UNIT-II

5-Marks Question

1. **Explain different types of clients that are configured and communicate with the cloud?**

Thin:

1. Thin clients are client computers that have no hard drives, no DVD-ROM drives.
2. It simply display what's on the server.
3. If a client only needs to access cloud-based services or is accessing a virtualized server, then thin clients are a great option.
4. They are less expensive than thick clients, are much less expensive to maintain, and use less energy.
5. There's also a high level of security, because no data is stored on the thin client.
6. All the data resides in your datacenter or on the cloud, so the risk of a physical breach is small.

Thick:

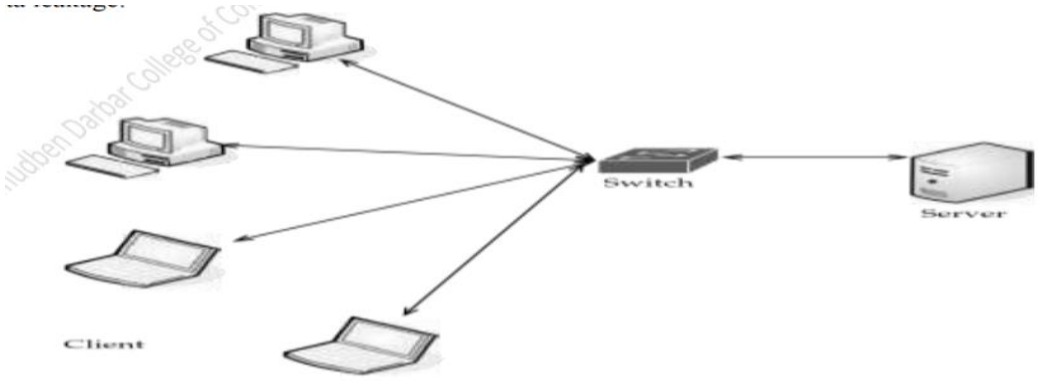
1. Thick clients are the clients normal PC.
2. You can be used to connect to applications in the cloud.
3. Already some applications have installed in end users' machines.
4. While you can offload some of your applications to the cloud or some mission-critical applications that simply need to stay in-house.
5. These machines can be connected to a virtualized server.
6. Thick clients are good choices if users need to maintain files on their own machines or run programs that don not exist on the cloud.
7. Security-wise, thick clients are more risk to attack than thins.
8. Since data is stored on the machine's hard drive, if the machine is stolen then the data could be compromised.

26. Difference between Thin client and Thick clients?

	Thin client	**Thick client**
Definition	Software that relies on a remote server such as a cloud platform for its feature.	Software that runs at least some features directly on your device.
Offline	Functions mostly do not work.	Functions mostly work.
Local resources	Generally consumes few local resources such as disk, computing power and memory.	Generally consumes more local power.
Network latency	Functionality may depend on a fast network connection.	Functionality may work without a connection or with a slow connection.
Data	Data is typically stored on servers.	Data may be stored locally.

2. With diagram explain Data Leakage?

1 The biggest benefit is the centralization of data.
2 Organizations have a problem to protect their resource.
3 Because of data being stored in numerous places, like laptops and the desktop.
4 Thick clients are suitable to download files and maintain them on the hard drive, and there are plenty of laptops out there with nonencrypted files.-Data Leakage
5 Using thin clients creates a better chance for centralized data storage. As such, there's less chance for data leakage.
6 Centralization also provides the opportunity for better monitoring. That data is in one place makes it easier to check in on your data and see that everything is okay.



Data store on local server with clients that store data has more opportunity for data leakage than clients that maintain no permanent storage.

7 What is Cloud Forensics? Explain Offloading Work and Logging?

Offloading Work (Dumping data)

1 It is Another security benefit isn't so much a technology
2 It is transfer of resources computational task to a separate processor or platform or to cloud.
3 Offloading to a coprocessor can be used to accelerate applications including; image rendering and mathematical calculations.
4 Offloading computing to an external platform over a network can provide computing power and overcome hardware limitations of a device, such as limited computational power, storage, and energy.
5 It's up to the cloud provider to provide adequate security.
6 The fact of the matter is that your cloud provider might offer more security features than you had before.
7 The fact that so many clients are paying allows cloud providers to have bigger security, simply because of the economy of scale involved.

