

CHAPTER 8 EMERGING TECHNOLOGIES

1. Write a note on Grid Computing.

- - It is a network of computing or processor machines
- managed with a kind of software known as 'Middleware'
- in order to access and use the resources remotely.
- The managing activity of grid resources through middleware is called 'Grid Services'.

Grid Computing is more popular due to following reasons:

- * It has the ability to make use of unused computing power and
- * thus it is cost effective solution.
- * This enables heterogeneous resources of computers
- * to work co-operatively and collaboratively
- * to solve a scientific problem.

2. Write a note on Cloud Computing.

- - It means use of computing resources as a service
- through networks, typically the internet.
- - With cloud computing, the users can access to database resources
- via internet from anywhere for as long as they need
- without worrying about the maintenance or management of actual resources.
- - Cloud computing is both, a software and hardware based computing resources
- delivered as a networked services.
- Cloud computing enables any time access to shared pool of applications and resources.
- The best example for cloud computing is "Google Apps".

3. Explain some pertinent similarities and differences between Cloud and Grid Computing.

- Similarities:**
- * Both are scalable.
 - * Both involve multi-tasking and multi-tenancy.

Differences

GRID COMPUTING	CLOUD COMPUTING
It is not suitable for storing an object as small as 1 byte	It is well suitable for storing an object as small as 1 byte and as larger as 5GB or even several terra bytes
It focuses on computationally intensive operations	It offers two types of instances Standard and High CPU

CHAPTER 8 EMERGING TECHNOLOGIES

4. Explain major goals of Cloud Computing.

- To enable “anywhere access” for ever increasing users.
- To enable rapid provision of resources as needed.
- To create highly efficient IT eco system.
- To scale the IT eco system – quickly
 - easily
 - cost effectively.
- To reduce the costs related to IT power consumption.
- To access services and data from anywhere at any time.
- To consolidate IT infrastructure into more integrated and manageable environment.

5. Explain the characteristics of Cloud Computing.

a) High Scalability:

- Cloud environments enable servicing of business requirements for larger audiences through high scalability.

b) Agility:

- The cloud works in the “distributed mode” environment.
- It shares resources among users and tasks while improving efficiency and agility.

c) High Availability and Reliability:

- Availability of servers is supported to be high and more reliable as the chances of infrastructure failure are minimal.

d) Multi-Sharing:

- With the cloud working in a distributed and shared mode multiple users and applications can work more efficiently with the cost reduction by sharing common infrastructure.

e) Services in pay per use mode:

- SLA's between the provider and user must be defined when offering services in pay per use mode.
- API may be offered to the users so they can access services on the cloud by using these API's.

f) Virtualisation:

- This technology allows servers and storage devices to increasingly share and utilize application by easy migration from physical server to another.

g) Performance:

- It is monitored and consistent and loosely coupled architecture are constructed using web services as the system interface.

h) Maintenance:

- The cloud computing applications are easier because they are not to be installed on each user's computer and can be accessed from different places.

CHAPTER 8 EMERGING TECHNOLOGIES

6. Explain the advantages of Cloud Computing.

a) Cost Efficiency:

- Cloud computing is the most cost efficient method to use, maintain and upgrade.
- It is available at much cheaper rates.
- Hence it can significantly lower the IT's expenses of the company.

b) Almost Unlimited Storage:

- Storing information in the cloud gives us almost unlimited storage capacity.
- Hence no need to worry about running out of storage space.

c) Backup and Recovery:

- Since all the data is stored in the cloud, backing it up and restoring the same is relatively much easier.

d) Easy Access to Information:

- Once registered in the cloud, one can access the information from anywhere through internet connection.
- It lets one move beyond time zone and geographic location issues.

