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INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

Unit - 5 CLOUD COMPUTING

Cloud Computing Issues

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Syllabus - Unit - V

UNIT V

Issues in cloud computing, Implementing real time application over cloud platform Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

Issues in Cloud Computing

Cloud Computing is Internet-based computing, where shared resources, software, and information are provided to computers and other devices on demand.

These are major issues in Cloud Computing:

- Privacy
- Compliance
- Security
- Sustainability

Privacy

The user data can be accessed by the host company with or without permission. The service provider may access the data that is on the cloud at any point in time. They could accidentally or deliberately alter or even delete information.

Compliance

There are many regulations in places related data and hosting. To comply with regulations (Federal Information Security Management Act, Health Insurance Portability and Accountability Act, etc.) user may have to adopt deployment modes that are expensive.

Security

Cloud-based services involve third-party for storage and security.Can one assume that a cloud-based company will protect and secure one's data if one is using their services at a very low or for free? They may share user's information with others.Security presents a real threat to cloud.

Sustainability

This issue refers to minimizing the effect of cloud computing on environment. Citing the server's effects on the environmental effects of cloud computing, in areas where climate favors natural cooling and renewable electricity is readily available, the countries with favorable conditions, such as Finland, Sweden, and Switzerland are trying to attract cloud computing data centers. But other than nature's favors, would these countries have enough technical infrastructure to sustain the high-end clouds

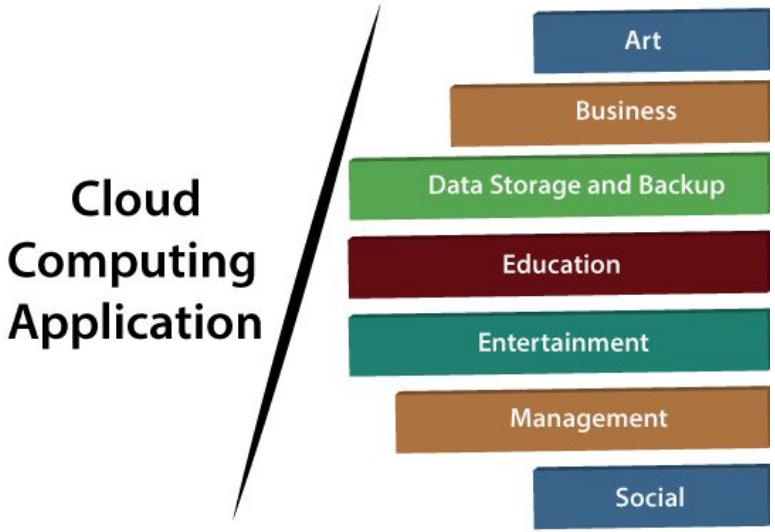
Abuse

While providing cloud services, it should be ascertained that the client is not purchasing the services of cloud computing for nefarious purpose. In 2009, a banking Trojan illegally used the popular Amazon service as a command and control channel that issued software updates and malicious instruction to PCs that were infected by the malware.

Implementing real time application over cloud platform

Cloud service providers provide various applications in the field of art, business, data storage and backup services, education, entertainment, management, social networking, etc.

7-17



Art Applications

Cloud computing offers various art applications for quickly and easily design attractive cards, booklets, and images. Some most commonly used cloud art applications are given below:

i Moo

Moo is one of the best cloud art applications. It is used for designing and printing business cards, postcards, and mini cards.

ii. Vistaprint

Vistaprint allows us to easily design various printed marketing products such as business cards, Postcards, Booklets, and wedding invitations cards.

iii. Adobe Creative Cloud

Adobe creative cloud is made for designers, artists, filmmakers, and other creative professionals. It is a suite of apps which includes PhotoShop image editing programming, Illustrator, InDesign, TypeKit, Dreamweaver, XD, and Audition.

Business Applications

Business applications are based on cloud service providers. Today, every organization requires the cloud business application to grow their business. It also ensures that business applications are 24*7 available to users.

There are the following business applications of cloud computing -

i. MailChimp

MailChimp is an email publishing platform which provides various options to design, send, and save templates for emails.

iii. Salesforce

Salesforce platform provides tools for sales, service, marketing, e-commerce, and more. It also provides a cloud development platform.

iv. Chatter

Chatter helps us to share important information about the organization in real time.

