models identified by the NIST for cloud deployment. They are:

1. **private cloud,**
2. **community based cloud,**
3. **public cloud, and**
4. **hybrid cloud.**

Any combination of the first three infrastructure models is considered a hybrid cloud.

The main difference in the cloud infrastructure models is: Who is responsible for maintaining the cloud service, and who may become a member of, or access the cloud structure.

Private Cloud – A private cloud is typically designed for exclusive use by an individual organization or user, such as a private corporation, government organization or an educational organization like a university. A private cloud is operated exclusively for the organization, but the service may be provided by a third party vendor. A private cloud does not require the infrastructure or support to be exclusive to the private party. Only the access to the private cloud is exclusive.

Community based cloud – A community-based cloud is an infrastructure of users who share a common interest or concern. You can think of Facebook, twitter or similar services as a community based cloud. A community based cloud can also be shared by several different organizations that support a common interest, such as a collection of individual schools or businesses that operate under different authorities.

For example, the Department of Defense (DOD) might setup a cloud service to provide, and exchange information exclusively to a group of private defense contractors that are all involved in building a new aircraft for the DOD.

Public cloud – An infrastructure open to the general public. A public cloud may be utilized by individuals, or business organizations as well as educational organizations. The main difference between a private cloud and a public cloud is the fact that the public cloud is typically hosted by a cloud service provider. The cloud service provider determines membership.

Hybrid cloud – A hybrid is simply a combination of two or more of the other cloud infrastructures, private, public and community based.

Service Models

The main purpose of a cloud is to provide services to its clients. The four classifications of service to consumers are:

1. **Software as a Service (SaaS)**,
2. **Platform as a Service (PaaS)**,
3. **Infrastructure as a Service (IaaS)**, and
4. **Anything goes as a Service (XaaS)**.

The services are typically designed to run on minimal computer devices such as smart phones and tablets as well as laptop and desktop computers.

Software as a Service - Software as a Service (SaaS) is designed to provide the use of software applications to a user either through a thin client software application or through a web browser. For example, web-based email can be provided as a cloud service. All that is needed to utilize cloud based web-browser email is a compatible web browser. Another example, is running a software application, such as Microsoft Office applications, from the cloud. Microsoft Office applications are quite large, and many could not be installed on a portable device that has only minimal CPU and RAM and storage space.

By accessing the Office application through cloud software service a thin client can connect to the cloud server that is hosting the Microsoft Office application, and allow the consumer to use it as though it were installed on the user device. This is also an example of how virtualization is achieved. The software application appears to the consumer as though it is installed on their own device. The consumer utilizes the cloud providers' software applications. This is the most common cloud service utilized by most everyday computer users.

Platform as a Service - Platform as a Service (**PaaS**) provides a service that supports programming software. The consumer deploys onto the cloud consumer-created applications using programming languages. In addition to the cloud hosting the consumer programming language, the PaaS cloud can also host libraries of programs and tools used in the creation and distribution of the consumers programming. This is a great way to host everything used by a large group of programmers working on the same project. Everyone in the group is able to have access to the very latest version of all programs and program libraries and tools.

In this model, the consumer does not need to manage the cloud server(s), storage, operating system(s), however they do have control over who has access to the project and its parts. Another example of Platform as a Service is when a data base software application, such as SQL Server, is hosted by a cloud service provider and then used by a consumer. The SQL Server software can be programmed into many different database configurations and is not considered a general consumer software application. SQL Server is a very technically-challenging programmable database application. Platform as a Service is also referred to as **Service Platform** by **some** cloud providers, such as Microsoft.

Infrastructure as a Service - Infrastructure as a Service (**IaaS**) is designed to provide storage and basic networking functions which are utilized by the consumer. The consumer then decides what software and applications they wish to use and do not need to worry about typical network support. The cloud provider will provide all the necessary network support functions required by the consumer. You can think of IaaS as a barebones type of service, which provides the hardware required to operate a cloud, while the consumer is responsible for what will be installed and distributed on the cloud. For example, a cloud provider might provide an IaaS to a game developer. The game developer the installs their game(s) and controls the distribution of the game to users. The game developer writes and distributes the game without the need to manage the cloud infrastructure such as the servers, storage and networking. The game developer would control who can access the games and be responsible for updating the game software.

