

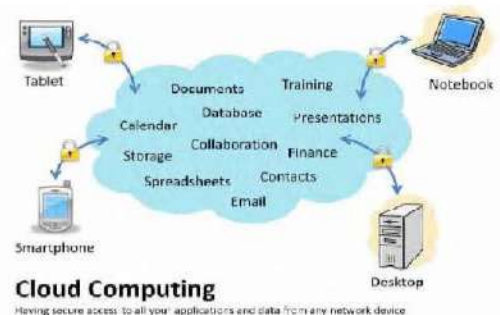
8. EMERGING TECHNOLOGIES

Q.No.1. What is Grid Computing? (A)

1. The idea of Grid computing is to make use of non-utilized or underutilized computing resources or power by the needy organizations, and thereby the Return On Investment (ROI) on computing investments can be increased.
2. Grid computing is a network of computing or processor machines managed with a kind of software such as middleware, in order to access and use the resources remotely. The managing activity of grid resources through the middleware is called Grid Services.
3. Grid Services provide access control, security, access to data including digital libraries and databases, and access to large-scale interactive and long-term storage facilities.
4. Grid Computing is more popular due to the following reasons:
 - a) It has the ability to make use of unused computing power, and thus, it is a cost-effective solution (reducing investments, only recurring costs).
 - b) This enables heterogeneous resources of computers to work cooperatively and collaboratively to solve a scientific problem.
5. Grid computing requires the use of software that can divide and carve out pieces of a program as one large system image to several thousand computers.
6. *One concern about grid is that if one piece of the software on a node fails, other pieces of the software on other nodes may fail.*

Q.No.2. Explain Cloud Computing in detail. (PM)

1. Cloud computing is nothing but use of computing resources as a service through networks, typically the Internet.
2. A cloud is a collection of servers, applications, databases, documents, agreements, spreadsheets, storage capacity etc which allows organizations to share these resources from anywhere.
3. With Cloud Computing, users can access database resources via the Internet from anywhere without worrying about any maintenance or management of actual resources.
4. Databases in cloud may be highly dynamic and scalable.
5. The best example of cloud computing is Google Apps where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet.
6. *Cloud computing is both, a combination of software and hardware based computing resources delivered as a networked service.*
7. Cloud computing provides the facility to access shared resources and common infrastructure offering services on demand over the internet.
8. The location of physical resources and devices being accessed are typically not known to the end user.
9. It also provides facilities for users to develop, deploy and manage their applications 'on the cloud', which entails virtualization of resources that maintains and manages itself.



10. With cloud computing, companies can scale up to massive capacities in an instant without having to invest in new infrastructure, train new personnel or license new software.
11. Cloud computing is of particular benefit to small and medium-sized business systems.

Q.No.3. What are the Pertinent similarities & difference between Cloud Computing and Grid computing? (OR) what are the significant differences between Cloud Computing & Grid computing. (OR) cloud vs Grid computing (B) (PM, N15 RTP, N15 MTP2, M17 – 4M)

1. Grid and Cloud are two terms used in computing to refer to two types of resource sharing techniques where multiple computing devices and usually the Internet are involved.
2. Cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive and it provides on demand services over the Internet.
3. Grid computing is a form of distributed computing where a virtual computing system is compiled by using many loosely connected computing devices to perform a large computing task.

PERTINENT SIMILARITIES:

1. **Scalability:** Cloud computing and grid computing both are scalable. Scalability is accomplished through load balancing of application instances running separately on a variety of operating systems and connected through Web services.
2. **Multitenancy and multitasking:** Both computing types involve multitenancy and multitasking, meaning that many customers can perform different tasks, accessing a single or multiple application instances.
3. **Reduced cost:** Sharing of resources among large pool of users help to reduce infrastructure costs.
4. **High uptime availability:** Service level agreement (SLA) ensures that high uptime availability in the terms of 99%.

PERTINENT DIFFERENCES:

- 1) **Data storage:** While the storage computing in the grid is well suited for data-intensive storage, it is not economically suited for storing objects as small as 1 byte. While in cloud computing, we can store an object as low as 1 byte and as large as 5 GB or even several terabytes.
- 2) **Computation:** A computational grid focuses on computationally intensive operations, while cloud computing offers two types of instances: standard and high process oriented CPUs.

Q.No.4. Discuss the major goals of Cloud computing. (PM, N14-6M, N14 RTP, M16 MTP1) (A) (OR)

Discuss some of the pertinent objectives in order to achieve the goals of cloud computing?

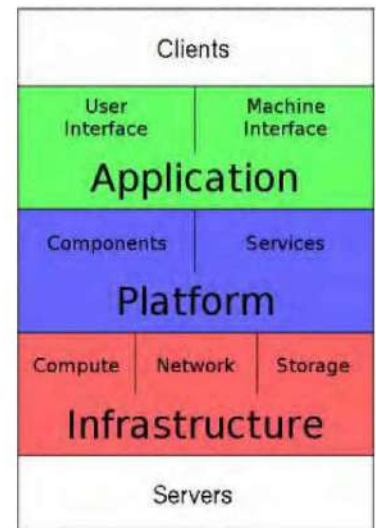
The key goals of a cloud computing are as follows:

- a) To create a highly efficient IT eco system, where resources are pooled together
- b) Costs are aligned with what resources are actually used, i.e. pay only for resources what actually used.
- c) Access services and data from anywhere at any time
- d) Scale the IT system quickly, easily and cost-effectively based on the business needs
- e) Consolidate IT infrastructure into a more integrated and manageable environment
- f) Reduce costs related to IT energy/power consumption
- g) Improve "Anywhere Access" (AA) for ever increasing users
- h) Enable rapidly provision resources as needed.

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Q.No.5. Write about Cloud computing architecture (CCA)? (or) Describe Frontend and Backend architectures with reference to cloud computing? (OR) cloud computing architecture comprises of two parts. Briefly describe these two parts. (A) (PM, M15 RTP, M17-4M)

1. The Cloud Computing Architecture (CCA) of a cloud solution is the structure of the system, which comprises of on-premise and cloud resources, services, middleware, and software components, their geo-location, their externally visible properties and the relationships between them.
2. In the context of cloud computing, protection depends on having the Right Architecture for the Right Application (RARA).
3. A cloud computing architecture consists of a Front end and a Back end connected to each other through a network, usually the Internet.
4. The front end is interface for the user and the backend is the cloud section for the whole system which facilitates the cloud services.
5. **Front End Architecture:**



- a) The Front end of the cloud computing system comprises of the client's devices (or computer network) and some applications needed for accessing the cloud computing system.
 - b) All the cloud computing systems do not give the same interface to users.
 - c) Web services like electronic mail programs use some existing web browsers such as Firefox, Microsoft's internet explorer or Apple's Safari.
6. **Back End Architecture:**
 - a) Back end refers to some service facilitating peripherals.
 - b) In cloud computing, the back end is cloud itself, which may include various computer machines, data storage systems and servers.
 - c) Groups of these clouds make up a whole cloud computing system. Usually, every application would have its individual dedicated server for services.

Central Server:

- a) A central server is established to be used for administering the whole system.
- b) It is also used for monitoring client's demand as well as traffic to ensure that everything of system runs without any problem.

Protocol: There are some set of rules, technically referred as protocols, are followed by server.

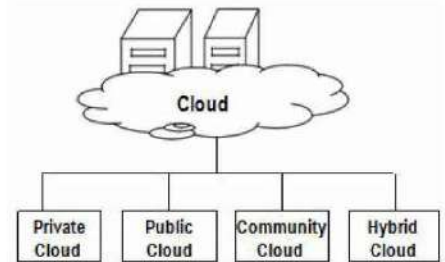
Middleware:

- a) Cloud uses a special type of software known as middleware. Middleware allows computers that are connected on networks to communicate with each other.
- b) The cloud computing system must have a redundant back-up copy of all the data of its client's.