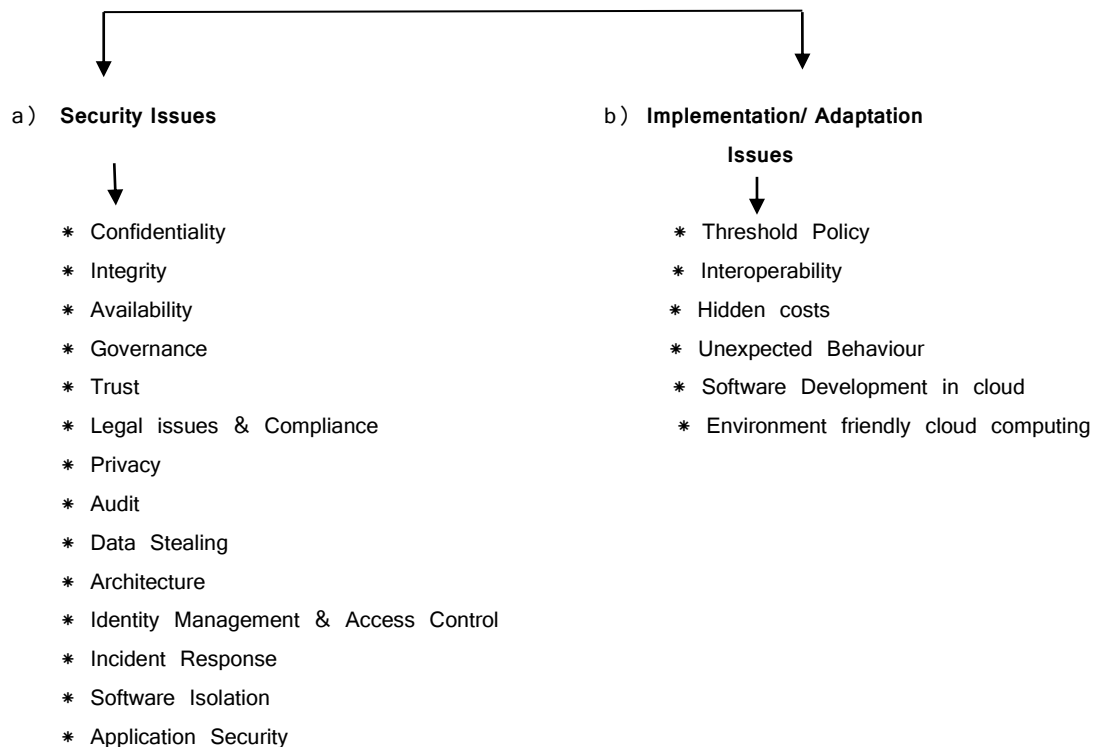
e) Automatic Software Integration:

- In the cloud, software integration usually occurs automatically.
- It allows us to customize the options with great ease.

f) Quick Deployment:

- Cloud computing gives us the advantage of quick deployment.
- Once we opt for this method of functioning, the entire system can be fully functional in a matter of few minutes.

7. Explain the Issues relating to Cloud Computing.



CHAPTER 8 EMERGING TECHNOLOGIES

8. **Explain Cloud Computing Architecture (CCA).**

- The CCA of a cloud solution is the structure of the system which comprises of
 - On-premise and cloud resources
 - Services
 - Middleware
 - Software components
 - Their geo-location
 - Their externally visible properties &
 - The relation between them.
- It typically involves into multiple cloud components communicating with each other over a loose coupling mechanism such as messaging queue.

The cloud computing architecture consists of

a) **Front End Architecture:**

- It is the side the computer user sees and interacts.
- It comprises of the clients devices and some other applications needed for accessing the cloud computing system.

b) **Back End Architecture:**

- Back end refers to some service facilitating peripherals.
- In cloud computing the back end is cloud itself.
- It encompasses various – computer machines
 - data storage system
 - servers.
- Group of these clouds make up a whole cloud computing system.

9. **Explain briefly the types of Clouds.**

a) **Private Clouds:**

- These are also known as internal clouds.
- These are exclusively used for the organization benefits.
- These are built primarily by the IT department within the enterprises.