Logging:

1. It is also called Logging as a service (LaaS).
2. logging is the process of collecting and storing data over a period of time in order to analyze specific trends or record the data-based events/actions of a system, network or IT environment.
3. It is collecting any type of log files coming from any given source or location such as servers, applications, devices etc.
4. logging enables the recording of activity performed on one or more data/file objects or sets.

5. data logging records events/actions, such as the data's size, most recent modification and username/name of the individual that modified the data.
6. logging also facilitates the storage and collection of computer or device information.
7. logging also allows information security (IS) and auditing staff to analyze system access information and assess audit trails to trace viruses and identify suspicious activities.
8. In the cloud, you have to contend with large volumes of log data. Your log data may be extracomplex because different cloud providers or services use different formats. And your logs may be spread across a distributed architecture.

How can we deal with these challenges?

1. Logging is also improved. It's something that, in-house, usually gets the short end of the stick. But in the virtualized world of cloud computing, providers can add as much memory as they need to extend logging.

Forensics- scientific tests or techniques used in connection with the detection of crime.

1. If there is a breach, the cloud provider can respond to the incident with less downtime than if you had to investigate the breach locally.
2. It is easy to build a forensic server online, and it costs almost nothing until it comes into use.
3. Cloud Forensics is actually an application within Digital Forensics which oversees the crime committed over the cloud and investigates on it.
4. If there is a problem, the virtual machine can be cloned for easy offline analysis.
5. Further, many companies do not have a dedicated in-house incident response team. Development
    1. Even more good news is that security vendors are not in the dark about this whole cloud thing.
    2. They are actively developing products that can apply to virtual machines and the cloud.
    3. Security vendors also have a unique opportunity in the cloud.

9. What is CloudAudit? Explain Compliance and Auditing in cloud ?

Auditing

It is the responsibility of the auditor to report on all the risks an organization may face. Following are some points that an auditor has to consider while performing an audit of the organization that uses cloud for storage and processing of data:-

1. Auditor have to verify that only authorized individuals have access to cloud computing resources based on their roles and responsibilities.
2. Auditor have to check about the type and sensitivity of data stored in the cloud. As loss, leakage or unavailability of data can cause loss to business.
3. Auditor have to check the risk associated with the change of technology. How the new technology is adopted and what are the benefits users
4. Auditor have to verify the sufficiency and appropriateness of policies, practices and procedures for the protection of data stored in the cloud.

5. Auditor have to review the terms of Service level Agreement (SLA) for the protection of data stored on the cloud.
6. Auditor have to assure that confidential and sensitive data should be encrypted in the cloud.
7. Auditor have to go through the access logs and assure the protection of access logs from inadvertent deletion or unauthorized access.
8. Auditor have to assure that if there is any lack of policy and procedures for appropriate handling of security and privacy incidents.
9. Auditor have to assure that password settings are strong at cloud and according to the organizational policies.
    1. There is the headache of securing your own local network.
    2. But when you send your data to the cloud, a whole new set of issues arise.
    3. This is largely because your data is being stored on someone else's equipment.
    4. The goal of CloudAudit is to provide cloud service providers with a way to make their performance and security data readily available for potential customers.

    Compliance-Agreement /standards:

    1. Compliance adds another level of headache.
    2. The term 'cloud compliance' can relate to many different industry standards and regulations that cloud customers need to comply with.
    3. For example, in the healthcare industry, a set of laws called HIPAA make strict guidelines and security protocols mandatory for certain kinds of patient health data.
    4. Another example is new financial privacy regulations that have stemmed from changes in the finance world over the last couple of decades.
    5. Cloud customer will figure out whether their cloud vendor services match the compliance that they need.
    6. In assessing cloud security, experts suggest that cloud customers ask certain kinds of questions, such as -- where is the data going to be stored? And who will be able to access it?
    7. Cloud compliance will remain an issue as engineers and designers work on how to provide the most secure and best options for customers.

Compliance could be managed by a few tasks:

1 Identify users and access privileges
2 Identify sensitive data
3 Identify where it's located
4 Identify how it is encrypted
5 Document this for auditors and regulators.