Q.No.6. Explain Cloud Computing Environment or Deployment models (OR) Explain different types of clouds? (B)

The cloud computing environment can consist of multiple types of clouds based on their deployment and usage. They are

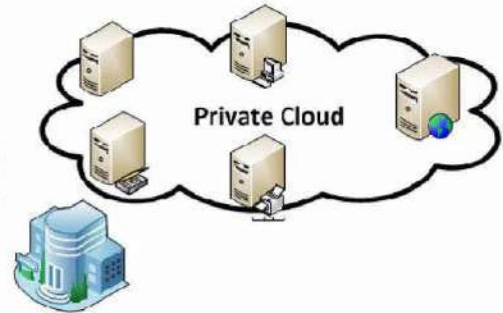
- Private Cloud.
- Public Cloud.
- Hybrid Cloud.
- Community Cloud.



Q.No.7. What is a Private Cloud? Explain its characteristics? (A)

Private Cloud:

- It resides within the boundaries of an organization and is used exclusively for the organization's benefits.
- These are also called internal clouds or corporate clouds.
- Private Clouds can either be private to the organization and managed by the single organization (On-Premise Private Cloud) or can be managed by third party (Outsourced Private Cloud).
- They are built primarily by IT departments within enterprises, who seek to optimize utilization of infrastructure resources within the enterprise by provisioning the infrastructure with applications using the concepts of grid and virtualization.



Characteristics of Private Cloud:

- Secure:** The private cloud is secure as it is deployed and managed by the organization itself, and hence there is least chance of data leakage from the private cloud.
- Central Control:** The private cloud is managed and controlled by the organization itself, there is no need for the organization to rely on anybody.
- Weak Service Level Agreements (SLAs):** SLA is defined as agreements between the user and the service provider. In private cloud, either Formal SLAs do not exist or are weak.

Q.No.8. Mention the advantages and limitations of Private Cloud? (B)

(PM)

Advantages:

- Improves average server utilization;
- Allow usage of low-cost servers and hardware thus improve efficiencies;
- Reducing the costs, compared to individual infrastructure by an organization.
- Provides a high level of security and privacy to the user.
- It is small in size, easy to controlled and maintained by the organization.

Limitations:

- IT teams in the organization may have to invest in buying, building and managing the clouds independently, hence it is expensive compared to public cloud.

- b) Budget is a constraint in private clouds and they also have loose SLAs.
- c) It supports only limited number of users, hence less scalable.

Q.No.9. Explain the major differences between On-Premise Private Cloud and Outsourced Private cloud. (B)

	On-Premise Private Cloud	Outsourced Private Cloud
Management	Managed by the organization itself.	Managed by the third party Everything is same as usual private cloud except that here the cloud is outsourced
Service Level Agreements(SLAs)	SLAs are defined between the organization and its users. Users have broader access rights than general public cloud users and service providers are able to efficiently provide the service because of small user base and mostly efficient network.	These are usually followed strictly as it is a third party organization.
Network	Network management and network issue resolving are easier. The networks usually have high bandwidth and low latency.	The cloud is fully deployed at the third party site and organizations connect to the third party by means of either a dedicated connection or through internet.
Security and Data Privacy	Comparatively it is more resistant to attacks than any other cloud and the security attacks are possible from an internal users only.	Cloud is relatively less secure and the security threat is from the third party and the internal employee.
Location	The data is usually stored in the same geographical location where the cloud users are present. In case of several physical locations, the cloud is distributed over several places and is accessed using the internet.	The cloud is located off site and when there is a change of location the data need to be transmitted through long distances.
Performance	The performance depends on the network and resources and can be controlled by the network management team.	The performance of the cloud depends on the third party that is outsources the cloud.

Q.No.10. What is public cloud? Explain its characteristics? (A)

Public Clouds:

(N14 – RTP)

- a) The public cloud is the cloud infrastructure that is provisioned for open use by the general public.
- b) It may be owned, managed, and operated by a business, academic, or government organizations, or some combination of them.
- c) Typically, public clouds are administrated by third parties or vendors over the Internet, and the services are offered on pay – per - use basis.
- d) These are also called Provider Clouds or external cloud.
- e) Public cloud consists of users from all over the world wherein a user can simply purchase resources on an hourly basis and work with the resources which are available in the cloud provider's premises.

Characteristics:

- Highly Scalable:** The resources in the public cloud are large in number and the service providers make sure that all requests are granted. Hence public clouds are considered to be scalable.
- Affordable:** The cloud is offered to the public on a pay-as-you-go basis. So the user has to pay only for what he or she is using (using on a per-hour basis).
- Less Secure:** Since it is offered by a third party and they have full control over the cloud, the public cloud is less secure out of all the other deployment models.
- Highly Available:** It is highly available because anybody from any part of the world can access the public cloud with proper permissions.
- Stringent SLAs:** As the service provider's business reputation and customer strength are totally dependent on the cloud services, they follow the SLAs strictly and violations are avoided.

Q.No.11. Mention the advantages and limitations of Public Cloud? (B)

(PM, N14 RTP)

Advantages of Public Cloud:

- It is widely used in the development, deployment and management of enterprise applications, at affordable costs.
- It allows the organizations to deliver highly scalable and reliable applications rapidly and at more affordable costs.
- No need for establishing infrastructure for setting up and maintaining the cloud.
- Strict SLAs are followed
- No limit for the number of users.

Limitations:

- Security assurance and building trust among the clients is far from desired.
- Privacy and organizational autonomy (independence) are not possible.

Q.No.12. What is Hybrid Cloud? Explain its characteristics? (B)

(PM)

- This is a combination of both at least one private (internal) and at least one public (external) cloud computing environments.
- The usual method of using the hybrid cloud is to have a private cloud initially, and then for additional resources, the public cloud is used.
- The hybrid cloud can be regarded as a private cloud extended to the public cloud and aims at utilizing the power of the public cloud by retaining the properties of the private cloud.

**Characteristics:**

- Scalable:** The hybrid cloud has the property of public cloud with a private cloud environment and as the public cloud is scalable; the hybrid cloud with the help of its public counterpart is also scalable.
- Partially Secure:** The private cloud is considered as secured and public cloud has high risk of security breach(violation) thus it is partially secure.
- Stringent SLAs:** Overall the SLAs are more strict than the private cloud and might be as per the public cloud service providers.
- Complex Cloud Management:** Cloud management is complex as it involves more than one type of deployment models and also the number of users is high.

Q.No.13. Mention the advantages and limitations of Hybrid cloud? (B)

(PM)

Advantages:

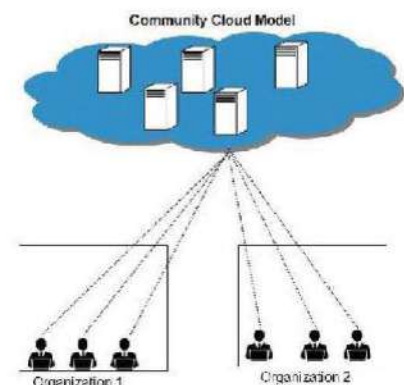
- It is highly scalable and gives the power of both private and public clouds.
- It provides better security than the public cloud.

Limitation: The security features are not as good as the private cloud and complex to manage.

Q.No.14. What is Community Cloud? Explain its characteristics? (B)

(PM, RTP M17 N16, MTP1 M17-4M)

- The community cloud is the cloud infrastructure that is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns. (eg. mission security requirements, policy, and compliance considerations).
- It may be owned, managed, and operated by one or more of the organizations in the community, a third party or some combination of them, and it may exist on or off premises.
- In this, a private cloud is shared between several organizations.
- This model is suitable for organizations that cannot afford a private cloud and cannot rely on the public cloud either.



Characteristics:

- Collaborative and Distributive Maintenance:** In this, no single company has full control over the whole cloud. This is usually distributed and hence better cooperation provides better results.
- Partially Secure:** Some organizations share the cloud, so there is a possibility that the data can be leaked from one organization to another, though it is safe from the external world.
- Cost Effective:** Cloud is being shared by several organizations community, not only the responsibility gets shared, the community cloud becomes cost effective.

Q.No.15. Mention the advantages and limitations of community Cloud? (PM)

(PM)

Advantages:

- It allows establishing a low-cost private cloud.
- It allows collaborative work on the cloud.
- It allows sharing of responsibilities among the organizations.
- It has better security than the public cloud.