Characteristics:

- It is secure.
- It is centrally controlled by the organization.
- Weak Service Level Agreements.

Advantages:

- It improves average server utilisation.
- It reduces the operation cost.
- It reduces the administration overheads.
- It provides a high level of security and privacy
- It is small in size and controlled and maintained by the organization.

Limitation:

- IT teams in the organization may have to invest in the clouds independently.

CHAPTER 8 EMERGING TECHNOLOGIES

b) **Public Clouds:**

- They are also called as provider clouds.
- This environment is used by general public.
- This includes individuals, corporate and other types of organizations.
- These are administered by third parties or vendors over the internet.
- The services are offered in pay per use basis.
- It consists of users from all over the world, where in a user can simply purchase resources on an hourly basis and work with the resources which are available in the cloud providers premises.

Characteristics:

- Highly Scalable
- Affordable
- Less Secure
- Highly Available
- Stringent Service Level Agreements.

Advantages:

- It is widely used at affordable cost.
- Strict SLA's are followed.
- There is no limit for the number of users.
- It allows the organization to deliver highly scalable and reliable application rapidly.

Limitation:

- Security assurance is the major limitation.

c) **Hybrid Clouds:**

- It is a combination of at least one private cloud and at least one public cloud.
- It usually consists of infrastructure, platforms and applications.
- 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.
- It is typically offered in either of two ways.

Characteristics:

- Scalable
- Partially Secure
- Stringent Service Level Agreement
- Complex Cloud Management.

Advantages:

- It is highly scalable.
- It provides better security than public clouds.

Limitation: * Complex to manage

- * Security is the concern.

CHAPTER 8 EMERGING TECHNOLOGIES

d) **Community Cloud:**

- It is the cloud infrastructure that is provisioned for exclusive use by a specific community of consumers from organizations that have shared concern.
- It may be owned, managed and operated by – one or more organizations or
 - third party or
 - combination of them.
- It may exist on or off premises.

Characteristics:

- Collaborative and Distributive maintenance.
- Partially Secure
- Cost Effective

Advantages:

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

Limitations:

- Autonomy of the organization is lost.
- Security feature is not good as private cloud.
- It is not suitable in the cases where there is no collaboration.

10. **Explain the difference between On-premise and Outsourced Private Clouds.**

BASIS	ON-PREMISE PRIVATE CLOUD	OUTSOURCED PRIVATE CLOUD
MANAGEMENT	• By organization itself	• By third party
SERVICE LEVEL AGREEMENTS	• SLA's are defined between organization and its users. • Users have broader access rights than general public cloud users and • Service providers are able to provide service effectively.	• 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 • Organisations connect to the third party by means of either dedicated connection or through internet.
SECURITY AND DATA PRIVACY	• Highly secure • The security attacks are possible from an internet user only.	• Less secure • The security threat is from third party and the internal employee.
PERFORMANCE	• The performance depends on the network and resources. • It can be controlled by the network management team.	• The performance of the cloud depends on the third party that is outsourcing the cloud.

CHAPTER 8 EMERGING TECHNOLOGIES

11. Write a note on mobile Computing.

- – It refers to the technology that allows transmission of data via computer
 - without having to be connected to the fixed physical link.
- – It has become a very important and rapidly evolving technology
 - as it allows users to transmit data from remote location to other remote or fixed location.
- – This proves to be the solution for the biggest problem of business people on the move i.e. mobility.

12. Explain the Components of Mobile Computing

- **Mobile Communication:**
 - * This refers to the infrastructure put in place, to ensure seamless and reliable communication goes on.
 - * This would include – communication properties
 - protocols
 - data formats and
 - concrete technologies.
- **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
 - tablets
 - personal computers &
 - personal digital assistants.
 - * The characteristics of mobile computing hardware are defined by – the size and form factor
 - weight
 - microprocessor
 - primary & secondary storage
 - means of input & output.
- **Mobile Software:**
 - * It is the actual programme that runs on the mobile hardware.
 - * It deals with the characteristics and requirements of mobile applications.
 - * It is the operating system of that appliance.
 - * It is the essential component that makes the mobile device operates.