10. With diagram explain key management in cloud technology?

Key Management:

1. Key management refers to management of cryptographic keys in a cryptosystem.
2. A key management service is a software-only approach that allows the client to create and manage the encryption keys used to protect sensitive data held in the cloud. Encryption keys reside within the cloud provider's infrastructure and are accessible only by the client.
3. With your data stored off-site, there's certainly opportunity for your data to be compromised.
4. Your applications, compute cycles, and storage are not under your direct control.
5. So, while cloud vendors aspire to keep your data safe, you can never really be 100 percent sure that it's not at risk.
6. There's no guarantee that it will be destroyed.
7. This is accomplished through client and server certificates that let you know you are connecting securely to your cloud assets.
8. Remote services must also be cryptographically protected. You use an authorization infrastructure, like Kerberos, to ensure that you are properly authenticated.

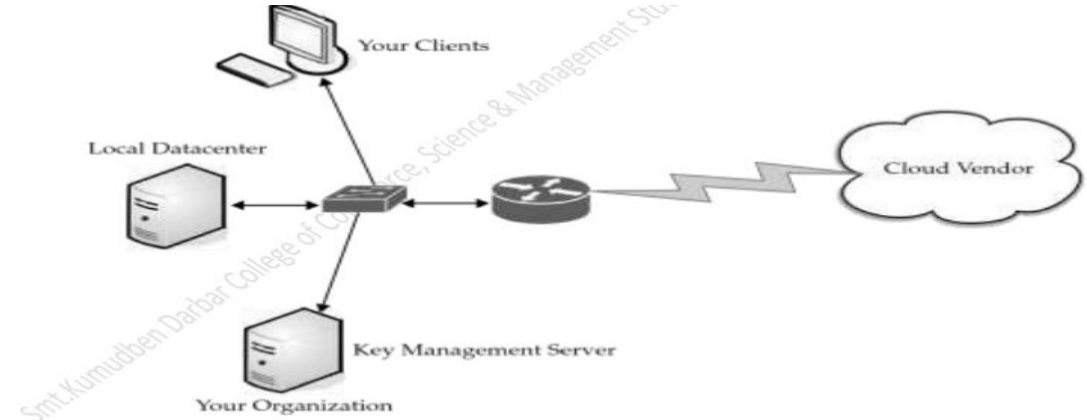


FIGURE 5-1 Cloud computing key management diagram

9. With cloud storage, be sure to protect it cryptographically as well.
10. This includes encrypting the data you store and ensuring that data is set up to be destroyed when the storage key is destroyed.
11. This process will make your data more secure, but it also requires a lot of keys. Consider the network diagram in Figure 5-1.

Notice in fig a key management server, which is critical to have to keep track of all your keys. Keys on the server include

1)Transport keys
2)Authentication keys
3)Authorization tokens
4)File encryption keys
5)Hardware storage keys
6)Revocation keys
7) Certificates.

11. Write down the advantages and disadvantages of Basic Public Internet?

The following are the advantages of Basic Public Internet:

1. There's a large audience. Anyone with Internet access can use this solution.
2. It's highly fault tolerant (accepting).
3. Many provider options are available.
4. Secure Sockets Layer (SSL)–based, Hypertext Transport Protocol Over Secure Sockets Layer (HTTPS), encrypted access provides confidentiality.
5. It's cost-effective.

The following are the disadvantages of Basic Public Internet:

1. Lack of end-to-end quality of service (QoS), thus making end-to-end service-level agreements (SLAs) difficult to reach.
2. Poor response over high-latency connections.
3. Downtime that might be out of your control (cable cuts, problems at the ISP, and so forth).

12. Explain Accelerated Internet and Optimized Internet Overlay. Give some providers name?

<u>The Accelerated Internet</u>

1. Accelerated Internet Access is a service that uses various software techniques to speed up the delivery of web pages to your web browser.
2. Accelerated internet. Faster internet through combining multiple internet connections.
3. It features on top of your Internet connection can benefit both the service provider and the client.
4. Cloud improvement can increase by 20 percent to 50 percent by offloading network-related functions from the server.
5. This method is mostly oriented toward the cloud service provider, but in the end it benefits the end user.
6. At the cloud, this method of acceleration requires the installation of a server-side appliance.

At the end user, it normally requires the installation of a downloadable client. Some providers offering this service include

1)AT&T Hosting
2)Citrix NetScaler
3)F5's WebAccelerator.

<u>Optimized Internet Overlay</u>

1. An optimized Internet overlay approach allows customers to access the cloud via the public Internet.
2. But enhancement occurs on the provider's cloud.
3. Enhancements at these points of presence (POP) include
    1) Optimized real-time routing. This helps avoid slowdowns.
    2) protocols and payload can be optimized and re-encrypted.
    3) Better scalability, fault tolerance, and response time, usually in excess of 80 percent.