Business Applications

v. Bitrix24

Bitrix24 is a collaboration platform which provides communication, management, and social collaboration tools.

vi. Paypal

Paypal offers the simplest and easiest online payment mode using a secure internet account. Paypal accepts the payment through debit cards, credit cards, and also from Paypal account holders.

vii. Slack

Slack stands for Searchable Log of all Conversation and Knowledge. It provides a user-friendly interface that helps us to create public and private channels for communication.

viii. Quickbooks

Quickbooks works on the terminology "Run Enterprise anytime, anywhere, on any device." It provides online accounting solutions for the business. It allows more than 20 users to work simultaneously on the same system.

Data Storage and Backup Applications

Cloud computing allows us to store information (data, files, images, audios, and videos) on the cloud and access this information using an internet connection. As the cloud provider is responsible for providing security, so they offer various backup recovery application for retrieving the lost data.

A list of data storage and backup applications in the cloud are given below -

i. Box.com

Box provides an online environment for secure content management, workflow, and collaboration. It allows us to store different files such as Excel, Word, PDF, and images on the cloud. The main advantage of using box is that it provides drag & drop service for files and easily integrates with Office 365, G Suite, Salesforce, and more than 1400 tools.

Data Storage and Backup Applications

ii. Mozy

Mozy provides powerful online backup solutions for our personal and business data. It schedules automatically back up for each day at a specific time.

iii. Joukuu

Joukuu provides the simplest way to share and track cloud-based backup files. Many users use joukuu to search files, folders, and collaborate on documents.

iv. Google G Suite

Google G Suite is one of the best cloud storage and backup application. It includes Google Calendar, Docs, Forms, Google+, Hangouts, as well as cloud storage and tools for managing cloud apps. The most popular app in the Google G Suite is Gmail. Gmail offers free email services to users.

Education Applications

Cloud computing in the education sector becomes very popular. It offers various online distance learning platforms and student information portals to the students. The advantage of using cloud in the field of education is that it offers strong virtual classroom environments, Ease of accessibility, secure data storage, scalability, greater reach for the students, and minimal hardware requirements for the applications.

There are the following education applications offered by the cloud -

i. Google Apps for Education

Google Apps for Education is the most widely used platform for free web-based email, calendar, documents, and collaborative study.

Education Applications

ii. Chromebooks for Education

Chromebook for Education is one of the most important Google's projects. It is designed for the purpose that it enhances education innovation.

iii. Tablets with Google Play for Education

It allows educators to quickly implement the latest technology solutions into the classroom and make it available to their students.

iv. AWS in Education

AWS cloud provides an education-friendly environment to universities, community colleges, and schools.

Entertainment Applications

Entertainment industries use a multi-cloud strategy to interact with the target audience. Cloud computing offers various entertainment applications such as online games and video conferencing.

i. Online games

Today, cloud gaming becomes one of the most important entertainment media. It offers various online games that run remotely from the cloud. The best cloud gaming services are Shaow, GeForce Now, Vortex, Project xCloud, and PlayStation Now.

ii. Video Conferencing Apps

Video conferencing apps provides a simple and instant connected experience. It allows us to communicate with our business partners, friends, and relatives using a cloud-based video conferencing. The benefits of using video conferencing are that it reduces cost, increases efficiency, and removes interoperability.

Management Applications

Cloud computing offers various cloud management tools which help admins to manage all types of cloud activities, such as resource deployment, data integration, and disaster recovery. These management tools also provide administrative control over the platforms, applications, and infrastructure.

Some important management applications are -

i. Toggl

Toggl helps users to track allocated time period for a particular project.

ii. Evernote

Evernote allows you to sync and save your recorded notes, typed notes, and other notes in one convenient place. It is available for both free as well as a paid version. It uses platforms like Windows, macOS, Android, iOS, Browser, and Unix.

iii. Outright

Outright is used by management users for the purpose of accounts. It helps to track income, expenses, profits, and losses in real-time environment.

iv. GoToMeeting

GoToMeeting provides Video Conferencing and online meeting apps, which allows you to start a meeting with your business partners from anytime, anywhere using mobile phones or tablets. Using GoToMeeting app, you can perform the tasks related to the management such as join meetings in seconds, view presentations on the shared screen, get alerts for upcoming meetings, etc.

Social Applications

Social cloud applications allow a large number of users to connect with each other using social networking applications such as Facebook, Twitter, Linkedln, etc.