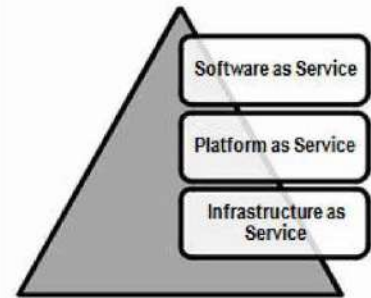
Limitations:

- The autonomy of the organization is lost.
- Some of the security features are not as good as the private cloud.
- It is not suitable in the cases where there is no collaboration.

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**Q.No.16. Write about various Cloud computing service models? (Or)
Cloud computing service providers offers their services on the lines of several fundamental models. Describe the various types of cloud computing models. (A) (M16 - 6M)**

1. Cloud computing is a model that enables the end users to access the shared pool of resources such as computing, network, storage, database and application as an on-demand service without the need to buy or own it.
2. The services are provided and managed by the service provider.
3. The essential characteristics of the cloud include on-demand, self service, broad network access, resource pooling, rapid elasticity, and measured service.
4. The National Institute of Standards and Technology (NIST) define three basic service models -
 - a) Infrastructure as a Service (IaaS)
 - b) Platform as a Service (PaaS)
 - c) Software as a Service (SaaS)



Q.No.17. What is Infrastructure as a Service (IaaS)? Explain its services? (A)

1. IaaS, a hardware-level service, provides computing resources such as processing power, memory, storage, and networks for cloud users to run their application on-demand.
2. It allows users to maximize the utilization of computing capacities without having to own and manage their own resources.
3. IaaS changes the computing from a physical infrastructure to a virtual infrastructure through virtual computing; storage; and network resources by abstracting the physical resources.
4. In order to deploy applications, cloud clients install operating -system images and their application software on the cloud infrastructure.
5. The end-users or IT architects will use the infrastructure resources in the form of Virtual machines (VMs) and design virtual infrastructure, network load balancers etc., based on their needs.
6. The IT architects need not maintain the physical servers as it is maintained by the service providers.
7. Examples of IaaS providers include Amazon Web Services (AWS), Google Compute Engine, OpenStack and Eucalyptus.
8. **A typical IaaS provider may provide the following services:**
 - a) **Compute:** Computing as a Service includes virtual Central Processing Inputs (CPUs) and virtual main memory for the Virtual Machines (VMs) that are provisioned to the end users.
 - b) **Storage:** STaaS provides back-end storage for the VM images. Some of the IaaS providers also provide the back end for storing files.
 - c) **Network:** Network as a Service (NaaS) provides virtual networking components such as virtual router, switch, and bridge for the VMs.
 - d) **Load Balancers:** Load balancing as a Service may provide load balancing capability at the infrastructure layer.

Q. No.18. Explain the characteristics of IaaS? (A)

(PM)

- 1) **Web access to the resources:** The IaaS model enables the IT users to access infrastructure resources over the Internet. When accessing a huge computing power, the IT user need not get physical access to the servers.
- 2) **Centralized management:** The resources distributed across different parts are controlled from any management console that ensures effective resource management and effective resource utilization.
- 3) **Elasticity and Dynamic Scaling:** IaaS resources and services can be increased or decreased according to the requirements.
- 4) **Shared infrastructure:** IaaS follows a one-to-many delivery model and allows multiple IT users to share the same physical infrastructure and increases resource utilization.
- 5) **Metered Services:** IaaS allows the IT users to rent the computing resources instead of buying it. The services consumed by the IT user will be measured, and the users will be charged based on the usage.

Q.No.19. Explain different Instances of IaaS? (B)

1. Network as a Service (NaaS):

- a) NaaS provides users with needed data communication capacity to accommodate bursts in data traffic during data-intensive activities such as video conferencing or large file downloads.
- b) It is an ability given to the end-users to access virtual network services that are provided by the service provider over the Internet on pay-per-use basis.
- c) NaaS allows network architects to create virtual networks; virtual network interface cards (NICs), virtual routers, virtual switches, and other networking components.
- d) NaaS providers operate using three common service models:
 - i) Virtual Private Network (VPN)
 - ii) Bandwidth on Demand (BoD)
 - iii) Mobile Virtual Network (MVN).

2. Storage as a Service (STaaS): (RTP N16)

- a) STaaS provides storage infrastructure on a subscription basis to users.
- b) It is a low-cost and convenient way to store data, synchronize data across multiple devices, manage off-site backups, mitigate risks of disaster recovery, and preserve records for the long-term.
- c) STaaS allows the end users to access the files at any time from any place.
- d) STaaS provider provides the virtual storage that is abstracted from the physical storage of any cloud data center.

3. Database as a Service (DBaaS):

- a) It provides users with seamless mechanisms to create, store, and access databases at a host site on demand.
- b) It is an ability given to the end users to access the database service without the need to install and maintain it on the pay-per-use basis.
- c) The end users can access the database services through any Application Programming Interfaces (APIs) or Web User Interfaces provided by the service provider.

4. Backend as a Service (BaaS):

- a) It provides web and mobile app developers a way to connect their applications to backend cloud storage.
- b) It also provides added services such as user management, push notifications, social network services integration using custom software development kits and application programming interfaces.

5. Desktop as a Service (DTaaS):

- a) It that provides ability to the end users to use desktop virtualization without buying and managing their own infrastructure.
- b) DTaaS is a pay-per-use cloud service delivery model in which the service provider manages the back-end responsibilities of data storage, backup, security and upgrades.

Q.No.20. Explain PaaS? (B)**(RTP M15, MTP M17, N16)**

1. PaaS provides the users the ability to develop and deploy an application on the development platform provided by the service provider.
2. In traditional application development, the application will be developed locally and will be hosted in the central location.
3. PaaS changes the application development from local machine to online.
4. For example- Google AppEngine, Windows Azure Compute etc.
5. **Typical PaaS providers may provide:**
 - a) **Programming Languages:** PaaS providers provide a wide variety of programming languages like Java, PHP, Python, Ruby etc. for the developers to develop applications.
 - b) **Application Frameworks:** PaaS vendors provide application development framework like Joomla, WordPress, Sinatra etc. for application development.
 - c) **Database:** Along with PaaS platforms, PaaS providers provide some of the popular databases like ClearDB, Cloudant, Redis etc. so that application can communicate with the databases.
 - d) **Other Tools:** PaaS providers provide all the tools that are required to develop, test, and deploy an application.

Q.No.21. Explain the characteristics of PaaS? (B)**(PM)**

1. **All in One:** Most of the PaaS providers offer services like programming languages to develop, test, deploy, host and maintain applications in the same Integrated Development Environment (IDE).
2. **Web access to the development platform:** It provides web access to the development platform that helps the developers to create, modify, test, and deploy different applications on the same platform.
3. **Offline Access:** The developers can develop an application locally (offline) and deploy it online whenever they are connected to the Internet.
4. **Built-in Scalability:** PaaS services provide built-in scalability to an application. It ensures that the application is capable of handling varying loads efficiently.
5. **Collaborative Platform:** To enable collaboration among developers, PaaS providers provide tools for project planning and communication.
6. **Diverse Client Tools:** PaaS providers offer a wide variety of client tools like Web User Interface (UI), Application Programming Interface (API) etc. to help the developers to choose the tool of their choice.

Q.No.22. Explain the SaaS? Explain Services provided by SaaS? (A) (RTPM15) (OR) Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) are two of the three main categories of cloud computing. What's the third category? Explain in brief.

1. SaaS provides ability to the end users to access an application over the Internet that is hosted and managed by the service provider.
2. SaaS changes the way the software is delivered to the customers.
3. In the traditional software model, the software is delivered as a license-based product that needs to be installed in the end user device.
4. SaaS is delivered as an on-demand service over the Internet, there is no need to install the software to the end-user's devices and these services can be accessed or disconnected at any time based on the end user's needs.

SERVICES PROVIDED BY SAAS:

- a) **Business Services:** SaaS providers provide a variety of business services to startup companies that includes ERP, CRM, billing, sales, and human resources.
- b) **Social Networks:** Since the number of users of the social networking sites is increasing exponentially, cloud computing is the perfect match for handling the variable load.
- c) **Document Management:** Most of the SaaS providers provide services to create, manage, and track electronic documents as most of the enterprises extensively use electronic documents.
- d) **Mail Services:** To handle the unpredictable number of users and the load on e-mail services, most of the email providers offer their services as SaaS services.

