Unit – I

Cloud Computing (Course Code: 4360709)

A. V. PAREKH TECHNICAL INSTITUTE, RAJKOT

Vision Mission

Vision of Computer Department

Develop globally competent Computer Engineering Professionals who achieve excellence in an environment conducive for technical knowledge, skills, moral and ethical values with a focus to serve the society.

Mission of Computer Department

M1 : To provide state of the art infrastructure and facilities for imparting quality education and computer engineering skills for societal benefit.

M2 : Adopt industry oriented curriculum with an exposure to technologies for building systems & application in computer engineering.

M3 : To provide quality technical professional as per the industry and societal needs, encourage entrepreneurship, nurture innovation and life skills in consonance with latest interdisciplinary trends.

Teaching Scheme

Teaching Scheme (Hrs.)			Total Credits (L + T/2 + L/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA*	ESE	CA	ESE	
3	-	4	5	30	70	25	25	150

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro- project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

Cloud Computing

UNIT - I

Unit-1: Cloud Computing

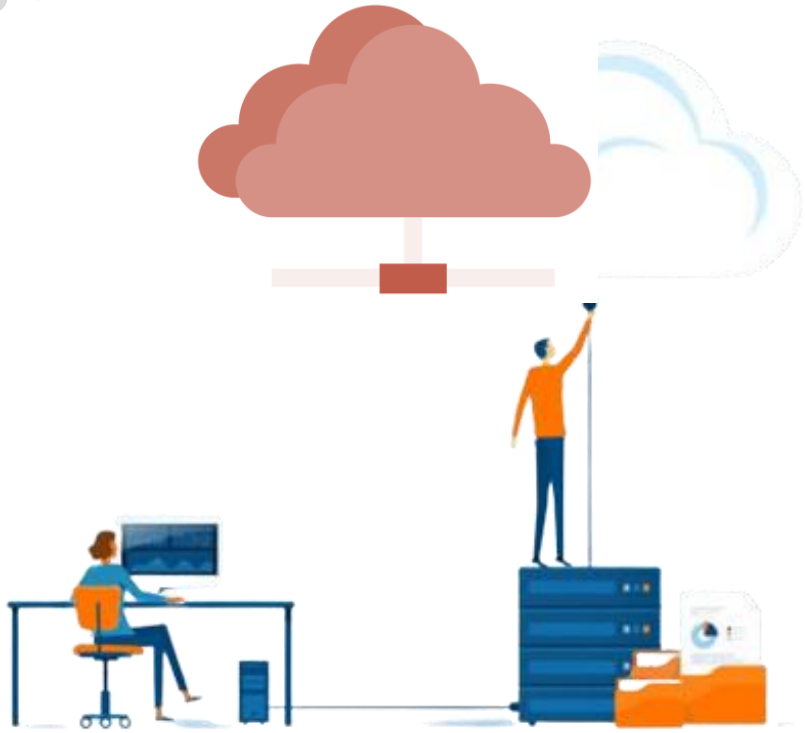
CO1 - a)To describe the principles and paradigm of Cloud Computing

1.1Describe basic concept of Cloud Computing and its applications
1.2Advantages and Disadvantages of Cloud Computing
1.1.1 cloud computing
About cloud
About computing
Definition of cloud computing
Central Ideas Behind Cloud Computing
1.1.2 Characteristics of Cloud Computing
1.1.3 Challenges of Cloud Computing
1.1.4 Novel Applications of cloud computing
1.1.5 Security risk of cloud computing
1.2.1 Advantages and Disadvantages of Cloud Computing

What is cloud computing?

Cloud computing refers to the delivery of computing services over the internet, including storage, processing power, and software applications.

It allows users to access resources and services on-demand, without the need for physical infrastructure or local servers.