13. Explain the benefits of Mobile Computing

- It provides **mobile workforce** with remote access to work order details.
- It provides **remote access to the corporate knowledge** at the job location.
- It enables mobile sales personnel to **update** the work order status **in real time**.
- It enables us to **improve the management effectiveness**.
- It facilitates **access to the corporate service and information** at any time, from anywhere.

CHAPTER 8 EMERGING TECHNOLOGIES

14. State the limitations of Mobile Computing.

- a) **Insufficient Bandwidth:**
 - * Mobile internet access is generally slower than direct cable connection.
- b) **Security Standards:**
 - * Security is the major concern while concerning the mobile computing standards.
- c) **Power Consumption:**
 - * Mobile computers must rely entirely on battery power, when a power outlet or portable generator is not available.
- d) **Transmission Interferences:**
 - * Weather, terrain and the range from the nearest signal point can all interfere with signal reception.
- e) **Potential Health Hazards:**
 - * Cell phones may interfere with sensitive medical devices and also cause health problems.
- f) **Human Interface with device:**
 - * Screens and keyboards tend to be small, which may make them hard to use.

15. Explain the issues in Mobile Computing.

- a) **Security Issues:**
 - * Wireless networks relatively have more security requirements than wired networks.
- b) **Bandwidth:**
 - * Bandwidth utilization can be improved by logging and compression of data before transmission.
- c) **Location Intelligence:**
 - * As the mobile computers move, they encounter networks with different features.
 - * A mobile computer must be able to switch from infrared mode to radio mode, as it moves from indoors to outdoors.
 - * It should be capable of switching from cellular mode of operation to satellite mode, as they moves from urban to rural areas.
- d) **Power Consumption:**
 - * Mobile computers will rely on their batteries as the primary power source.
 - * Power consumption should be minimized to increase battery life.
- e) **Revising the technical architecture:**
 - * To provide complete connectivity among mobile users, the current communication technology must be revised, to incorporate mobile connectivity.
- f) **Reliability, coverage, capacity and cost:**
 - * At present wireless network – is less reliable
 - have less geographic coverage
 - have reduced bandwidth
 - are slower and
 - more costly.
- g) **End to end Design and Performance:**
 - * Since mobile computing involves multiple networks & multiple application server platform
 - * end to end technical compatibility, server capacity design and network response time estimates are difficult to achieve.
- h) **Business Challenge:**
 - * Mobile computing faces business challenges, due to lack of trained professionals and various reasons.

CHAPTER 8 EMERGING TECHNOLOGIES

16. Explain how mobile computing works.

- The user enters or access data, using the application on handheld computing device.
- Using one of several connecting technologies, the new data are transmitted from handheld to site's information system.
- Now both systems have the same information and are in sync.
- The process work the same way starting from the other direction.

Note:

- *The process is similar to the way the worker's desktop PC access the organization's application's, except that
 - *user's device is not physically connected to the organization's system.
- *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.

17. Explain in detail about Green Computing or Green IT.

- It refers to the study and practice of environmentally sustainable computing or IT. In other words,
- It is the study and practice of
 - designing, manufacturing, using and disposing
 - computers, servers, associated subsystems and peripheral devices
 - efficiently and effectively with highly mitigated negative impact on the environment.

Objectives of Green Computing:

- To reduce the use of hazardous materials.
- To maximize energy efficiency during the product life cycle.
- To promote recyclability or biodegradability of defunct products and waste of factory.

18. Explain the Best practices of Green Computing.

a) Develop a sustainable green computing plan:

- * Involve stakeholders to include checklists, recycling policies_etc, in organisational policies and plans.
- *_Include power usage, reduction of paper consumption etc, in organisational policies and plans.
- * Use Cloud Computing.

b) Recycle:

- * Dispose e-waste according to regulations.
- * Discard used or unwanted electronic equipment in a environmentally responsible manner.
- * Recycle computers through manufacturer's recycling services.