Q.No.23. Explain the Characteristics of SaaS? (B)

(PM)

1. **One to Many:** SaaS services are delivered as one-to-many models where a single instance of the application can be shared by multiple customers.
2. **Web Access:** SaaS services allow the end users to access the application from any location, from any device that is connected to the Internet.
3. **Centralized Management:** Since SaaS services are hosted and managed from the central location, the SaaS providers perform the automatic updates to ensure that each customer is accessing the most recent version of the application without any user-side updates.
4. **Multi-device Support:** SaaS services can be accessed from any end user devices such as desktops, laptops, tablets, smart phones, and thin clients.
5. **Better Scalability:** Most of the SaaS services leverage PaaS and IaaS for its development and deployment and ensure a better scalability than traditional software.
6. **High Availability:** SaaS services ensure 99.99% availability of user data as proper backup and recovery mechanisms are implemented.
7. **API Integration:** SaaS services have the capability of integrating with other software or service through standard APIs.

Q.No.24. Explain the various Instances of SaaS? (B)

1. **Testing as a Service (TaaS):** This provides users with software testing capabilities such as generation of test data, generation of test cases, execution of test cases and test result evaluation on a pay-per-use basis.

2. **API as a Service (APIaaS):** This allows users to explore functionality of Web services such as Google Maps, Payroll processing, and credit card processing services etc.
3. **Email as a Service (EaaS):** This provides users with an integrated system of emailing, office automation, records management, migration, and integration services with archiving, spam blocking, malware protection, and compliance features.

Q.No.25. Explain various other cloud service models. (B)

1. **Communication as a Service (CaaS):** (M16 MTP1)
 - a) CaaS has evolved in the same lines as SaaS.
 - b) CaaS is an outsourced enterprise communication solution that can be leased from a single vendor/seller.
 - c) The CaaS vendor is responsible for all hardware and software management and offers guaranteed Quality of Service (QoS).
 - d) It allows businesses to selectively deploy communication devices and modes on a pay -as-you-go, as-needed basis by eliminating the large capital investments.
 - e) Examples are: Voice over IP (VoIP), Instant Messaging (IM), Collaboration and Videoconferencing application using fixed and mobile devices.
2. **Data as a Service (DaaS):**
 - a) DaaS provides data on demand to a diverse set of users, systems or application.
 - b) The data may include text, images, sounds, and videos.
 - c) Data encryption and operating system authentication are commonly provided for security.
 - d) DaaS users have access to high-quality data in a centralized place and pay by volume or data type, as needed.
 - e) However, as the data is owned by the providers, users can only perform read operations on the data.
 - f) DaaS is highly used in geography data services and financial data services
3. **Security as a Service (SECaaS):**
 - a) It is an ability given to the end user to access the security service provided by the service provider on a pay-per-use basis.
 - b) It is a new approach to security in which cloud security is moved into the cloud itself whereby cloud service users will be protected from within the cloud using a unified approach to threats.
 - c) Four mechanisms of Cloud security that are currently provided are Email filtering, Web content filtering, Vulnerability management and Identity management
4. **Identity as a Service (IDaaS):**
 - a) It is an ability given to the end users; typically an organization or enterprise; to access the authentication infrastructure that is built, hosted, managed and provided by the third party service provider.
 - b) Generally, IDaaS includes directory services, authentication services, risk and event monitoring, single sign-on services, and identity and profile management.

Q.No.26. Explain different characteristics of cloud computing? (A) (PM, N16 RTP)

1. **High Scalability:** Cloud environments enable servicing of business requirements for larger audiences, through high scalability, it allows ability to increase or decrease resources according to the requirements.
2. **Agility:** The cloud works in the 'distributed mode' environment. It shares resources among users and tasks, while improving efficiency and agility (responsiveness).

3. **High Availability and Reliability:** Availability of servers is supposed to be high and more reliable as the chances of infrastructure failure are minimal.
4. **Multi-sharing:** With the cloud working in a distributed and shared mode, multiple users and applications can work more efficiently with cost reductions by sharing common infrastructure.
5. **Virtualization:** This technology allows servers and storage devices to increasingly share and utilize applications, by easy migration from one physical server to another.
6. **Performance:** It is monitored and consistent and loosely coupled architectures are constructed using web services as the system interface.
7. **Maintenance:** Cloud computing applications are easier, because they are not to be installed on each user's computer and can be accessed from different places
8. **Services in Pay-Per-Use Mode:** SLAs between the provider and the user must be defined when offering services in pay per use mode. This may be based on the complexity of services offered.

Q.No.27. Briefly discuss the advantages of Cloud computing?

(OR)

What are the advantages of using cloud computing environment? (A)(PM, N15-5M, N16 MTP2)

Cloud computing provides large number of benefits such as cost efficiency, easy access of information and applications and availability of large storage space.

1. Cost Efficiency:

- a) Cloud computing is probably the most cost efficient method to use, maintain and upgrade.
- b) Traditional desktop software costs companies a lot in terms of finance. Adding up the licensing fees for multiple users can prove to be very expensive for the establishment concerned.
- c) The cloud, on the other hand, is available at much cheaper rates and hence, can significantly lower the company's IT expenses.
- d) Besides, there are many one-time-payments, pay-as-you-go and other scalable options available, which make it very reasonable for the company.

2. Almost Unlimited Storage:

- a) Storing information in the cloud gives us almost unlimited storage capacity.
- b) Hence, one no more need to worry about running out of storage space or increasing the current storage space availability.

3. Backup and Recovery:

- a) Since all the data is stored in the cloud, backing it up and restoring the same is relatively much easier than storing the same on a physical device.
- b) Furthermore, most cloud service providers are usually competent enough to handle recovery of information.
- c) Hence, this makes the entire process of backup and recovery much simpler than other traditional methods of data storage.

4. Automatic Software Integration:

- a) In the cloud, software integration is usually something that occurs automatically.
- b) This means that we do not need to take additional efforts to customize and integrate the applications as per our preferences.
- c) This aspect usually taken care of service provider.
- d) Cloud computing allows us to customize the options with great ease

5. **Easy Access to Information:** Once registered in the cloud, one can access the information from anywhere, where there is an Internet connection. This convenient feature lets one move beyond time zone and geographic location issues.
6. **Quick Deployment:**
- Cloud computing gives us the advantage of quick deployment and use of services.
 - Once we opt for this method of functioning, the entire system can be fully functional in a matter of a few minutes.

Q.No.28. Explain key challenges relating to cloud computing? (OR)
Explain various security issues of cloud computing? (OR)
Management wants to know the major challenges in using cloud computing technology for running the new web application. Write any five challenges. (OR)
Explain the Major challenges in cloud computing issues in cloud computing technology for running the new web application. (A) (PM, M15-5M, N14 RTP)

Maintaining security and confidentiality of data is one of the key challenges for cloud computing.

a) **Confidentiality:**

- Cloud works on public networks thus Prevention of the unauthorized disclosure of the data is referred as Confidentiality.
- With the use of encryption and physical isolation, data can be kept secret.
- The basic approaches to attain confidentiality are the encrypting the data before placing it in a Cloud with the use of TC3 (Total Claim Capture & Control).*

b) **Integrity:**

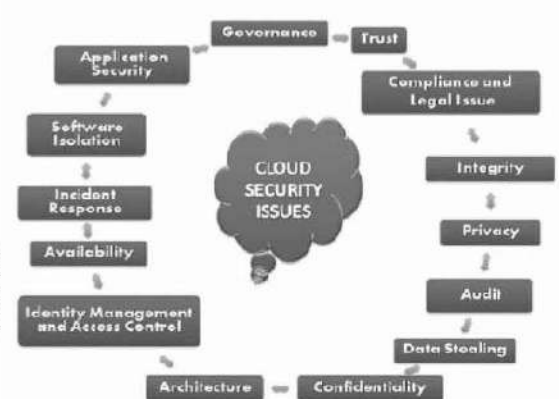
- Integrity refers to the prevention of unauthorized modification of data and it ensures that data is of high quality, correct, consistent and accessible.
- Data integrity ensures that data is error free and represent the actual facts.
- The data owners need to be ensured that data after moving to cloud not changed, tampered, or deleted.
- Strong data integrity controls such as digital signature and authorization control for data access and use should be maintained to deal with issue of data loss and deletion.