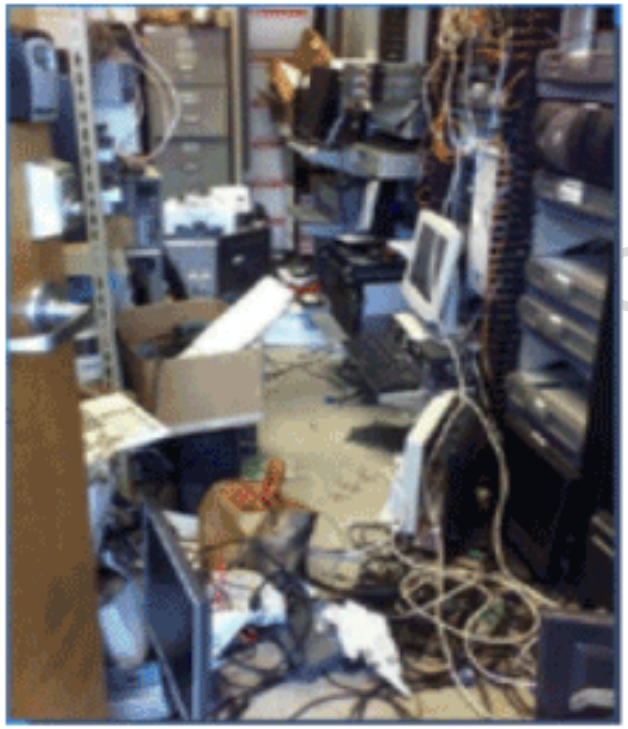


Central Ideas Behind Cloud Computing

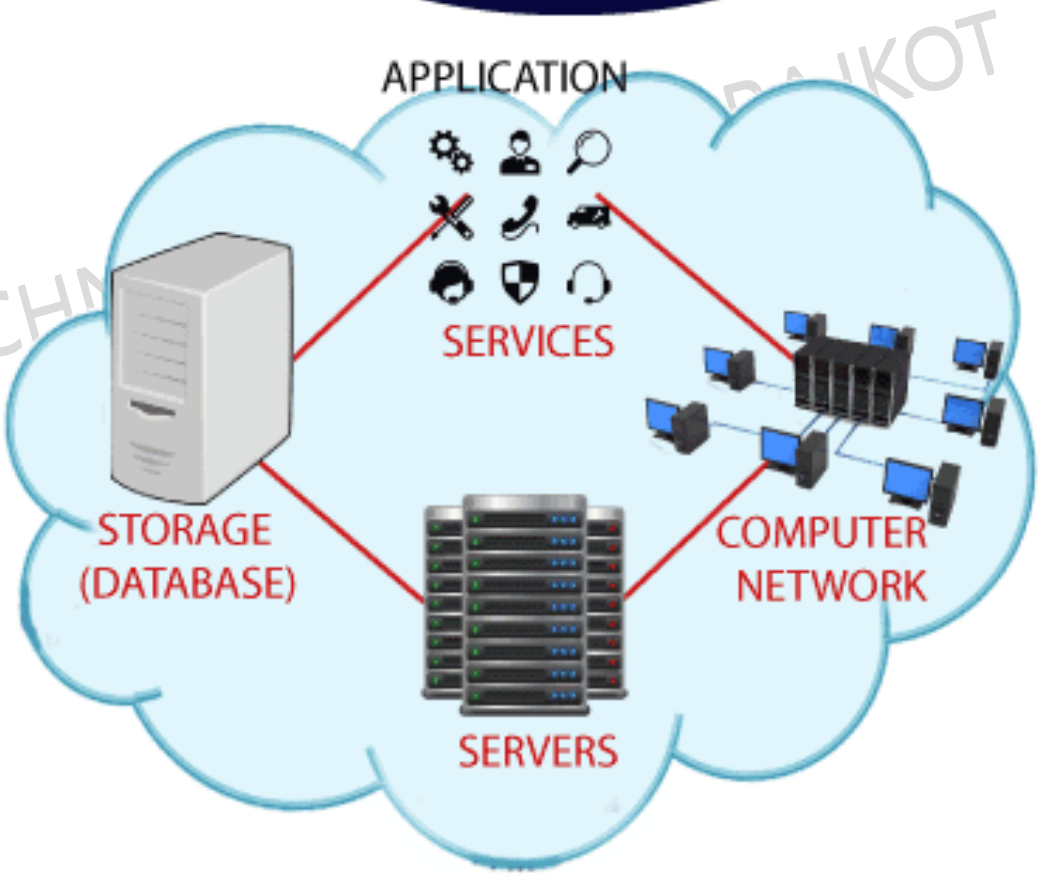
- Small as well as large IT companies, follow the traditional methods to provide the IT infrastructure. That means **for any IT company, we need a Server Room that is the basic need of IT companies**.
- In that server room, there should be a database server, mail server, networking, firewalls, routers, modem, switches, QPS (Query Per Second means how much queries or load will be handled by the server), configurable system, high net speed, and the maintenance engineers.
- To establish such IT infrastructure, we need to spend lots of money. To overcome all these problems and to reduce the IT infrastructure cost, Cloud Computing comes into existence.

Central Ideas Behind Cloud Computing

Before Cloud Computing



After Cloud Computing



Central Ideas Behind Cloud Computing

- Cloud computing differs from traditional IT hosting services in that the consumer (whether that's a business, organization, or individual user) generally doesn't own the infrastructure needed to support the programs or applications they use.

- Instead, those elements are owned and operated by a third party, and the end-user pays only for the services they use. In other words, cloud computing is an on-demand, utility-based model of computing.