As you can see, there are five typical cloud characteristics, three types of cloud service, and four deployment models. The cloud classifications can be somewhat fuzzy themselves and at time, somewhat difficult to classify according to the NIST definitions.

Anything goes as a Service (XaaS) - Anything goes as a service (**XaaS**) is not an official NIST service standard, but the term and acronym are used by many providers. This is a prime example of how a term is coined and used by the industry, but in reality is not recognized as a standard by any authority. In time, it could become a defacto term used to describe hybrid cloud services. XaaS is a hybrid of the first three types of services and can be thought of as an “anything you want to do” type of service. The largest cloud service providers will design a cloud service to meet anyone needs, thus the “anything goes XaaS

service. Note: XaaS is also the name of a cloud service provider. To learn more about XaaS visit the following link <http://www.xaas.com/>

Now let's take a look at a few common cloud services available today.

Microsoft Cloud Services - Microsoft offers several versions of cloud services at this time such as, but not limited to, Windows Live, Office 365, Azure, and Intune. Some are free, but most are not. The fees vary in range based upon the desired services and number of users. For example, the cost of the service can be based on the number of users determined by the number of unique email accounts.

Microsoft Windows Live - Microsoft Windows Live is a cloud service provided for free for common PC users. Live provides storage is for user's documents, photos and presentations.

Windows Live



Stay in touch and share your world
Email, photos, movies, video chat, and more



Hotmail
The efficient way to do email
[Sign up for Hotmail](#)



Messenger
Share smiles with video chat
[Download Messenger](#)
[View system requirements](#)

<p>Save files to the cloud Get lots of free online storage on SkyDrive. Use it to save your files or share photos and videos. Get free online storage</p>	<p>Become a photo pro Windows Live Photo Gallery can help you remove red eye, create amazing panoramas, and more. Learn about Photo Gallery</p>	<p>Keep your files in sync Now you can stop emailing files to yourself. Keep docs, photos, and other files in sync across your PCs. Check out Windows Live Mesh</p>	<p>Inbox in your pocket Take your Hotmail inbox, calendar, and contacts with you on your phone. And there's Messenger for mobile too! Learn about Hotmail for mobile</p>
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<p>Recommended topics</p> <ul style="list-style-type: none">Can't sign in? Get help hereHelp stop the hackers—add extra protection to your Hotmail accountSweep unwanted mail out of your inboxView Microsoft Office docs from a mobile phoneMake a movie in just a few minutes using AutoMovie themes	<p>Most popular topics</p> <ul style="list-style-type: none">Hotmail: Navigate a safer inboxMessenger: TipsMessenger: Use Messenger on the webMessenger: Full screen video chatMessenger: Full view in Messenger
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Windows Live Cropped

Office 365

Microsoft Office Live 365 is a fee-based cloud service that provides storage spaces for files and photos, as well as access to Microsoft software such as Word, Excel, OneNote, PowerPoint, Publisher, Access, and email service, calendar sharing, PC to PC calling, video conferencing and more. Most individuals would not use all the features available in Office 365. They would most likely prefer one of the smaller free services. Larger groups of consumers such as educational institutions, small businesses, as well as midsize-to-large enterprises would find the Office 365 service quite useful, especially since Microsoft provides all the support services, thus reducing or eliminating the need for a large network support group of technicians and the purchase of costly software packages. Individual users may also purchase Office 365, but it is not common at this time.