c) **Availability:**

- It refers to data is available when needed. It also meets the organization's continuity and contingency planning requirements
- Availability refers to the prevention of unauthorized withholding of data and it ensures the data backup through Business Continuity Planning (BCP) and Disaster Recovery Planning (DRP).*
- Availability can be affected temporarily or permanently, and a loss can be partial or complete from Temporary breakdowns, sustained and Permanent Outages, Denial of Service (DoS) attacks, equipment failure, and natural calamities are all threats to availability.*

d) **Privacy:**

- Privacy refers to the personal information should not be disclosed intentionally or accidentally. *It is also considered as one of the important issues in Cloud.*
- It should include both the legal compliance and trusting maturity.*
- The Cloud should be designed in such a way that it decreases the privacy risk.*



e) Data Stealing or data loss:

- i) In a Cloud, data stored anywhere. In such cases, an issue arises as data stealing.
- ii) Some of the Cloud providers do not use their own server, instead. They use servers from other service providers. So, there is a probability that the data is less secure and is more prone to the loss from external server.
- iii) *Back up policies such as Continuous Data Protection (CDP) should be implemented in order to avoid issues with data recovery in case of a sudden attack.*

f) Application Security: In cloud computing, the applications for data processing are stored on cloud thus face the issues of application security because cloud is accessible by large number of users.**g) Software Isolation:** Software isolation is to understand virtualization and other logical isolation techniques that the Cloud provider employs in its multi –tenant software architecture and evaluate the risks required for the organization.**h) Identity Management and Access control:**

- i) Every organization normally uses its own rules for identity management and access controls.
- ii) The identity management provides a trust and shares the digital attributes between the Cloud provider and organization ensuring the protection against attackers.

i) Cloud Architecture: In the architecture of Cloud computing models, there should be a control over the security and privacy of the system.**j) Governance:**

- i) Every organization has their own governance rules and policies to meet their business objectives.
- ii) It system of organization is normally designed to meet business objectives and employees of organizations are governed by rules and policies.
- iii) Extending these governing rules, policies and business objectives to cloud service provides system is also an issue or big challenge.

k) Trust:

- i) An organization will have direct control over IT resource and employees who are using these resources.
- ii) However extending these direct controls for cloud service providers employees and resource is not possible. Therefore, establishing trust between organizations and cloud service provides is also a big challenge.

l) Legal Issues and Compliance:

- i) One of the major challenge of cloud computing. There are various requirements relating to legal and regulatory compliance for information system, data protection and security.
- ii) The biggest issue is these laws vary from location to location and in cloud computing it is not known where data is physically stored and from where it will be accessed and used.
- iii) This requires a thorough knowledge of laws and compliance requirement from all perspectives.

m) Audit:

- i) Auditing is type of checking that 'what is happening in the Cloud environment'.
- ii) It is an additional layer before the virtualized application environment, which is being hosted on the virtual machine to watch 'what is happening in the system'.

n) Incident Response:

- i) It ensures to meet the requirements of the organization during an incident.
- ii) It ensures that the Cloud provider has a transparent response process in place and sufficient mechanisms to share information during and after an incident.

Q.No.29. Explain some pertinent issues in Cloud Computing? (OR) Explain various Implementation / Adaptation Issues in cloud computing (A) (PM, N14 - 6M)

SOME OF THE WELL-IDENTIFIED ISSUES STAND OUT WITH CLOUD COMPUTING:

1. **Threshold Policy:** This is a policy which defines cyclic use of any application e.g. use of credit card will rise sharply during the festival seasons and use will decrease significantly after the festival or buying season is over. The program processing the credit card should be having the capability to provide more instances or processing capabilities during buying seasons and deallocate these instances for other work when buying season is over. The threshold policy helps to detect sudden increase in the demand and results in the creation of additional instances to fill in the demand. It also determines how unused resources are to be deallocated and turned over to other work. Developing and implanting an appropriate threshold policy in the cloud program is a key issue with cloud computing.
2. **Interoperability:** There are no industry wide standards for interoperability of application and data between different cloud computing vendors. If a company outsources or creates applications with one cloud computing vendor, the company may find it difficult to change to another computing vendor that has proprietary Application Programming Interfaces (APIs) and different formats for importing and exporting data. It requires change of the format/logic in applications.
3. **Hidden Costs:** Cloud computing services providers do not reveals hidden costs such as higher chargers for data storage and use of applications during peak time and companies could experience slow services or latency in services particularly during heavy traffic.
4. **Unexpected Behavior:** Companies may get unexpected results or outputs while using cloud services. Therefore, it is necessary that before migrating to cloud the companies should test the cloud services for correct output particularly during the heavy traffic or peak loads.
5. **Software Development in Cloud:** To develop software using high-end databases, the most likely choice is to use cloud server pools at the internal data corporate centre and extend resources temporarily for testing purposes. This allows project managers to control costs, manage security and allocate resources to clouds for a project. The project managers can also assign individual hardware resources to different cloud types: Web development cloud, testing cloud, and production cloud.
6. **Environment Friendly Cloud Computing:** One reason for cloud computing is that it may be more environment friendly. *It reduces the number of hardware components needed to run applications on the company's internal data centre and replacing them with cloud computing systems*

Q.No.30. What is Mobile computing? Explain the components of Mobile computing? (A) (PM, N15 RTP, N14, N16 MTP1)

1. Mobile Computing refers to the technology that allows transmission of data via a computer without having to be connected to a fixed physical link.
2. Mobile voice communication is widely established throughout the world and has a rapid increase in the number of subscribers to the various cellular networks over the last few years.
3. An extension of this technology is the ability to send and receive data across these cellular networks. This is the fundamental principle of mobile computing.
4. Mobile data communication has become a very important and rapidly evolving technology as it allows users to transmit data from remote locations to others either in remote or fixed locations.

Components of Mobile Computing: The key components of Mobile Computing are as follows:

- a) **Mobile Communication:** This refers to the infrastructure put in place to ensure that seamless and reliable communication goes on. This would include communication properties, protocols, data formats and concrete technologies.

- b) Mobile Hardware:** This includes mobile devices or device components that receive or access the service of mobility. They would range from Portable laptops, Smart Phones, Tablet PCs, and Personal Digital Assistants (PDA) that use an existing and established network to operate on. *The characteristics of mobile computing hardware are defined by the size and form factor, weight, microprocessor, primary storage, secondary storage, screen size and type, means of input, means of output, battery life, communications capabilities, expandability and durability of the device.*
- c) Mobile Software:** Mobile Software is the actual program that runs on the mobile hardware and deals with the characteristics and requirements of mobile applications. It is the operating system of that appliance and is the essential component that makes the mobile device operates.

Q.No.31. Explain the working of Mobile computing? (B)

(MTP M17)

1. The user enters or access data using the application on handheld computing device.
2. Using one of several connecting technologies, the new data are transmitted from handheld to site's information system where files are updated and the new data are accessible to other system user.
3. Now both systems (handheld and site's computer) have the same information and are in sync.
4. The process work the same way starting from the other direction.
5. The process is similar to the way a worker's desktop PC access the organization's applications, except that user's device is not physically connected to the organization's system.
6. The communication between the user device and site's information systems uses different methods for transferring and synchronizing data, some involving the use of Radio Frequency (RF) technology.

Q.No.32. Explain the benefits of Mobile Computing? (A)

(PM, M16 - 6M, N15 MTP2)

- a) It provides mobile workforce with remote access to work order details, such as work order location, contact information, required completion date, asset history relevant warranties/service contracts.
- b) It enables mobile sales personnel to update work order status in real-time, facilitating excellent communication.
- c) It facilitates access to corporate services and information at any time, from anywhere.
- d) It provides remote access to the corporate Knowledgebase at the job location.
- e) It enables to improve management effectiveness by enhancing information quality, information flow, and ability to control a mobile workforce.

Q.No.33. Explain the Limitations of Mobile computing? (B)

(N16-5M)

1. **Insufficient Bandwidth:** Mobile Internet access is generally slower than direct cable connections using technologies.
2. **Security Standards:** One can easily attack the VPN through a huge number of networks interconnected through the line.
3. **Power consumption:** When a power outlet or portable generator is not available, mobile computers must rely entirely on battery power.
4. **Transmission interferences:** Weather, terrain, and the range from the nearest signal point can all interfere with signal reception. Reception in tunnels, some buildings, and rural areas is often poor.