Challenges of Cloud Computing

- **Security and Privacy**

Security and Privacy of information is the biggest challenge to cloud computing. Security and privacy issues can be overcome by employing encryption, security hardware and security applications.

- **Portability**

This is another challenge to cloud computing that applications should easily be migrated from one cloud provider to another. There must not be vendor lock-in. However, it is not yet made possible because each of the cloud provider uses different standard languages for their platforms.

Challenges of Cloud Computing

- **Interoperability**

It means the application on one platform should be able to incorporate services from the other platforms. It is made possible via web services, but developing such web services is very complex.

- **Computing Performance**

Data intensive applications on cloud requires high network bandwidth, which results in high cost. Low bandwidth does not meet the desired computing performance of cloud application.

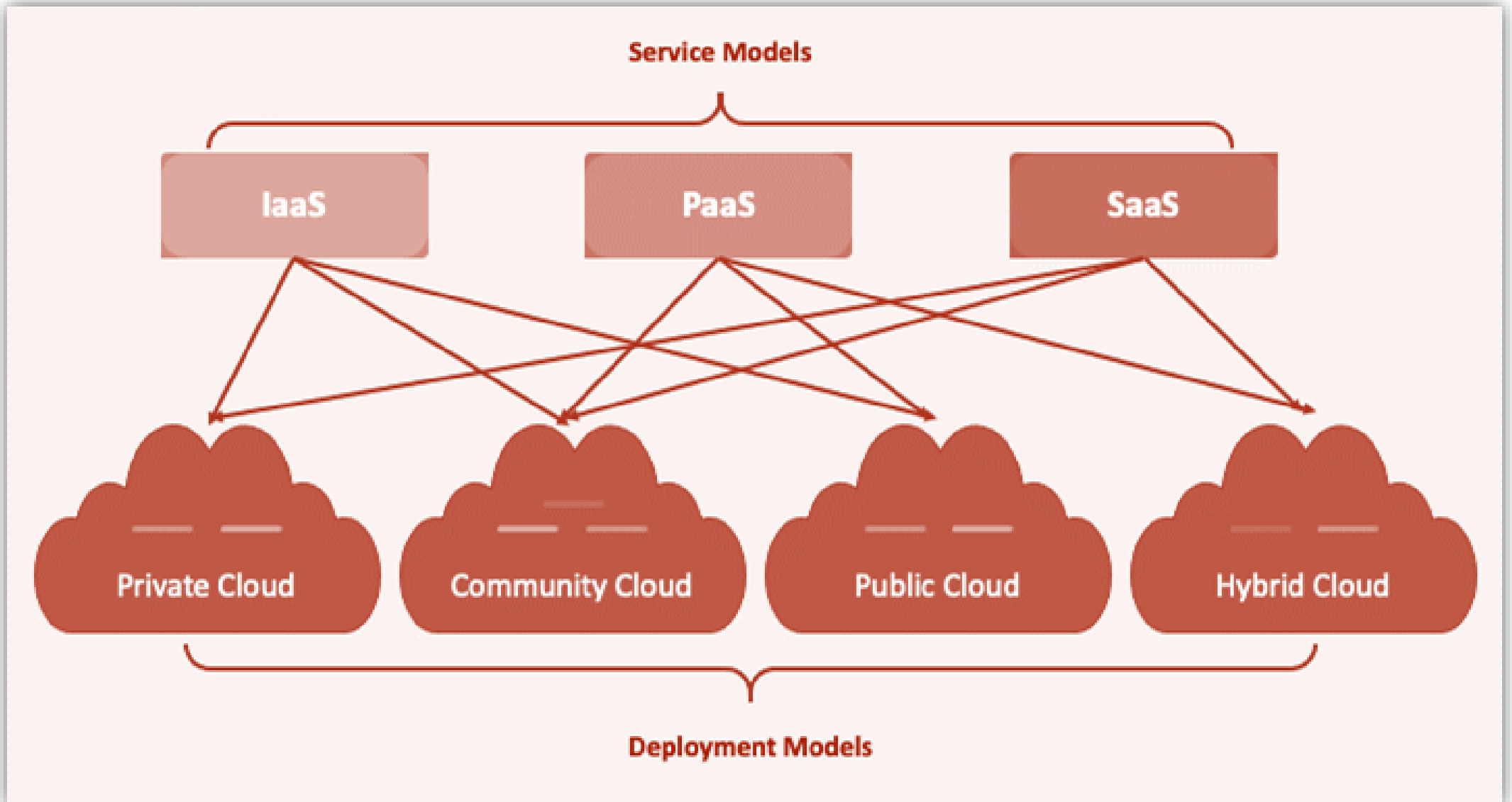
- **Reliability and Availability**

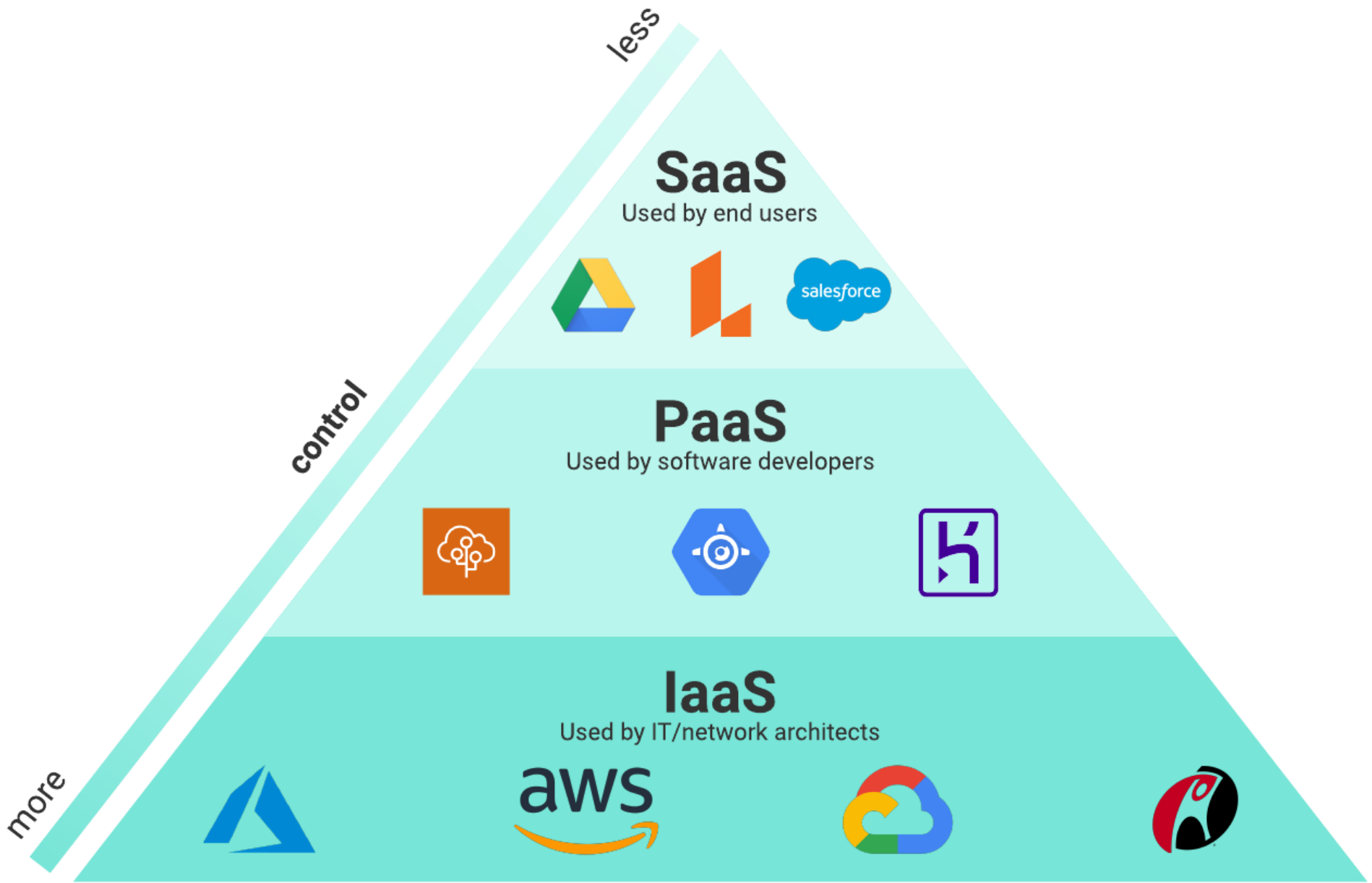
It is necessary for cloud systems to be reliable and robust because most of the businesses are now becoming dependent on services provided by third-party.

Key Characteristics of Cloud Computing

- On-Demand Self-Service: Users can provision resources and services as needed, without requiring human interaction with service providers.
- Broad Network Access: Services are accessible over the internet via standard protocols and devices.
- Resource Pooling: Computing resources are pooled together to serve multiple users, allowing for efficient utilization and scalability.
- Rapid Elasticity: Resources can be scaled up or down quickly to meet changing demands.
- Measured Service: Cloud service usage is measured, monitored, and billed based on actual consumption.