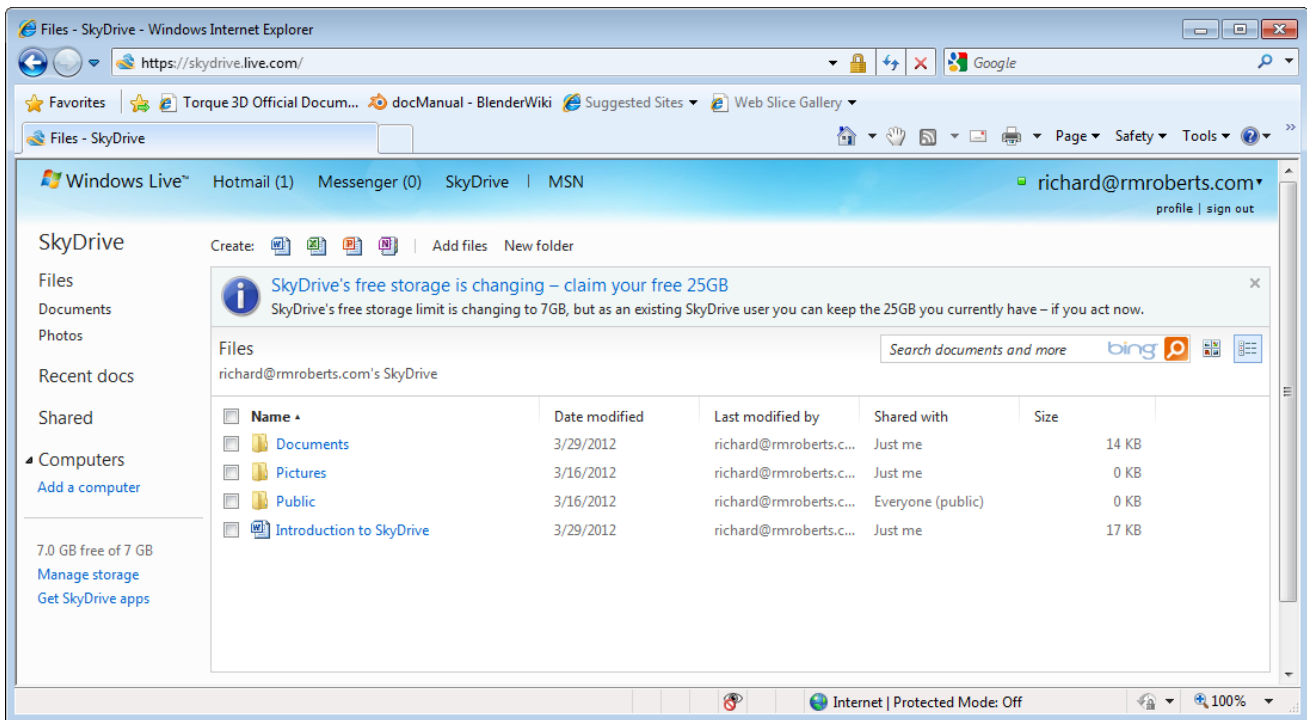
Microsoft Office 365 has several different plans with different combinations of software applications and services. You can select the plan based upon your or your company needs. For example, a corporation user needs would be much different as compared to a home user. The corporation package has all the common software applications as required in the corporate environment such as a company email, voice mail and other server applications. One such optional service is called SharePoint service. Microsoft SharePoint is designed for creating a website that will share information, and documents and support collaboration between employees. This can be a private or public type of website.

Microsoft Intune

Microsoft Intune is a cloud service designed for businesses to manage and secure their business computers. Many small businesses do not have a full time computer or network technician, and simply have a designated computer person who deals with common computer and network problems. If the designated person cannot remedy the problem, they will contact a support provider to come to their business and remedy the problem. Intune provides remote services to business computers, and allows the designated support person to remotely perform many common computer tasks. The designated person can perform many remedies that would normally require a technician. For example, the designated person can manage malware scans and updates for all PCs from one centralized location. They can remotely monitor computers, force computer restarts, manage updates, distribute software, provide remote assistance, and manage the firewall all from one centralized location.

SkyDrive

The most popular cloud service at this time is cloud storage. Cloud storage allows the user to store documents, pictures and more on a remote server and access the storage at anytime, from anywhere using a standard web browser. Typically, all that is required is a user name and password, and the user can access from any type of device such as a desktop computer or portable device such as a tablet or smart phone. One such cloud storage service is Microsoft's SkyDrive. Look at the screen capture below of the SkyDrive cloud storage service.



SkyDrive

Windows Live



Stay in touch and share your world
Email, photos, movies, video chat, and more



Hotmail
The efficient way to do email
[Sign up for Hotmail](#)



Messenger
Share smiles with video chat
[Download Messenger](#)
[View system requirements](#)

Save files to the cloud

Get lots of free online storage on SkyDrive. Use it to save your files or share photos and videos.

[Get free online storage](#)

Become a photo pro

Windows Live Photo Gallery can help you remove red eye, create amazing panoramas, and more.

[Learn about Photo Gallery](#)

Keep your files in sync

Now you can stop emailing files to yourself. Keep docs, photos, and other files in sync across your PCs.

[Check out Windows Live Mesh](#)

Inbox in your pocket

Take your Hotmail inbox, calendar, and contacts with you on your phone. And there's [Messenger for mobile](#) too!