5. **Potential health hazards:** People who use mobile devices while driving are often distracted from driving and are thus assumed to be more likely involved in traffic accidents. Cell phones may interfere with sensitive medical devices.
6. **Human interface with device:** Screens and keyboards tend to be small, which may make them hard to use. Alternate input methods such as speech or handwriting recognition require training.

Q.No.34. Explain various issues in Mobile computing? (B)

(PM)

1. **Security Issues:** Wireless networks have relatively more security requirements than wired network. A number of approaches have been suggested and also the use of encryption has been proposed.
 - a) **Confidentiality:** Preventing unauthorized users from gaining access to critical information of any particular user.
 - b) **Integrity:** Ensures unauthorized modification, destruction or creation of information cannot take place.
 - c) **Availability:** Ensuring authorized users getting the access they require.
 - d) **Legitimate:** Ensuring that only authorized users have access to services.
 - e) **Accountability:** Ensuring that the users are held responsible for their security related activities by arranging the user and his/her activities are linked if and when necessary.
2. **Bandwidth:** Bandwidth utilization can be improved by logging and compression of data before transmission. The technique of caching frequently accessed data items can play an important role in reducing contention in narrow bandwidth wireless networks. The cached data can help improve query response time.
3. **Location Intelligence:** A mobile computer must be able to switch from infrared mode to radio mode as it moves from indoors to outdoors. A small movement may result in a much longer path if cell or network boundaries are crossed. It will also lead to updating of the location dependent information.
4. **Power Consumption:** Mobile Computers will rely on their batteries as the primary power source. Batteries should be ideally as light as possible but at the same time they should be capable of longer operation times. Power consumption should be minimized to increase battery life.
5. **Revising the technical architecture:** Mobile users are demanding and are important to the business world. To provide complete connectivity among users; the current communication technology must be revised to incorporate mobile connectivity.
6. **Reliability, coverage, capacity, and cost:** At present; wireless network is less reliable, have less geographic coverage and reduced bandwidth, are slower, and cost more than the wired-line network services. It is important to find ways to use this new resource more efficiently by designing innovative applications.
7. **Integration with legacy mainframe and emerging client/server applications:** Application development paradigms are changing. As a result of the IT industry's original focus on mainframes, a huge inventory of applications using communications interfaces that are basically incompatible with mobile connectivity have been accumulated.
8. **End-to-end design and performance:** Since mobile computing involves multiple networks (including wired) and multiple application server platforms; end-to-end technical compatibility, server capacity design, and network response time estimates are difficult to achieve.
9. **Business challenges:** Mobile computing also faces business challenges. This is due to the lack of trained professionals to bring the mobile technology to the general people and development of pilot projects for testing its capabilities.

Q.No.35. Write about Green IT or Green Computing? (A)

(PM)

1. Green computing or Green IT refers to the study and practice of environmentally sustainable computing or IT.
2. It is the study and practice of establishing / using computers and IT resources in a more efficient and environmentally friendly and responsible way.
3. Computers consume a lot of natural resources, from the raw materials needed to manufacture them, the power used to run them, and the problems of disposing them at the end of their life cycle.
4. This can include "designing, manufacturing, using, and disposing of computers, servers and associated subsystems - such as monitors, printers, storage devices, and networking and communications systems - efficiently and effectively with minimal or no impact on the environment".
5. The objective of Green computing is to reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste.
6. Such practices include the implementation of energy-efficient Central Processing Units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste).

Q.No.36. Explain the Green Computing best practices? (A)

(OR)

What are your recommendations for efficient use of computers and IT resources to achieve the objectives of "Green computing". (OR)

(PM, N14-5M, M15-4M, N14, M17, N16 RTP, N15 MTP2)

The work habits of computer users and businesses can be modified to minimize adverse impact on the global environment'. Discuss some of such steps, which can be followed for Green IT.

The work habits of computer users and businesses can be modified to minimize adverse impact on the global environment.

Some of such steps for Green IT include the following:

a) Develop a sustainable Green Computing plan:

- i) Involve stakeholders to include checklists, recycling policies, recommendations for disposal of used equipment, government guidelines and recommendations for purchasing green computer equipment in organizational policies and plans;
- ii) Encourage the IT community for using the best practices and encourage them to consider green computing practices and guidelines.
- iii) Include power usage, reduction of paper consumption, as well as recommendations for new equipment and recycling old machines in organizational policies and plans.
- iv) Use cloud computing so that multiple organizations share the same computing resources, thus increasing the utilization by making more efficient use of hardware resources.

b) Recycle

- i) Dispose e-waste according to central, state and local regulations ;
- ii) Discard used or unwanted electronic equipment in a convenient and environmentally responsible manner as computers emit harmful emissions;
- iii) Manufacturers must offer safe end-of-life management and recycling options when products become unusable; and Recycle computers through manufacturer's recycling services.

c) Make environmentally sound purchase decisions

- i) Purchase of desktop computers, notebooks and monitors based on environmental attributes;

- ii) Provide a clear, consistent set of performance criteria for the design of products;
- iii) Recognize manufacturer efforts to reduce the environmental impact of products by reducing or eliminating environmentally sensitive materials, designing for longevity and reducing packaging materials; and
- iv) Use Server and storage virtualization that can help to improve resource utilization, reduce energy costs and simplify maintenance.

d) Reduce Paper Consumption

- i) Reduce paper consumption by use of e-mail and electronic archiving
- ii) Use of "track changes" feature in electronic documents, rather than redline corrections on paper;
- iii) Use online marketing rather than paper based marketing because e-mail providers provides online accessing and support.
- iv) While printing documents; make sure to use both sides of the paper, recycle regularly, use smaller fonts and margins, and selectively print required pages.

e) Conserve Energy

- i) Use Liquid Crystal Display (LCD) monitors rather than Cathode Ray Tube (CRT) monitors;
- ii) Develop a thin-client strategy wherein thin clients are smaller, cheaper, simpler for manufacturers to build than traditional PCs or notebooks and most importantly use about half the power of a traditional desktop PC;
- iii) Use notebook computers rather than desktop computers whenever possible.
- iv) Use the power-management features to turn off hard drives and displays after several minutes of inactivity;
- v) Power-down the CPU and all peripherals during extended periods of inactivity ;
- vi) Try to do computer-related tasks during contiguous, intensive blocks of time, leaving hardware off at other times;
- vii) Power-up and power-down energy-intensive peripherals such as laser printers according to need;
- viii) Employ alternative energy sources for computing workstations, servers, networks and data centers; and
- ix) Adapt more of Web conferencing offers instead of travelling to meetings in order to go green and save energy.

Q.No.37. Explain relevant facts about Green IT? (B)

1. All businesses are increasingly dependent on technology, and small business is no exception.
2. We work on our PCs, notebooks and smart phones all day, connected to servers running 24x7.
3. Since the technology refresh cycle is fast, these devices quickly become obsolete, and at some point — more often sooner than later — we dispose of old devices and replace them with new ones.
4. We use massive quantities of paper and ink to print documents, many of which we promptly send to the circular file.
5. In the process, most businesses waste resources, in the form of energy, paper, money and time — resources we could invest to develop new products or services, or to hire and train employees.
6. Even if we aren't a tree hugger, it makes good business sense to green our IT environment and culture.
7. Many IT vendors have major initiatives underway to green their products, services and practices. it include building computers with more environmentally friendly materials, designing them to be consume less energy, providing recycling programs to dispose of old systems, developing virtualization and cloud computing alternatives, and providing tips to businesses that want to go green.

Q.No.38. Explain Green IT security services and challenges? (B)

1. IT solutions providers are offering green security services in many ways.
2. What to look in green security products, the challenges in the security services market and how security services fare in a recession.
3. If administered properly with other green computing technologies, green security can be a cost-efficient and lucrative green IT service for solution providers.
4. The basic aim is to increase the customer's energy savings through green security services and assess that 'how sustainable computing technology can immediately help the environment'.
5. Green IT services present many benefits for clients as well as providers, but knowing 'how to evaluate a client's infrastructure to accommodate green technology is really a vital issue'.
6. Moreover, apart from the common security issues, the green security emphasizes the role of security tools, methods and practices that reduce a company's environmental impact.
7. But to estimate the scope, to cope with the lack of green security services in the market and get advice on conserving power and purchasing switches is very important and needs a high level of sensitivity.
8. Learning about the challenges of implementing green security and the best practices is a major hope, as the artifacts are still evolving.