Cloud Deployment Models




less
control
more
SaaS
Used by end users
salesforce
PaaS
Used by software developers
IaaS
Used by IT/network architects
aws

Novel Applications

1)Data Storage over the Internet

Nowadays companies have bulks of data that when stored locally, will ask for huge storage, hence escalating the costs. To overcome issues like these businesses use Cloud Computing as it gives storage and easy access to data like files, images, audio, and videos.

Cloud storage provides services to access data at any time as demanded.

Applications that provide data storage are:

Box.com

Allows its users to store different files such as Excel, Word, PDF, and images on the cloud. It provides drag & drop service for the files, and gets integrated with office 365, salesforce, and more than 1400 tools.

Google G Suite

Is one of the top cloud storage solutions, it offers cloud storage, various management tools, and Google services like Google Calendar, Docs, and Forms. One of the well-known G Suite apps is email, which offers customers free email services.

Novel Applications

2)Backup and Recovery:

Cloud services provide a secure environment as well as backup facilities to restore lost data. Cloud computing provides various recovery applications for retrieving lost data, these applications are:

Mozy

Provides strong backup solutions for business data, it schedules an automatic backup facility occurring each day at a specific time.

Joukuu

Provides the service of simple sharing and tracking of cloud-based backup files. It is mainly used by customers to search files, folders, and documents.

Novel Applications

3)Big Data Analysis

The work of analyzing and storing a vast volume of data is difficult for outdated methods. Cloud computing has established itself in the corporate market thanks to its enormous storage capacity and ability to analyze large amounts of data.

Helps businesses to harness deeper insight into Machine Learning and Artificial Intelligence as it is a task of analysis and then predictions.

Novel Applications

4) Business Applications

Cloud computing provides services to the businesses like storing customer data, and product data in a single platform, ensuring the services are 24*7 available to users.

Cloud computing business applications are:

MailChimp

Provides an email publishing platform that provides choices for designing, sending, and saving templates for emails.

Chatter

Assists in the instantaneous sharing of critical company information.

Novel Applications

5)Banking Enterprise

Cloud computing has entered the banking industry to keep up with the rapidly expanding issues, continuously shifting consumer expectations, and rising cybersecurity dangers.

Cloud computing applications in banking are to provide world-class security and an ecosystem that can predict the customer's behavior related to their old banking history.

Novel Applications

6)Educational Sector

Due to the unexpected pandemic, E-learning got a hike which it has never experienced. The rapid increase in the demand for online learning programs brought applications of Cloud Computing to the education sector too.
It provides an environment for learning, and teaching, providing cloud services for their establishment and to access data and information without any hassle.
Cloud computing applications provided in education are:

Google Meets

Provide a lecture hall-like environment to the learners as well as to the teachers, where they can interact and clear their doubts. Authorizing the teachers with some grants brings a sense of discipline.

Microsoft Teams

A cloud-based application that provides an educational-friendly environment for universities, colleges, and schools.

Novel Applications

7) Entertainment Applications

It is a vast industry that uses a multi-cloud strategy to interact with its customers. Cloud computing offers various entertainment applications like online games and video conferencing.

8) Social Applications

One of the major applications of Cloud Computing is social networking. Cloud services provide the ability to connect a larger number of users with each other by using social media like:

Meta

Previously known as Facebook, which allows its active users to share photos, and videos with their friends, and families using the cloud storage system.

Novel Applications

9) Management Applications

Cloud management tools assist administrators in managing a variety of cloud-related tasks, including resource deployment, data integration, and disaster recovery. The platforms, apps, and infrastructure are all under the administrative authority of management tools. An example of a management application is-