CHAPTER 8 EMERGING TECHNOLOGIES

c) **Make environmentally sound purchase decisions:**

- * Purchase of desktop computers, notebooks and monitors based on environmental attributes.
- * Provide a clear, consistent set of performance criteria for the design of products.
- * Use server and storage virtualisation.

d) **Reduce paper consumption:**

- * Reduce paper consumption by use of e-mail and electronic archiving.
- * Use of 'track changes' feature in electronic document.
- * Use online marketing rather paper based marketing.

e) **Conserve energy:**

- * Use Liquid Crystal Display (LCD) Monitor rather than Cathode Ray Tube (CRT) monitor.
- * Use notebook computer rather than desktop computer.
- * Power down the CPU and all peripherals during extended period of inactivity.
- * Power up and power down energy intensive peripherals according to need.
- * Try to do computer related tasks during contiguous, intensive blocks of time.
- * Adapt more of web conferencing offers.

19. **Write a note on Bring Your Own Device.**

- It refers to the business policy that allows employees to use their preferred computing devices like – smart phones, laptops etc, for business purposes.
- It means employees are welcome to use personal devices to connect to the corporate network to access information and application.

Advantages of BYOD

- It helps employees to use their own devices when at work, hence **Happy Employees**.
- The employees could involve in the more **Financial Savings** to the organisation.
- IT department **does not** have to provide end user **support and maintenance** for all these devices.
- Employees are generally proactive in adoption of new technologies that results in **enhanced productivity**.
- The **efficiency of employee is more** when the employee works on his own device.

CHAPTER 8 EMERGING TECHNOLOGIES

20. Explain emerging BYOD Threats.

a) Network Risk:

- * It is normally exemplified and hidden in “**Lack of Device visibility**”.
- * As network visibility is of high importance this lack of visibility can be hazardous.
- * The network security lines become blurred when BYOD is implemented.

b) Device Risk:

- * It is normally exemplified and hidden in “**Loss of Devices**”.
- * A lost or stolen device can result in an enormous financial and reputational embarrassment to an organisation.

c) Application Risk:

- * It is normally exemplified and hidden in “**Application Viruses and Malware**”.
- * Organisation's are not clear in deciding that “who is responsible for device security”.

d) Implementation Risk

- * It is normally exemplified and hidden in “**Weak BYOD Policy**”.
- * A weak policy fails to educate the users, thereby increasing vulnerability to the threats.

21. Write a note on Social Media.

- A social network is usually created by a group of individuals, who have a common interests and objectives.
- There are usually a set of network formulators followed by a broadcast to achieve the network membership.
- This happens both in public and private groups depending upon the confidentiality of the network.
- Success of a social network mainly depends on the member's contribution, interest and motivation along with technology backbone or platform support.
- Implementing social networks and sustaining them is one of the biggest challenge.

22. Explain the types of Social Network.

a) Social Contact Networks:

- * They are formed to keep contact with friends and family.
- * Example– Orkut, Face book and Twitter.

b) Study Circles:

- * These are social networks which mainly dedicated for students.
- * Example– Fledge Wing, College Tonight.

c) Social Network for Specialist Groups:

- * These are specifically designed for core field workers like doctors, engineers, scientists etc.
- * Example– LinkedIn

d) Network for Fine Arts:

- * These are dedicated to people linked with music, painting and related arts.