[Learn about Hotmail for mobile](#)

Recommended topics

[Can't sign in? Get help here](#)

[Help stop the hackers—add extra protection to your Hotmail account](#)

[Sweep unwanted mail out of your inbox](#)

[View Microsoft Office docs from a mobile phone](#)

[Make a movie in just a few minutes using AutoMovie themes](#)

Most popular topics

[Hotmail: Navigate a safer inbox](#)

[Messenger: Tips](#)

[Messenger: Use Messenger on the web](#)

[Messenger: Full screen video chat](#)

[Messenger: Full view in Messenger](#)

Windows Live Ad

SkyDrive provides Cloud storage folders for documents, pictures, a public folder for sharing as well as the ability to store documents without a folder or even creating customized folders. Notice that URL address at the top of the browser is <https://skydrive.live.com/> which is a combination of “SkyDrive” and “live.”

SkyDrive is a sub-domain of Windows Live domain. Windows Live provides calendar service, Photo storage, Instant Messaging-IM, instant links to LinkedIn, Facebook, file synchronization, and more. Most other cloud service providers also offer storage such as Google, Drop Box, IBM, and Apple to name a few.

The main differences between different cloud services are the amount of storage provided for free, the bandwidth, automatic backup service of all your data, and any additional cost. For example, what happens when you exceed the amount of free storage space? What happens when you exceed your allocated bandwidth? Bandwidth is not only the upload and download data rates, but also the total amount of data transferred over a given period of time. For example, the free service might be limited to a total bandwidth of 1 GB, which means that you can only upload and download a total of 1 GB of data in one month. If you are (for example) a professional photographer, you may be constantly uploading and downloading digital pictures and digital audio as well. You could rapidly exceed the 1 GB limit. Your operation could be abruptly interrupted or you could be charged for your overage.

There are many different free cloud services you can choose from. You need to carefully check out each service to see what is provided and any other hidden costs. Some cloud storage services you may wish to checkout are listed later in the article. Take a few minutes to visit the links to see how the services are similar and how they differ. Free services are typically provided free, because the service provider usually places vendor advertisements all over the user home pages and typically uses pop ads to generate revenue. After all, nothing is really free.

Microsoft Azure

Microsoft Azure is a cloud service but it is not free. It is designed for corporations, governmental and educational institutions, and similar users. Azure provides a wide variety of services. For example, Azure is designed for customized website support and hosting, selling or distributing software, data storage and distribution, game hosting and distribution, support for mobile devices such as tablets and phones. Azure is not for the average cloud user, but rather for large business purposes.

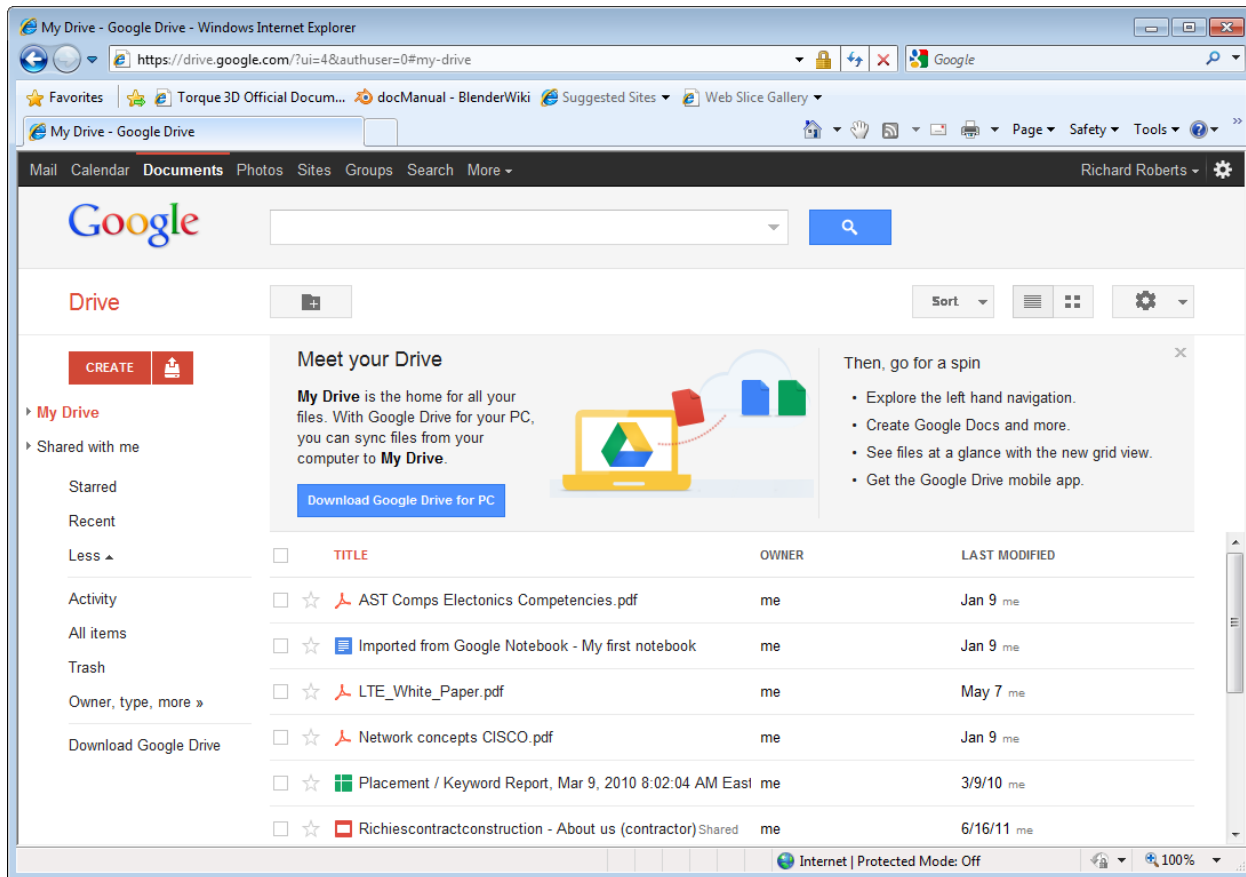
At the time of this writing Microsoft has made Azure available for educators for free for the next six months. Check the following website link to find out more.