There are the following cloud based social applications -

i. Facebook

Facebook is a social networking website which allows active users to share files, photos, videos, status, more to their friends, relatives, and business partners using the cloud storage system. On Facebook, we will always get notifications when our friends like and comment on the posts.

ii. Twitter

Twitter is a social networking site. It is a microblogging system. It allows users to follow high profile celebrities, friends, relatives, and receive news. It sends and receives short posts called tweets.

iii. Yammer

Yammer is the best team collaboration tool that allows a team of employees to chat, share images, documents, and videos.

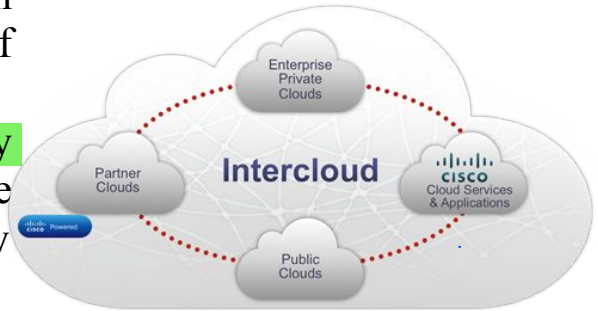
iv. LinkedIn

LinkedIn is a social network for students, freshers, and professionals.

What is Intercloud?

18 – 25

- Intercloud is a network of clouds that are linked with each other. This includes private, public, and hybrid clouds that come together to provide a seamless exchange of data.
- The concept of Intercloud was introduced as a research project in 2008 at Cisco, which was later developed by the Institute of Electrical and Electronics Engineers (IEEE).
- The Intercloud platform provides end-to-end private connectivity for cloud applications, enabling customers to address the problem while ensuring security, the privacy of their data at any point-of-time.
- Most Intercloud platforms provide the 'pay-per-use' service flexibility, giving clients the opportunity to manage costs effectively, according to the cloud consumption



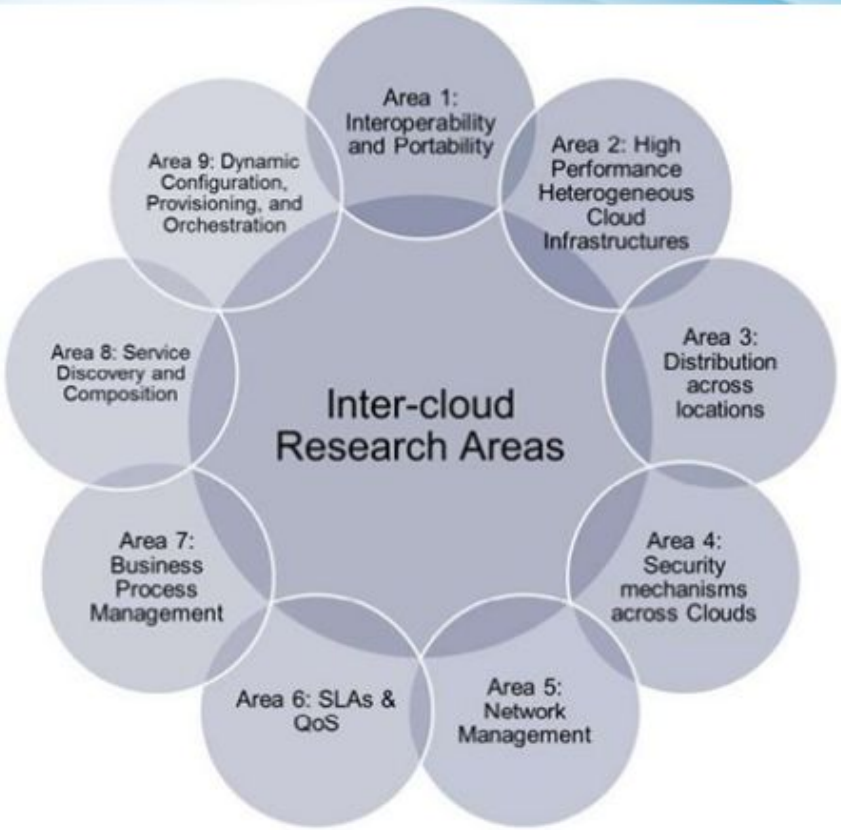
Inter-cloud Challenges

- Multi-Cloud
  - Serial or simultaneous use of services from diverse provider
- Hybrid Cloud
  - Coordinated use of cloud service services across isolation and external cloud services.
- Federated Cloud
  - Cloud provider sub-contracts capacity from other providers and also offer sparse capacity to a federation of cloud providers.
- Multi-cloud scenarios-criteria
  - Decision actor and decision time
  - Decision actor determines whether the decision to use diverse cloud is taken by cloud provider or broker or user.
  - Decision time classifies the application deployment at a time