CHAPTER 8 EMERGING TECHNOLOGIES

- e) **Police and military Networks:**
 - * These types of networks are not operating in a public domain.
 - * They operate in a private domain, due to confidentiality of information.
- f) **Sporting Network:**
 - * These are dedicated to people of the sporting fraternity.
 - * Example– Athlinks.
- g) **Mixed Networks:**
 - * It is a heterogeneous social network, serving multiple types of social collaboration.
- h) **Social Networks for the ‘Inventors’:**
 - * These are dedicated for the people, who have invented the concept of social networks.
 - * Example– Technical Forums and Mash-up Centres.
- i) **Shopping and Utility Service Networks:**
 - * These are social networks, which will try to analyze the social behaviour and send related information for the same to respective marts and stores.
- j) **Others:**
 - * Apart from the networks like above, there are multiple other social networks, which serve huge number of people.

23. **Write a note on Web 2.0**

- It is the term given to second generation of the World Wide Web.
- It is focused on the ability of the people to collaborate and share information online.
- It refers to the transition from static HTML web pages to a more dynamic web.
- The power of web 2.0 is to create new relationship between collaborators and information.
- The two major contributors of web 2.0 are:
 - * the technological advances enabled by Ajax (Asynchronous Java Script and XML) &
 - * RSS (Really Simple Syndication).
- One of the most significant differences between web 2.0 and the traditional WWW is the migration from “Read-only web” to “Read-write web”.

24. **Explain briefly the components of Web 2.0**

- a) **Communities:**
 - * These are an online space formed by a group of individuals.
 - * They share their thoughts, ideas etc and have 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) **Bloggng:**
 - * A blog is a journal, diary or a personal website.
 - * It is maintained on the internet.
 - * It is updated by the user frequently.
 - * It allows a user to make a post to a web log or a blog.

CHAPTER 8 EMERGING TECHNOLOGIES

d) **Wiki:**

- * It is a set of co-related pages on a particular subject.
- * It allows user to share content.
- * It is very easy to create and maintain.

e) **Usage of Ajax and other new Technologies:**

- * Ajax is a way of developing web application.
- * That combines XHTML and CSS standards based presentation.
- * That allows – interaction with the web page and
 - data interchange with XML and XSLT.

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.
- * It is also known as Social Bookmarking.

g) **File sharing/Podcasting:**

- * This is the facility, which helps the users to send their media files and related content through online for other people of the network to see and contribute.

h) **Mash-ups:**

- * This is the facility, by using this people on the internet, can congregate services from multiple vendors, to create a completely new service.

25. **Explain the application of Web 2.0**

a) **Social Media:**

- * Social media or social network is an important application of web 2.0.
- * Because it provides a fundamental shift i.e. the way people communicate and share information.