<http://www.windowsazure.com/en-us/community/education/program/educators/>

Microsoft wants you to teach Azure to your students. Microsoft also provides free lab activities for Azure to help you learn, as well as curriculum for teaching. I expect Microsoft will provide educational incentives in the future as well.

Google Drive

Another popular cloud service is Google Drive. Look at the screen capture below to see one of the user interfaces.



Google Drive

Google Drive provides cloud storage, as well as the ability to open and modify documents online. The documents can be synchronized with other computers and devices so that the latest version is always available for all devices. You can also enable sharing to specific people of your choice and control their ability to modify the content or not.

As you can see, there are a lot of possibilities and many different cloud service providers. Cloud storage and services will continue to evolve, probably rapidly. As cloud service evolves, a common set of services will be provided to match most client needs. This market is extremely lucrative at this time and we are sure to see efforts by vendors to dominate this market. Changes will be quickly evolving.

To learn more about cloud characteristics and services visit the following websites provided in the links below. This is not a complete list, but it does contain what seems to be the most popular at this time. You should take some time and explorer each.

Essential Website Visit for Certification Purposes

The next two links are essential if you plan to pursue a cloud certification. I suspect all certification exams will contain content based on NIST cloud computing standards as defined by the National Institute of Standards. Visit the NIST webpage PDF article at the following location.

<http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>

To learn more about cloud security standards recommended by the NIST read or download the following PDF.

<http://csrc.nist.gov/publications/drafts/800-146/Draft-NIST-SP800-146.pdf>

You can also conduct an Internet search using the terms “NIST and Gov + cloud.” The NIST Cloud guide of standards will prove to be a valuable resource if you are planning to become Cloud certified technician.

Below is a list of additional web links to various cloud providers and resource. You should take a look at the various possible offerings to get a better understanding of how broad the services which can be provided by cloud. As a technician, you will be asked for advice regarding Cloud services and you should know which services will meet your client’s needs.

iCloud is a cloud storage service provided by Apple. It is similar to SkyDrive.

<http://www.apple.com/icloud/>

Google Drive is an extension of Google Docs and provides Cloud storage services.

<https://drive.google.com/start?authuser=0#home>

DropBox is another cloud storage service <https://www.dropbox.com/>

Ubuntu <https://one.ubuntu.com/>

Google Drive <https://tools.google.com/dlpage/drive>

The following Microsoft website link provides a chart for comparing major cloud services for SkyDrive, Apple, Google and Drop Box.