Disadvantages of this method include

1) It is costlier than public Internet connectivity, sometimes as much as four times as much. Providers such as Google, Youtube, etc.

13. What is OpenID? Explain cloud identity and cloud integration?

Open ID is an unified user identification method released as an open standard that essentially acts as a single user identification system that can be used across multiple websites.

Cloud Identity:

1) No matter where an application runs—in-house or on the cloud—it needs to know about its users.
2) To accomplish this, the application asks for a digital identity—a set of bytes—to describe the user.
3) Based on this information, the application can determine who the user is and what he or she is allowed to do.
4) Clouds, however, have to use their own identity services.
5) If you sign on to Amazon cloud services, you have to sign on using an Amazon-defined identity.
6) Google's App Engine requires a Google account, and Windows uses Windows Live ID for use with Microsoft's cloud applications.
7) OpenID is an open, decentralized, single signon standard that allows users to log in to many services using the same digital identity.
8) An OpenID registration is shown in Figure 5-2. OpenID authentication is used by many organizations, including:

1) • Google
2) • IBM
3) • Microsoft
4) • Yahoo!

FIGURE 5-2 OpenID is a means to keep login information consistent across several sites.

Cloud integration:

1. Cloud integration is a system of tools and technologies that connects various applications, systems, repositories, and IT environments for the real-time exchange of data and processes.
2. Once combined, the data and integrated cloud services can then be accessed by multiple devices over a network or via the internet.
3. Cloud integration is the act of combining different cloud-based systems into an integral whole.
4. The term may also refer to joining cloud-based systems with on-premises(buildings) systems.
5. The ultimate goal of cloud integration is to connect the disparate elements of various cloud and local resources into a single.
6. For example, Amazon's Simple Queue Service (SQS) provides a way for applications to exchange messages via queues in the cloud.- Amazon SQS provides a queued cloud platform for message creation, transport and broadcasting
7. Another example of cloud-based integration is BizTalk Services.
    1. Instead of using queuing, BizTalk Services utilizes a relay service in the cloud, allowing applications to communicate through firewalls.

14. Define Cloud search? Explain cloud payment and cloud mapping in cloud technology?

Cloud search the ability to embed search options in a web site is certainly nothing new, but it is a rich feature that you might want to employ in your own web or application development. Microsoft's Live Search allows on-site and cloud applications to submit searches and then get the results back.

Cloud payment:

1. Another cloud service that you might want to plan for and configure your hardware appropriately for is payments.
2. Depending on your organization, you may or may not want to accept online payments from customers.
3. Luckily, there is no lack of ways to get paid online.You can simply sign up with a service to accept credit cards, or you can go the route of PayPal.
4. With an online payment service, customers can send money directly to your organization.

Cloud mapping:

1. Maps are becoming more and more popular in web applications.
2. For example, hotel and restaurant web sites show their locations on their web sites and allow visitors to enter their addresses to get customized directions.
3. But the guy who developed the web site likely didn't have the time or money (not to mention the interest) to make his own mapping database.
4. Enough organizations want this functionality, however, so it is offered as a cloud application.
5. Such services as Google Maps and Microsoft's Virtual Earth provide this cloud-based function, allowing developers to embed maps in web pages.
6. These services are really just additions to existing web sites.

15. Define cloud platforms. explain Web Hosting Service a) Amazon Elastic Compute Cloud b) Mosso.

A Cloud platform is how a cloud computing environment is delivered to you.

Web Hosting Service:

1. Web hosting service that will allow to store data and applications. This is what we think of when the term "cloud provider" is used. This is the organization that will host your data.
2. Some web hosting services include Amazon Elastic Compute Cloud and Mosso.

Amazon Elastic Compute Cloud:

1. Amazon Elastic Compute Cloud (http://aws.amazon.com/ec2) is a web service that provides resizable compute capacity in the cloud.
2. Amazon EC2's web service interface allows you to obtain and configure capacity with minimal friction(tension).
3. It provides complete control of your computing resources and lets you run on Amazon's computing environment.
4. Amazon EC2 quickly scale capacity, both up and down, as a client's computing requirements change.
5. Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use.