Q.No.39. Write about BYOD? Explain its advantages? (A)**(PM, N15 RTP)**

1. BYOD (Bring Your Own Device) refers to business policy that allows employees to use their preferred computing devices, like smart phones and laptops for business purposes.
2. It means employees are welcome to use personal devices (laptops, smart phones, tablets etc.) to connect to the corporate network to access information and application.
3. The BYOD policy has rendered the workspaces flexible, empowering employees to be mobile and giving them the right to work beyond their required hours.
4. The continuous influx of readily improving technological devices has led to the mass adoption of smart phones, tablets and laptops, challenging the long- standing policy of working on company-owned devices.

Advantages of BYOD:**(N16-4M)**

- a) **Happy Employees:** Employees love to use their own devices when at work. This also reduces the number of devices an employee has to carry.
- b) **Lower IT budgets:** The employees could involve financial savings to the organization since employees would be using the devices they already possess, thus reducing the cost of the organization in providing devices to them.
- c) **IT reduces support requirement:** IT department does not have to provide end user support and maintenance for all these devices resulting in cost savings.
- d) **Early adoption of new Technologies:** Employees are generally proactive in adoption of new technologies that result in enhanced productivity of employees leading to overall growth of business.
- e) **Increased employee efficiency:** The efficiency of employees is more when the employee works on their own device.

Q.No.40. What is BYOD and what are its key threats? (OR) Explain emerging BYOD Threats? (OR) If the employees of the company are allowed to use personal devices such as laptop, smart phones tablets etc. to connect and access the data, what could be the security risks involved? Classify and elaborate such risks. (A) (N15- 5M, M16 RTP, N15 MTP1)

Every business decision is accompanied with a set of threats and so is BYOD program also.

A BYOD program that allows access to corporate network, emails, client data etc. is one of the top security concerns for enterprises.

Overall, these risks can be classified into four areas:

a) Network Risks:

- i) It is normally exemplified and hidden in 'Lack of Device Visibility'.
- ii) When company-owned devices are used by all employees within an organization, the organization's IT practice has complete visibility of the devices connected to the network.
- iii) This helps to analyze traffic and data exchanged over the Internet.
- iv) As BYOD permits employees to carry their own devices (smart phones, laptops for business use), the IT practice team is unaware about the number of devices being connected to the network.
- v) It is possible that some of the devices may cause the destructive operations such as inserting viruses, although security checks will be there but that may miss some of the destructive operations for outside devices.

b) Device Risks:

- i) It is known as 'Loss of Devices'.
- ii) A lost or stolen device can result in an enormous financial and reputational embarrassment to an organization as the device may hold sensitive corporate information.
- iii) Data lost from stolen or lost devices ranks as the top security threats as per the rankings released by Cloud Security Alliance.
- iv) With easy access to company emails as well as corporate intranet, company trade secrets can be easily retrieved from a misplaced device.

c) Application Risks:

- i) It is normally exemplified and hidden in 'Application Viruses and Malware'.
- ii) A related report revealed that a majority of employees' phones and smart devices that were connected to the corporate network weren't protected by security software.
- iii) With an increase in mobile usage, mobile vulnerabilities have increased concurrently.
- iv) Organizations are not clear in deciding that 'who is responsible for device security – the organization or the user'.

d) Implementation Risks:

- i) It is known as 'Weak BYOD Policy'.
- ii) It is important that the organization should have a strong BYOS policy, this policy should be effectively implemented as well.
- iii) Any weakness in this implementation may result in big loss to organization.

Q.No.41. Explain Social media? (B)

1. There are two types of networks: physical and logical networks.
2. Physical network is a network of computers and devices.
3. Logical network is network of communities and human beings to exchange ideas and information with each others. These logical networks are known as social networks or social media.
4. Social media refers to the means of interaction among the people in which they create, share, and exchange information and ideas in virtual communities and networks.
5. There are multiple types of social networks due to different human interests and professions. This can range from a network of researchers, to a network of doctors to a network of academics etc.
6. Each type of network has its own focus area, member size, geographical spread, societal impact and objective.
7. Managing such networks is not only complicated but requires lot of collective efforts and collaboration.
8. A social network is usually created by a group of individuals, who have a set of common interests and objectives.
9. There are usually a set of network formulators followed by a broadcast to achieve the network membership.
10. This happens both in public and private groups depending upon the confidentiality of the network.
11. Success of a social network mainly depends on contribution, interest and motivation of its members along with technology backbone or platform support that makes the life easier to communicate and exchange information to fulfill a particular communication need.
12. *Implementing social networks and sustaining them is one of the biggest challenges and people have formulated many mechanisms in the past to keep alive such networks.*

Q.No.42. Write about Web 2.0? (B)**(PM)**

1. Web 2.0 is the term given to describe a second generation of the World Wide Web that is focused on the ability for people to collaborate and share information online.
2. The two major contributors of Web 2.0 are the technological advances enabled by Ajax (Asynchronous JavaScript and XML) and other applications and other applications such as RSS (Really Simple Syndication) and Eclipse that support the user interaction and their empowerment in dealing with the web.
3. Web 2.0 basically refers to the transition from static HTML Web pages to a more dynamic Web that is more organized and is based on serving Web applications to users.
4. Other improved functionality of Web 2.0 includes open communication with an emphasis on Web-based communities of users, and more open sharing of information.
5. One of the most significant differences between Web 2.0 and the traditional World Wide Web (Web 1.0) is that migration is from the "read-only web" to "read-write web".
6. Blogs, wikis, and Web services are all seen as components of Web 2.0.
7. *Web 2.0 tries to tap the power of humans connected electronically through its new ways at looking at social collaboration.*
8. The main agenda of Web 2.0 is to connect people in numerous new ways and utilize their collective strengths, in a collaborative manner.
9. *In this regard, many new concepts have been created such as Blogging, Social Networking, Communities, Mashups, and Tagging.*

Q.No.43. Explain the components of web 2.0 for Social networks? (OR) Describe the major components of web 2.0 for Social networks. (A) (M16- 4M, N15 RTP)

Major components that have been considered in Web 2.0 include the following:

- a) **Communities:** These are an online space formed by a group of individuals to share their thoughts, ideas and have a variety of tools to promote Social Networking.
- b) **RSS-generated Syndication:** RSS is a format for syndicating web content that allows feed the freshly published web content to the users through the RSS reader.
- c) **Blogging:** A blog is a journal, diary, or a personal website that is maintained on the internet, and it is updated frequently by the user. Blogging allows a user to make a post to a web log or a blog. Blogs give the users of a Social Network the freedom to express their thoughts in a free form basis and help in generation and discussion of topics.
- d) **Wikis:** A Wiki is a set of co-related pages on a particular subject and allow users to share content. Wikis replace the complex document management systems and are very easy to create and maintain.
- e) **Usage of Ajax and other new technologies:** Ajax is a way of developing web applications that combines XHTML and CSS (Cascading Style Sheets) standards-based presentation that allows the interaction with the web page and data interchange with XML (eXtensible Markup Language) and XSLT (eXtensible Stylesheet Language Transformations).
- f) **Folksonomy:** This allows the free classification of information available on the web, which helps the users to classify and find information, using approaches such as tagging.
- g) **File Sharing/Podcasting:** This is the facility, which helps users to send their media files and related content online for other people of the network to see and contribute.
- h) **Mashups:** This is the facility, by using which people on the internet can congregate services from multiple vendors to create a completely new service.