Inter-cloud Challenges

- Multi-Cloud setup challenges
  - Scalability and wide resource availability
  - Cost efficiency and energy savings
  - Avoid vendor lock-in
  - Federated to reduce latency and other legal constraints, availability

Inter-cloud research & challenges



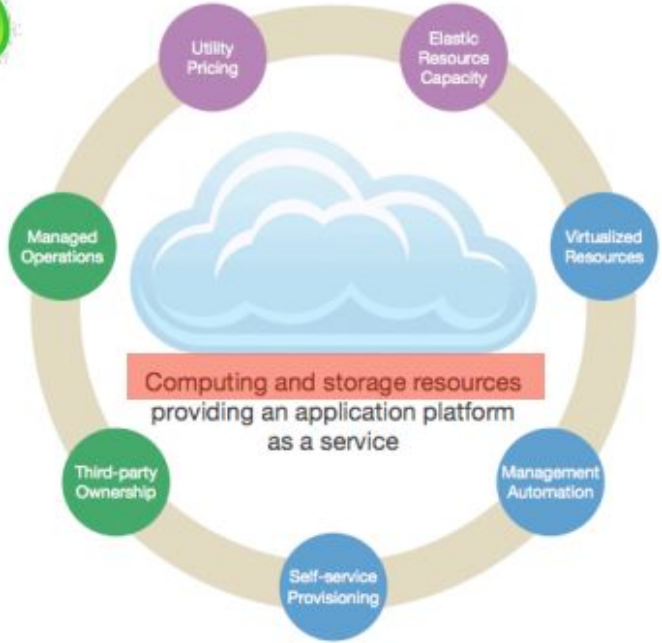
QOS - Quality of Service

- Quality of service (QoS) is the description or measurement of the overall performance of a service, such as a telephony or computer network or a cloud computing service, particularly the performance seen by the users of the network.
- Quality of service is the ability to provide different priority to different applications, users, or data flows, or to guarantee a certain level of performance .
- QoS criteria are numerous and is highly dependant of the application.. Throughput, Delay, jitter, Loss rate ... Or of the end-user Image resolution, sound quality, appropriate language, ...

QOS - Common Service Specification

- **Loss:** probability that a flow's data is lost
- **Delay:** time it takes a packet's flow to get from source to destination
- **Delay jitter:** maximum difference between the delays experienced by two packets of the flow
- **Bandwidth:** maximum rate at which the source can send data

QoS for Cloud



Economic Elements:
Pay-as-you-go, pay-as-you-grow, no CAPEX.

Architectural Elements:
Simple, abstract environment for development.

Strategic Elements:
Focus on your core business, leave the rest to someone else.

How to provide QoS?

Scheduling, admission control, traffic control, dynamic resource provisioning

How to take into account the various application's profiles?

How to protect users from misbehaving applications?

How to handle urgent demands?

Regulate (adapt & control) the data injection rate into the

computing resources

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Grid Computing

27-2

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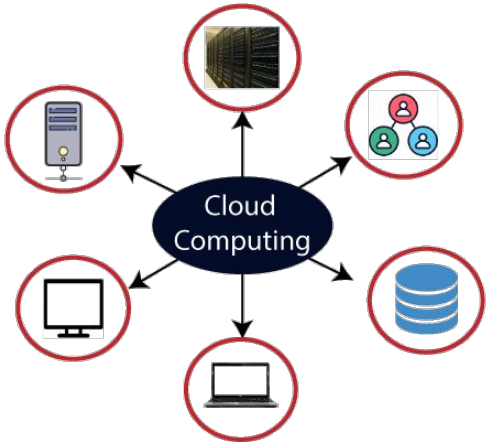
Cloud Computing

Cloud computing uses a client-server architecture to deliver computing resources such as servers, storage, databases, and software over the cloud (Internet) with pay-as-you-go pricing.

Cloud computing becomes a very popular option for organizations by providing various advantages, including cost-saving, increased productivity, efficiency, performance, data back-ups, disaster recovery, and security.



Grid Computing

Grid computing is also called as "distributed computing." It links multiple computing resources (PC's, workstations, servers, and storage elements) together and provides a mechanism to access them.

The main advantages of grid computing are that it increases user productivity by providing transparent access to resources, and work can be completed more quickly.