b) **Marketing:**

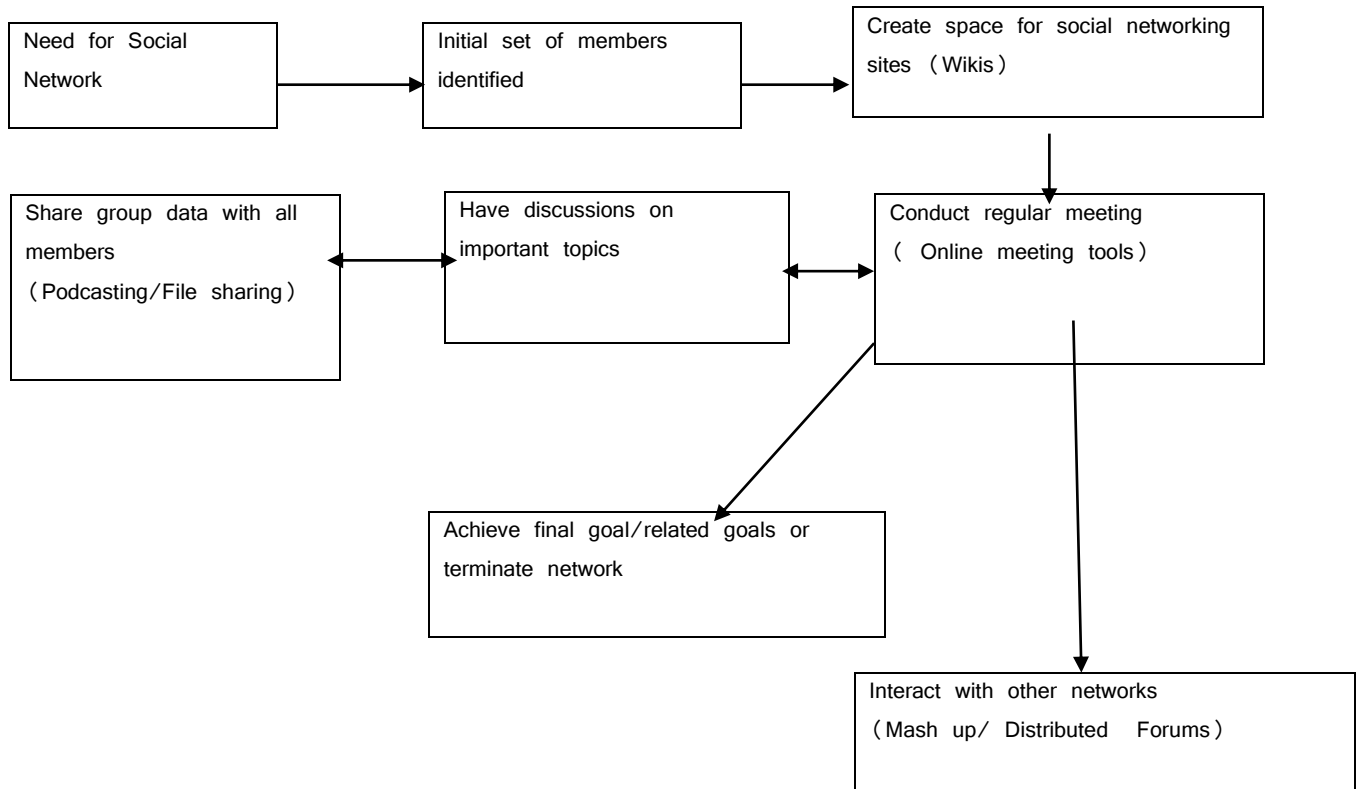
- * Web 2.0 offers excellent opportunities for marketing by engaging customers in various stages of the product development cycle.
- * Consumer-oriented companies use networks such as Twitter and Facebook as common elements of multi channel promotion of their products.

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.

CHAPTER 8 EMERGING TECHNOLOGIES

26. Write a note on life cycle of a social networks with Web 2.0.



27. Write a note on Web 3.0

- ❖ The term Web 3.0 is also known as Semantic Web.
- ❖ It is considered as the next logical step in the evolution of internet and web technologies.
- ❖ Web 3.0 standard uses – semantic web technology
 - drag and drop mash-ups
 - widgets
 - user behaviour
 - user engagement
 - consolidation of dynamic web contentsdepending on the interest of the individual users.
- ❖ It uses the “Data Web” technology, which features the data records that are publishable and reusable on the web through query able formats.
- ❖ It incorporates the latest researches in the field of artificial intelligence.
- ❖ An example of typical web 3.0 application is the one that uses content management system along with artificial intelligence.

CHAPTER 8 EMERGING TECHNOLOGIES

28. Explain the Components of Web 3.0

a) Semantic Web:

- * this provides the web users a common framework that could be used to share and reuse data across various – applications
 - enterprise &
 - community boundaries.
- * This allows the data and information to be readily intercepted by machines.

b) Web Services:

- * It is a software system that supports computer to computer interaction over the internet.
- *Example– a popular photo-sharing website Flickr.

29. Explain the approaches how to minimise the Security Issues.

ISSUE	APPROACH
CONFIDENTIALITY	Preventing unauthorized users from gaining access to critical information of any particular user
INTEGRITY	Ensures unauthorized modification, destruction or creation of information cannot take place
AVAILABILITY	Ensuring authorized users getting access they require.
LEGITIMATE	Ensuring that only authorized users have access to services
ACCOUNTABILITY	Ensuring that the users are held responsible for their security related activities.