Mosso:

1. Mosso is the home of The Hosting Cloud and CloudFS, providing enterprise-grade hosting and storage services.
2. Mosso provides an easily managed interface so that developers, designers, and IT managers can deploy reliable web applications quickly and easily
3. It is high-performance cloud-based storage service.
4. Mosso offering: Cloud Sites (put sites on cloud), Cloud Files(unlimited storage), cloud Servers(deploy hundreds of cloud server).

16. With example explain choices existing in cloud web applications? Hint: example Google

Web Applications:

1. If you are going to use applications on the cloud, there are many to choose from.
2. In this section we'll talk about the choices you have in existing cloud applications.

1. Your Choice:
    1. You have tons of options when it comes to finding online applications.
    2. Your provider may have a stable of premade applications that you can use.
    3. It may be that someone else has already created the application and it is simply a matter of using what they have created.
    4. For example, Force.com allows you and others to create your own apps and then make them available for others to use.
    5. If you do not see an application that you want, ask your service provider—they may have it offline somewhere—or they can point you to it.
2. Sample Applications:
    1. Different companies offer different things, but for the sake of understanding the market, let's take a closer look at cloud giant Google and their offerings.
    2. Following this link (http://www.google .com/apps/intl/en/business/index.html) will take you to their apps.
    3. More than 100,000 small businesses and hundreds of universities now use the service.
    4. Google also offers a premium service called Google Apps Premier Edition.
    5. Google Apps Premier Edition has the following unique features: Per-user storage of 10GBs, APIs for business integration Uptime of 99.9 percent ,Support for critical issues 24/7,Advertising optional ,Low fee, Google Docs and Spreadsheets
    6. Google Apps, launched as a free service in August 2006, is a suite of applications that includes • Gmail webmail services
    7. Google Calendar shared calendaring
    8. Google Talk instant messaging and Voice Over IP
    9. Start Page for creating a customizable home page on a specific domain

17. Define cloud web API? Explain Google Data APIs and GoGrid API

<u>Web APIs</u>

1. You are likely to use APIs when building your apps.
2. There are a number of different APIs out there, and which one you use will depend on your programmer's skills and which company you use for cloud services.
3. Different cloud providers use different APIs.

What Are APIs?

1. An application programming interface (API) is a set of programming instructions and standards for accessing a web-based program.
2. Software companies release their APIs to the public so that other software developers can design products that are powered by its service.
3. For example, Amazon released its own API so that web site developers could more easily access information maintained at the Amazon web site.
4. By using Amazon's API, a third-party web site can directly link to products on the Amazon site.
5. APIs allow one program to speak with another. They are not user interfaces.

Google Data APIs

1. The Google Data APIs provide a simple standard protocol for reading and writing data on the Web.
2. They encompass a broad range of business functions that can be used to link your applications within and outside of the cloud.
3. The Google Data APIs include: Blogger Data API, Google Book Search Data API, Google Calendar Data API

GoGrid:

1. GoGrid's API is a web service that allows developers to control their interaction with GoGrid's cloud hosting infrastructure.

3. The GoGrid API provides two-way communication for controlling GoGrid's control panel functionality. Typical uses for the API include
    1) Auto-scaling network servers
    2) Listing assigned public and private IP addresses
    3) Deleting servers
    4) Listing billing details

18. Discuss different cloud web browsers?

Web Browsers

1. To connect to the cloud, users will utilize a web browser.
2. Browsers tend to be mostly the same, but with some sensitive functional differences.
3. Internet Explorer enjoys the highest market share of browser usage—69.77 percent.
4. Internet Explorer is included with Windows operating system.
5. Mozilla's Firefox accounts for 20.78 percent, Apple's Safari represents 7.13 percent, while Google Chrome accounts for less than 1 percent of the market.

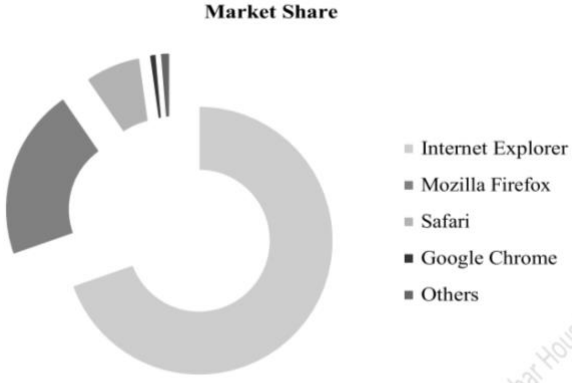


FIGURE 6-1 Microsoft Internet Explorer represented almost 70 percent of the web browser market at the end of 2008.