Evernote

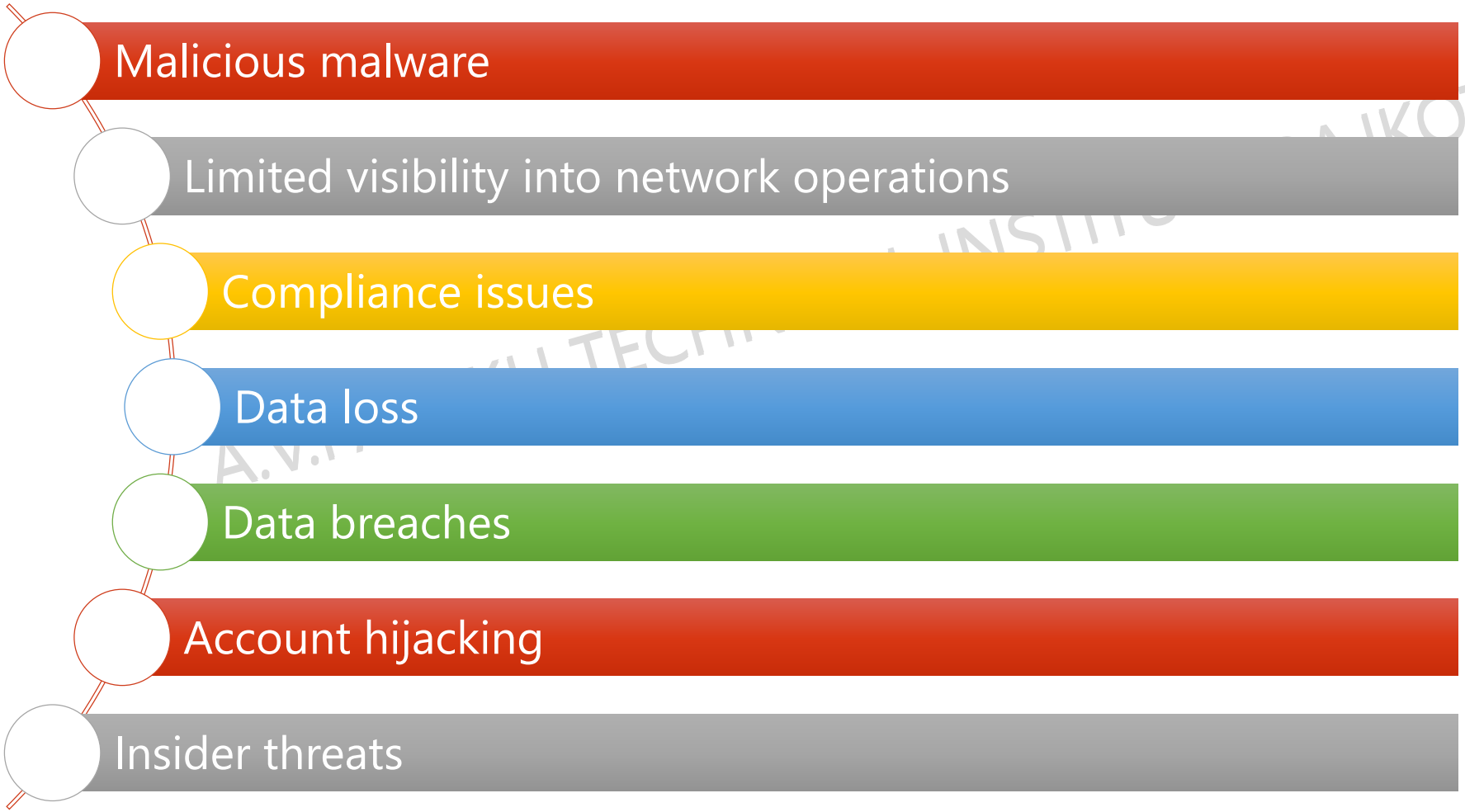
Allow users to synchronize and save recorded and typed notes in one place only. It can work on any different platform.

10) Designing Applications

Cloud computing offers various design applications for quick and easy designs of attractive images and booklets. Applications that provide such services are Adobe Creative Cloud, Moo, and Vistaprint.

Security Risk of Cloud Computing

- **7 SECURITY RISKS OF CLOUD COMPUTING**



Security Risk of Cloud Computing

1. MALICIOUS MALWARE

Often, when companies implement cloud computing, they erroneously believe that they're now safe from traditional malware attacks. Unfortunately, this isn't always the case. Although cloud malware's intended target is the cloud platform provider, end users can still experience repercussions.

2. LIMITED VISIBILITY INTO NETWORK OPERATIONS

When businesses use a mix of cloud platforms and environments as well as on-premises servers, this infrastructure can become complex and cause limited visibility within a network. Although complex networks can cause inefficient operations and network downtime, leading to overspending, the main security issue is the unintentional creation of network "dark spots." This term refers to areas within a cloud network or infrastructure that monitoring tools frequently miss, leaving those segments open and exposed to a security breach.

Security Risk of Cloud Computing

3. COMPLIANCE ISSUES

The regulations you have to comply with depend on your industry or the service you provide. Two of the most widespread and relevant pieces of legislation regarding cloud computing are the EU General Data Protection Regulation (GDPR) and the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

4. DATA LOSS

Although one of the major reasons to use cloud computing is to safeguard data and assets, it is not immune to data loss.

One significant cause of data loss is insufficient data backup and recovery. Many startup owners and entrepreneurs place too much faith in the cloud, meaning they don't have adequate planning and resources for data recovery. In the event of physical damage, cyber attacks or insider threats, data can be permanently lost if regular backups and contingency plans are not in place.

Security Risk of Cloud Computing

5. DATA BREACHES

Surprisingly, or perhaps not, the largest cause of data breaches is human error. According to Verizon's 2023 Data Breaches Investigations Report, 74 percent of data breaches involved a human element, whether intentional or not.