<http://windows.microsoft.com/en-US/skydrive/compare>

Microsoft Private Cloud information.

<http://www.microsoft.com/en-us/server-cloud/private-cloud/default.aspx>

Microsoft Live free cloud services.

<https://login.live.com/>

Microsoft Azure cloud services (not free).

<http://www.windowsazure.com/en-us/>

Google connect for Microsoft Office

<https://tools.google.com/dlpage/cloudconnect?hl=en>

For details Windows Intune

<http://www.microsoft.com/en-us/download/details.aspx?id=27572>

Microsoft Azure cloud services

<http://www.windowsazure.com/en-us/>

Summary Points

- Cloud computing means accessing a shared pool of resources such as storage, application software as well as specialized services, such as instant messaging, email, database support.
- A thin client is a computer that has a small application (app) installed on it, which allows it to run a remote software application or program at a remote location.
- There are four main classifications of cloud service, SaaS, IaaS, PaaS, and XaaS.
- SaaS - Software as a Service
- IaaS – Infrastructure as a Service.
- PaaS – Platform as a Service.
- XaaS – Anything as a Service
- The five characteristics of cloud service have been identified by the NIST are on-demand service, broad network access, resource pooling, rapid elasticity, and measured service.
- There are four major infrastructure or deployment models private cloud, community based cloud, public cloud and Hybrid cloud.
- The Department of Commerce designated the National Institute of Standards and Technology (NIST) to design a set of standards defining cloud computing.

Review Questions

1. What are the four cloud infrastructure or deployment models?
2. What are the four main cloud service types and their acronyms?
3. Name three cloud services offered by Microsoft?
4. Which Microsoft cloud service is free and intended for common PC users?
5. Which service is designed primarily for the business community and provides cloud services but not intended to provide remote support of a collection of business computers?
6. Which Microsoft cloud service is designed to provide cloud services for remote support of small business collection of computers with services such as malware scans and updates as well as distribute software and provide remote assistance from a centralized location?

Match the following terms and acronyms to the example of definition phrases to questions 7, 8, & 9. Use the letter associated with the acronyms and write the corresponding letter (A B or C) in front of the correct phrase or definition.

A. SaaS - Software as a Service

B. IaaS – Infrastructure as a Service.

C. PaaS – Platform as a Service.

7. ___ Provides software applications such as Word using a web browser or thin client.
8. ___ Provides a cloud for use by a company to support their programming language environment and share their work product with each other.
9. ___ Provides a cloud service to support a game developer game distribution and does not provide software application support.
10. Which cloud deployment model is typically designed for exclusive use by an individual organization or user such as a private corporation?
11. Which cloud deployment model is typically used by the general public?
12. What organization was designated by the Department of Commerce to design a set of standards defining cloud services?

Review Questions Answers

1. What are the four cloud infrastructure or deployment models? **Private cloud, Community base cloud, Public cloud, Hybrid cloud.**
 2. What are the four main cloud service types and their acronyms? **Software as a Service SaaS, Infrastructure as a Service, Platform as a Service PaaS, and Anything as a Service XaaS.**
 3. Name three cloud services offered by Microsoft? **Live, Office 365 and Intune.**
 4. Which Microsoft cloud service is free and intended for common PC users? **Live**
 5. Which service is designed primarily for the business community and provides cloud services but not intended to provide remote support of a collection of business computers? **Office 365**
 6. Which Microsoft cloud service is designed to provide cloud services for remote support of small business collection of computers with services such as malware scans and updates as well as distribute software and provide remote assistance from a centralized location? **Intune**
- Match the following terms and acronyms to the example of definition phrases. Use the letter associated with the acronyms and write the corresponding letter (A B or C) in front of the correct phrase or definition.
- A.** SaaS - Software as a Service
 - B.** IaaS – Infrastructure as a Service.
 - C.** PaaS – Platform as a Service.
7. **A** Provide software applications such as Word using a web browser or thin client.
 8. **C** Provide a cloud for use by a company to support their programming language environment and share their work product with each other.
 9. **B** Provide a cloud service to support a game developer game distribution and does not provide software application support,.
 10. Which cloud deployment model is typically designed for exclusive use by an individual organization or user such as a private corporation? **Private cloud**
 11. Which cloud deployment model is typically used by the general public? **Public cloud**
 12. What organization was designated by the Department of Commerce to design a set of standards defining cloud services? **National Institute of Standards and Technology (NIST)**