Internet Explorer:

Windows Internet Explorer 8 for Windows Vista, XP, and Windows 7 is the latest version of the popular web browser.

IE 8 Features:

1. Internet Explorer 8 delivered a new look and enhanced capabilities that made everyday tasks— such as searching, browsing multiple sites, and printing—simple and fast.

2. Microsoft engineered Internet Explorer 8 for compatibility with existing web sites by most important standards for web site development.

Firefox:

2. In June 2008 Mozilla released Firefox 3, free, open-source web browser.
3. Firefox 3 is the three years of efforts from thousands of developers, security experts, localization and support communities, and testers from around the globe.
4. Available in approximately 50 languages

User Experience:

1. The enhancements to Firefox 3 include the new Firefox 3 smart location bar, affectionately known as the "Awesome Bar."
2. The Firefox 3 has browsing history, bookmarks, and tags, where they can be easily searched and organized.

Firefox Performance:

1. Firefox 3 uses less memory while it is running and its redesigned page rendering and layout engine means that users see web pages two to three times faster than with Firefox 2.

2. Security:
   a. The new malware and phishing protection helps protect from viruses, worms, trojans, and spyware to keep people safe on the Web.
   b. Firefox 3's one-click site ID information allows users to verify that a site is what it claims to be.

3. Customization:

1. Firefox 3 lets users customize their browser with more than 5,000 add-ons.
2. Firefox add-ons allow users to manage tasks like uploading digital photos, seeing the weather forecasts, and listening to music.

Safari:

1. Apple claims that Safari 3.1 is the world's fastest web browser for Mac and Windows PCs, loading web pages 1.9 times faster than Internet Explorer 7 and 1.7 times faster than Firefox 2.
2. Safari also runs JavaScript up to six times faster than other browsers.
3. Safari 3.1 is available as a free download at www.apple.com/safari for both Mac OS X and Windows.

Safari Performance:

1. Safari features a drag-and-drop bookmarks, easy-to organize tabs.
2. Safari 3.1 is the first browser to support the new video and audio tags in HTML 5 and the first to support CSS Animations.

Chrome:

1. Chrome is Google's open-source browser.
2. Google Chrome was built for today's Web and for the applications of tomorrow.
3. Google Chrome has a simple user interface with a hi-tech core to enable the modern web.

Chrome Features:

1) A combined search and address bar quickly takes users where they want to go.
2) When users open a new tab it shows most-visited sites, recent searches, and bookmarks, making it easier to navigate the Web.

Open Source:

1. Google Chrome was built upon other open source projects that are making significant contributions to browser technology.
2. Google Chrome is being released as an open-source project under the name Chromium.
3. Chrome Cloud:
1. Chrome being a great tool for cloud computing.
2. It is believed that Chrome will allow desktop and web applications to merge, putting everything into the cloud so that you won't even have to think about both terms.
3. Chrome is an application virtual machine for both on and offline web applications.
4. Google Chrome can be downloaded at www.google.com/chrome.

19. Discuss Storage as a Service give some examples of specialized cloud providers

1. Cloud storage involves exactly what the name suggests—storing your data with a cloud service provider rather than on a local system.
2. Then cloud services, access the data stored on the cloud via an Internet link.

Storage as a Service:

1. The term Storage as a Service means that a third-party provider rents space on their storage to end users who does not have a budget to pay.
2. Also, when technical personnel are not available or have inadequate knowledge to implement and maintain that storage infrastructure.
3. Storage service providers are popular for backup, duplication, and disaster recovery among small and medium-sized businesses.
4. The biggest advantage to SaaS is cost savings.
5. Storage is rented from the provider using a cost-per-gigabyte-stored or cost-per-datatransferred model.
6. The end user does not have to pay for infrastructure; they simply pay for how much they transfer.

Providers:

There are hundreds of cloud storage providers on the Web, some examples of specialized cloud providers:

1. Google Docs allows users to upload documents, spreadsheets, and presentations to Google's data servers.
2. Web email providers like Gmail, Hotmail, and Yahoo! Mail store email messages on their own servers. Users can access their email from computers and other devices connected to the Internet.
3. Flickr and Picasa host millions of digital photographs. Users can create their own online photo albums.
4. YouTube hosts millions of user-uploaded video files.
5. GoDaddy store files and data for many client web sites.