6. ACCOUNT HIJACKING

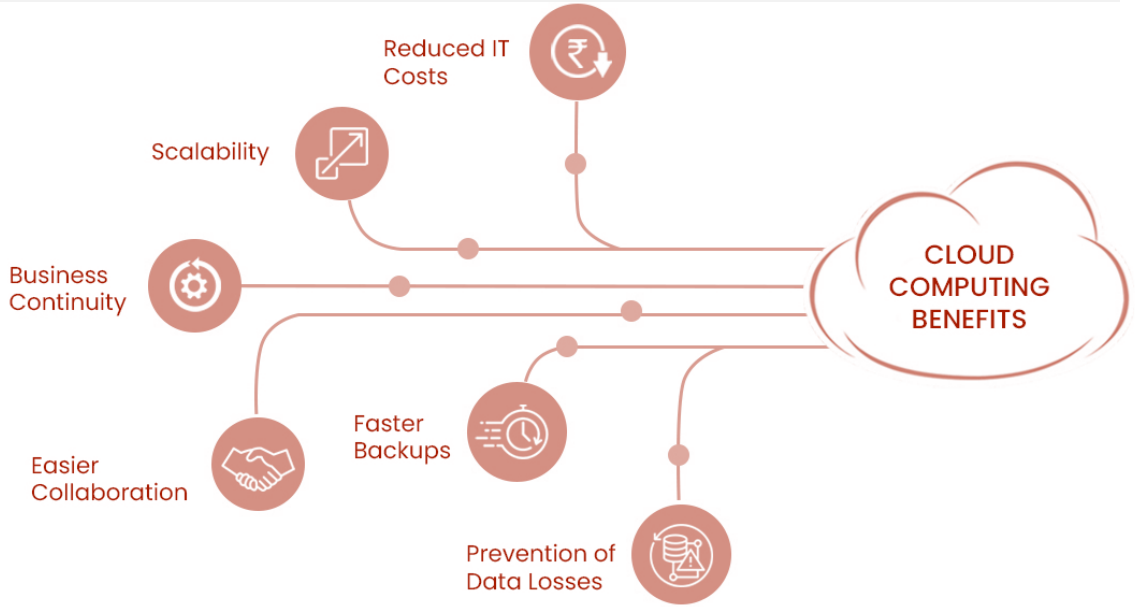
This won't be news to you but, if users write down their cloud account password or share it with others, the chance of their cloud accounts being hijacked increases. As a result of this type of negligence, hackers can gain access to employees' emails and, from there, can easily access their whole cloud accounts.