Q.No.44. Write about types and behavior of Social networks? (OR) Explain various social networks? (A) (M16 MTP1)

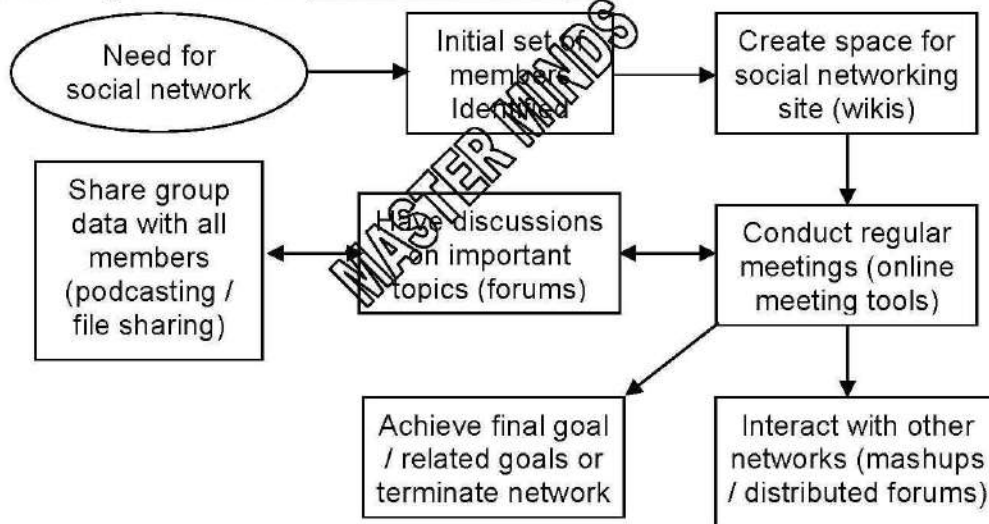
1. Social networks exist in various domains-within and outside organizations, within and outside geographical boundaries, within and outside social boundaries and many other areas.
2. **The main categories are:**
 - a) **Social Contact Networks:** These most popular types of networks are formed to keep contact with friends and family. They have all components of Web 2.0 like blogging, tagging, wikis, and forums. Examples of these include Orkut, Facebook and Twitter.
 - b) **Study Circles:** These are social networks dedicated for students, where they can have areas dedicated to student study topics, placement related queries and advanced research opportunity gathering. These have components like blogging and file sharing. Examples of these include, Fledge Wing and College Tonight.
 - c) **Social Networks for Specialist Groups:** These types of social networks are specifically designed for core field workers like doctors, scientists, engineers, members of the corporate industries. A very good example for this type of network is LinkedIn.
 - d) **Networks for Fine Arts:** These types of social networks are dedicated to people linked with music, painting and related arts and have lots of useful networking information for all aspiring people of the same line.
 - e) **Police and Military Networks:** These types of networks, though not on a public domain, operate much like social networks on a private domain due to the confidentiality of information.
 - f) **Sporting Networks:** These types of social networks are dedicated to people of the sporting fraternity and have a gamut of information related to this field. Examples of these include Athlinks.

- g) **Mixed Networks:** There are a number of social networks that have a subscription of people from all the above groups and is a heterogeneous social network serving multiple types of social collaboration.
- h) **Social Networks for the 'inventors':** These are the social networks for the people who have invented the concept of social networks, the developers and architects that have developed the social networks. Examples include Technical Forums and Mashup centres.
- i) **Shopping and Utility Service Networks:** The present world of huge consumerism has triggered people to invest in social networks, which will try to analyze the social behavior and send related information for the same to respective marts and stores.
- j) **Others:** Apart from the networks outlined above, there are multiple other social networks, which serve huge number of the internet population in multiple ways.

Q.No.45. Explain the life cycle of social networks? (B)

(N15 MTP1)

- The concept of social net works and the components of Web 2.0, which are significant for social networks.
- For any social network, there are a number of steps in its life cycle.
- In each of the life cycle step of an online social network, Web 2.0 concepts have a great influence.
- Consider the diagram below for social network life cycle.



- For all the steps in the life cycle, web 2.0 has provided tools and concepts which are not only cost effective and easy to implement but also to achieve desired objectives.
- Web 2.0 provides excellent communication mechanisms concepts like blogging and individual email filtering too keep everyone in the network involved in the day to day activities of the networks.

Q.No.46. Explain various applications of Web 2.0. (A)

Social networks built on Web 2.0 concepts has become so cost affordable and easy to use that more and more people are migrating to this wave.

Web 2.0 finds applications in different fields, some of them are:

- a) **Social Media:** It is an important application of web 2.0. It provides a basic way in which people communicate and share information. It also offers a number of online tools and platforms that can be used by the users to share their data, perspectives, and opinions among other user communities.

- b) **Marketing:** It allows the marketers to collaborate with consumers on various aspects such as product development, service enhancement, and promotion. Consumer-oriented companies use networks such as Twitter and Face book as common elements of multichannel promotion of their products.
- c) **Education:** Web 2.0 technologies can help the education scenario by providing students and faculty with more opportunities to interact and collaborate with their peers. By utilizing the tools of Web 2.0, the students get the opportunity to share what they learn with other peers by collaborating with them.

Q.No.47. Explain the benefits and challenges for social networks using web 2.0? (A)

Benefits:

- a) It provides a platform where users of the network need not to worry about the implementation of underlying technology at a very affordable cost and a very easy pickup time.
- b) Concepts of Web 2.0 like blogging are some things that people do on a day -to-day basis and no new knowledge skills are required.
- c) Web 2.0 techniques are very people centric activities and its adaptation is very fast.
- d) People are coming much closer to another and all social and geographical boundaries are being reduced at lightning speed, *which is one of the biggest sustenance factors for any social network*.
- e) Using Web 2.0 also increases the social collaboration to a very high degree and this in turn helps in achieving the goals for a social network.

Challenges:

- a) One of the major aspects is data security and privacy and in such public domains, there is a huge chance of data leak and confidentiality loss because there are usually no centrally mandated administrative services to take care of such aspects.
- b) Privacy of individual users also arises and can create a huge problem if malicious users somehow manage to perpetuate the social networks.
- c) This is more important for public utility networks like doctors and police.
- d) A majority of the social networks are offline, and for bringing these under the purview of online social networks, a lot of education and advertising needs to be done, which itself becomes a cost burden, when the people involved are not computer literate.
- e) This becomes more viable in the areas of the world that are developing and do not have the basic amenities.
- f) The fact is that these areas are the ones that can benefit the most using social networks in an online mode and a huge amount of effort would be needed to help them using the technologies.

Q.No.48. Explain Web 3.0? Explain the major components of Web 3.0. (A)

1. The Web 3.0 also known as Semantic Web, which generated data without direct user interaction.
2. Web 3.0 is considered as the next logical step in the evolution of the Internet and Web technologies.
3. It allows drag and drop mash-ups, widgets, user behavior, user engagement, and consolidation of dynamic web contents depending on the interest of the individual users.
4. It uses the "Data Web" Technology, which features the data records that are publishable and reusable on the web through query-able formats.
5. An example of typical Web 3.0 application is the one that uses content management systems along with artificial intelligence.

6. *These systems are capable of answering the questions posed by the users, because the application is able to think on its own and find the most probable answer, depending on the context, to the query submitted by the user.*
7. Web 3.0 can also be described as a "machine to user" standard in the internet.

Major components of Web 3.0:

(N16-4M, RTP M17)

- a) **Semantic Web:** It provides the web user a common framework that could be used to share and reuse the data across various applications, enterprises, and community boundaries.
- b) **Web Services:** It is a software system that supports computer-to-computer interaction over the Internet. For example - the popular photo-sharing website Flickr provides a web service that could be utilized and allows searching for images.

Q.No.49. Write short notes on mobile computing and BYOD.

(RTP N15)

1. Mobile Computing and Buy Your Own Devices (BYOD): Mobile computing, including BYOD is the single most radical shift in business since the PC revolution of the 1980s.
2. Over the next decade, it will have a huge impact on how people work and live, how companies operate, and on the IT infrastructure.
3. These services will focus on the issues and opportunities surrounding the new way to communicate and consume computing services. Mobile computing is not just PCs on the move.
4. Mobile devices such as smart phones, tablets, and the iPod Touch, the last PDA standing are a radically different kind of devices, designed from the ground up as end points of data networks both internal corporate networks and the Internet rather than primarily as stand-alone devices.
5. They are optimized for mobility, which means that they have to be light, easy to handle, and maximize battery life.
6. Where laptops has a three hour battery life, the tablet and smartphone regularly run 12 hours or more between charging and serve as windows into the Cloud.

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THE END