1. Facebook and MySpace are social networking sites and allow members to post pictures and other content.
2. Many of these services are provided for free, but others charge you per stored gigabyte and by how much information is transferred to and from the cloud.

20. Write the advantages of cloud storage?

Advantages:

1. with cloud storage, data resides on the Web, located across storage systems rather than at a hosting site.
2. Cloud storage providers balance server loads and move data among various datacenters, ensuring that information is stored close—and thereby available quickly—to where it is used.
3. It allows to protect data in case there is a disaster.
4. Locally storing of critical information as backups does not help when sudden fire to organization, so Storing data on the cloud is advantageous and good.
5. Amazon S3 is the best-known storage solution, but other vendors might be better for large enterprises.

21. What is GDrive? Explain Amazon Simple Storage Service and Google Bigtable Datastore?

Amazon ,Google is ready to launch its own cloud storage solution called GDrive.

Amazon Simple Storage Service (S3):

1. The best-known cloud storage service is Amazon's Simple Storage Service (S3).
2. Amazon S3 is designed to make web-scale computing easier for developers.
3. Amazon S3 provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the Web.
4. Amazon S3 functionality: Write, read, and delete objects containing from 1 byte to 5 gigabytes of data each.

Google Bigtable Datastore:

1. Google Bigtable is database capable of handling numerous users on on-demand basis.
2. Bigtable was developed with very high speed, flexibility, and extremely high scalability in mind.
3. A Bigtable database can be petabytes (one thousand million bytes 1015) in size and span thousands of distributed servers.
4. Bigtable is available to developers as part of the Google App Engine, their cloud computing platform.

22. Discuss Cloud Storage Providers a) MobileMe b) Live Mesh c) Nirvanix

a) MobileMe:

1. MobileMe is Apple's solution that delivers push email, push contacts, and push calendars from the MobileMe service in the cloud.
2. Used in applications on iPhone, iPod touch, Macs, and PCs.
3. MobileMe also provides a suite of ad-free web applications that deliver a desktop like experience through any modern browser.

4. MobileMe applications (www.me.com) include Mail, Contacts, and Calendar, as well as Gallery for viewing and sharing photos and iDisk for storing and exchanging documents online.

b) Live Mesh:

1. Live Mesh is Microsoft's "software-plus-services" platform.
2. Live Mesh has the following components: The Live Mesh software, called Mesh Operating Environment (MOE), is available for Windows XP, Windows Vista, Windows Mobile, Mac OS X.

c) Nirvanix:

1. Nirvanix uses custom-developed software and file system technologies running on Intel storage servers at six locations on both coasts of the United States.
2. Benefits of Nirvanix CloudNAS cloud network attached storage (CloudNAS) include
3. Cost savings of 80–90 percent over managing traditional storage solutions
4. Encrypted offsite storage that integrates into existing archive and backup processes
5. Built-in data disaster recovery and automated data replication

23. Discuss about a) Virtualization b) Open Hypervisor Standards c) Community Source d) Open Virtualization Format

a) **Virtualization:**

1. Whenever something new happens in the world of computing, competitors to have their implementation be the standard.
2. Virtualization is somewhat different, and major players worked together to develop a standard.

In a virtualized environment, applications run on a server and are displayed on the client. The server can be local or on the other side of the cloud.

VMware, Cisco, Computer Associates International, Dell, HP, IBM, Intel, Novell, QLogic, and Red Hat all worked together to advance open virtualization standards.

b) **Open Hypervisor Standards:**

Hypervisors are the primary component of virtual infrastructure, an open-standard hypervisor framework can benefit customers able to exchange and make use of information.

c) **Community Source:**

1. The Community Source program provides industry partners with an opportunity to access VMware Server source code under a royalty-free license.
2. Partners can contribute shared code or create binary modules and make an integrated virtualization solution.
3. The idea is to combine the best of both the traditional commercial and open-source development models.

4. For customers, the VMware Community Source program help to get integrated VMware virtual infrastructure products.

d) **Open Virtualization Format (OVF):**

OVF describes how virtual appliances can be packaged in a vendor neutral format to be run on any hypervisor. It is standard for packaging and distribution format for virtual appliances.