7. INSIDER THREATS

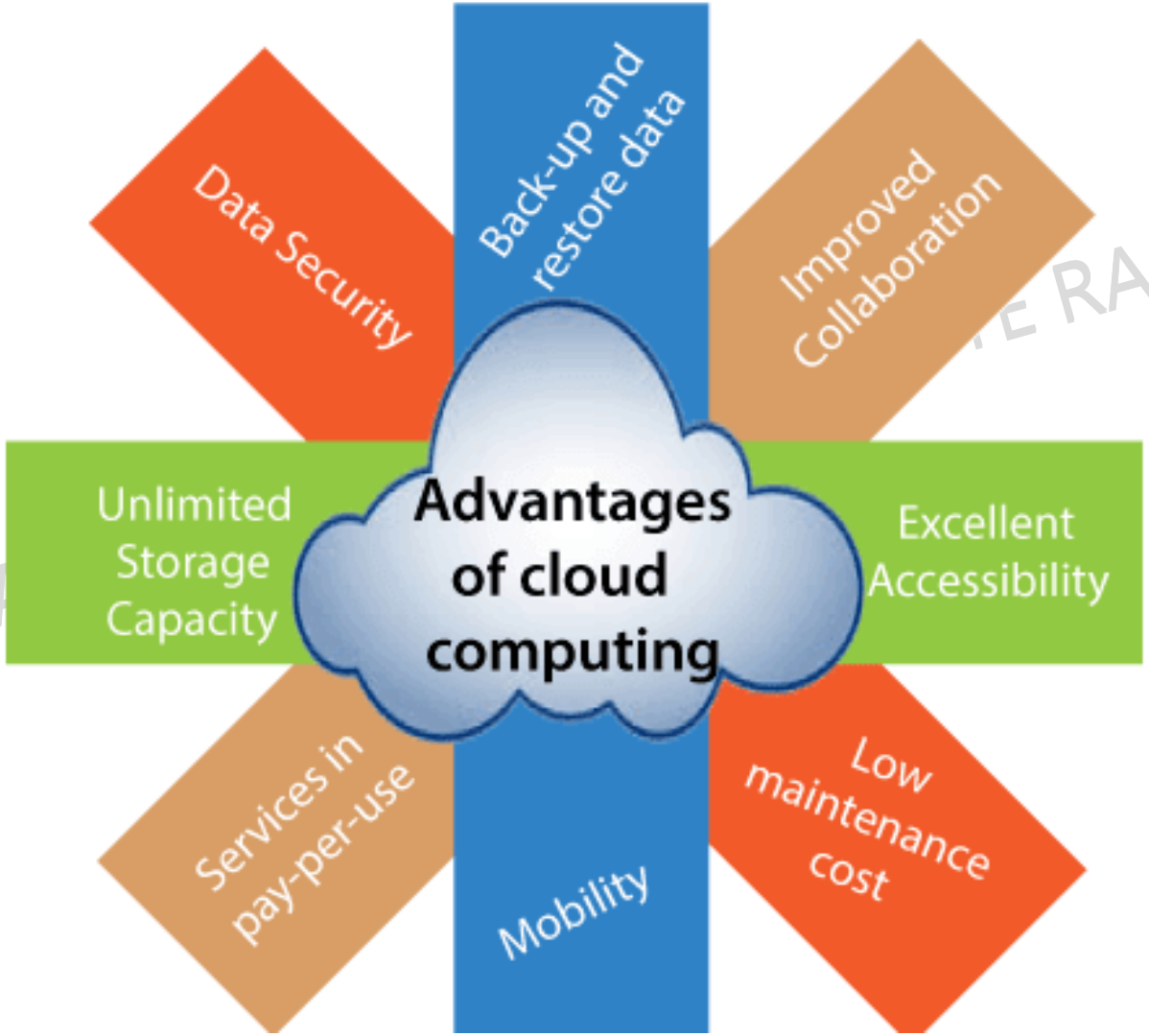
Now it's time for the snakes in the grass, the true rogues: insider threats. These can be current or former employees, workers who have been reckless or negligent with their actions, or threat actors who've gained the trust of naïve employees.

Benefits of Cloud

- **Cost Savings**: Pay for what you use, with no upfront infrastructure costs.
- **Scalability**: Easily scale resources up or down based on demand.
- **Flexibility**: Access resources and applications from anywhere with an internet connection.
- **Reliability**: Cloud providers typically offer high uptime and data redundancy.
- **Collaboration**: Enable seamless collaboration and data sharing among teams.



Advantages of Cloud Computing



Advantages of Cloud Computing

1) Back-up and restore data : Once the data is stored in the cloud, it is easier to get back-up and restore that data using the cloud.

2) Improved collaboration : Cloud applications improve collaboration by allowing groups of people to quickly and easily share information in the cloud via shared storage.

3) Excellent accessibility : Cloud allows us to quickly and easily access store information anywhere, anytime in the whole world, using an internet connection. An internet cloud infrastructure increases organization productivity and efficiency by ensuring that our data is always accessible.

4) Low maintenance cost : Cloud computing reduces both hardware and software maintenance costs for organizations.

Advantages of Cloud Computing

5) Mobility :Cloud computing allows us to easily access all cloud data via mobile.

6) IServices in the pay-per-use model : Cloud computing offers Application Programming Interfaces (APIs) to the users for access services on the cloud and pays the charges as per the usage of service.

7) Unlimited storage capacity : Cloud offers us a huge amount of storing capacity for storing our important data such as documents, images, audio, video, etc. in one place.

8) Data security :Data security is one of the biggest advantages of cloud computing. Cloud offers many advanced features related to security and ensures that data is securely stored and handled.

Disadvantages of Cloud Computing

1) Internet Connectivity

As you know, in cloud computing, every data (image, audio, video, etc.) is stored on the cloud, and we access these data through the cloud by using the internet connection. If you do not have good internet connectivity, you cannot access these data. However, we have no any other way to access data from the cloud.

2) Vendor lock-in

Vendor lock-in is the biggest disadvantage of cloud computing. Organizations may face problems when transferring their services from one vendor to another. As different vendors provide different platforms, that can cause difficulty moving from one cloud to another.

Disadvantages of Cloud Computing

3) Limited Control

As we know, cloud infrastructure is completely owned, managed, and monitored by the service provider, so the cloud users have less control over the function and execution of services within a cloud infrastructure.

4) Security

Although cloud service providers implement the best security standards to store important information. But, before adopting cloud technology, you should be aware that you will be sending all your organization's sensitive information to a third party, i.e., a cloud computing service provider. While sending the data on the cloud, there may be a chance that your organization's information is hacked by Hackers.


THANK YOU

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