# An Analysis of Cloud Computing as it Leads to Technological Transformation

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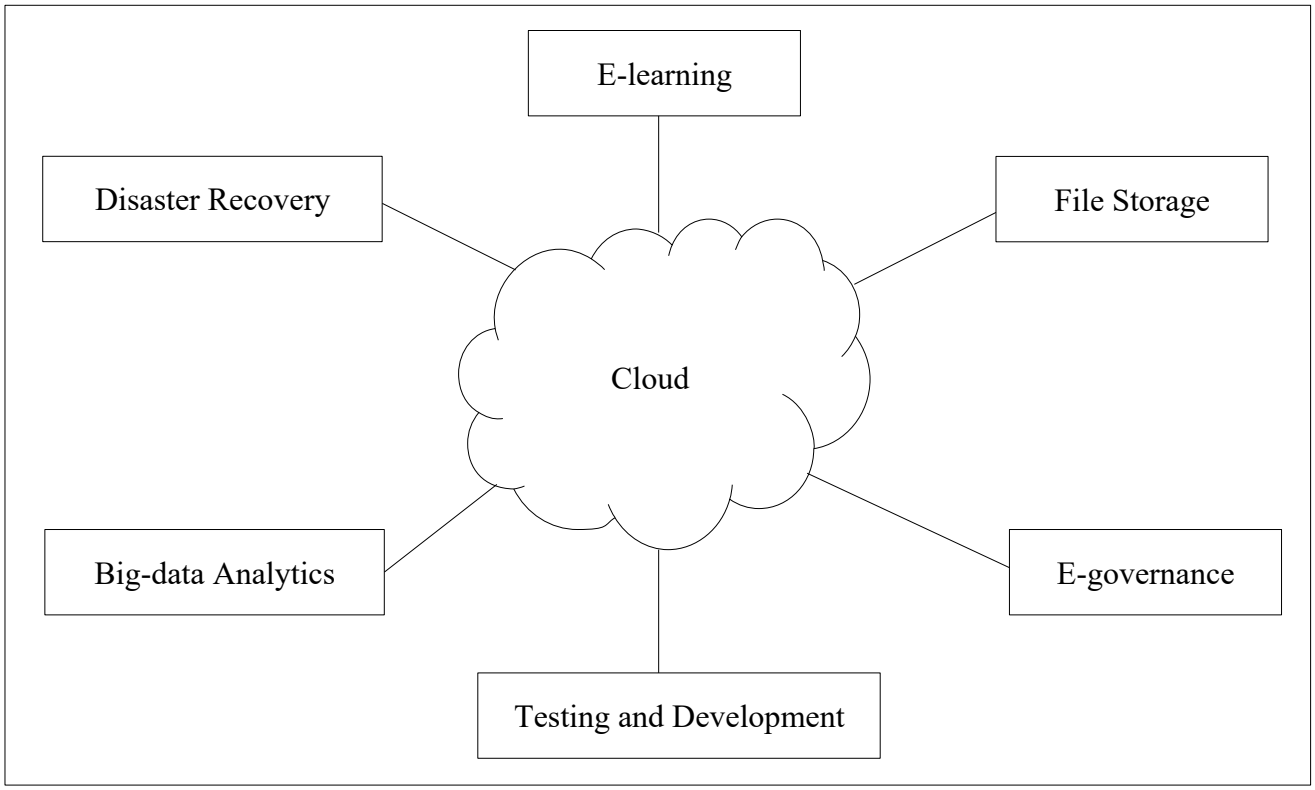
**Abstract**

With rise in the growing amount of data, today's era has become data rich world. With a view of keeping it safe along with the entire process very effective, reliable and far from the hardware and software requirements to the clients, organizations and its data owners have shifted to a much wider and tremendous technology of cloud computing which has its very strong roots and is growing with time. In this review paper we have done analysis to make views clear about the cloud computing technology, whose research will never end. This paper provides an idea to readers about the basic concepts, facts and ideas related to the cloud, whether small, large or medium, cloud is adopted by individuals because of its services, platform and characteristics.

## Introduction

Cloud Computing, a vast topic which is a subject in itself is of great concern from the past decade. Similar to the collection of molecules of water in cloud, the term "Cloud" in "Cloud Computing" points to the network containing huge secure collection of data. Cloud computing is a technology which has its roots emerging from more than past twenty years and is trending and still emerging. The concept of cloud computing is very simple to comprehend. In a very comprehend able sense, cloud computing refers to the computing done through the cloud. Cloud in general refers to the internet. Computation here refers to the mapping done from generally input to output. Today's world is highly information rich world. A lot amount of data is generated every day, every hour, every minute and every second. Data in general refers to information stored in the formed of numbers, text, audio, video, images and each that thing which consists of facts and figures. For storing this huge quantity of data, the technology must be advancing well enough to handle it smoothly, without any fear or concern of it being lost with the economic criteria.

Figure: Uses of Cloud Computing




An important and vast topic, cloud computing came into picture which resolved the issues of data service delivery, data security and the most important-data storage. Cloud computing in simple, is internet based computing. In cloud computing, the entire user's data is stored on the cloud, which refers to internet. The data is stored on remote servers when needed is provided to the users as per their demand and choice. This concept of cloud is much appreciated since, it was an old concept which came into picture in past decade and is of great demand in present scenario. It helped a lot in decreasing the requisition of hardware and software at client side as they pay only for the service they use. Helping in reducing cost and management of data, it impressed our technology rich world and is in great demand. Important characteristics such as agility, scalability and elasticity, easy maintenance, security, automation, availability, large network access are available ensuring users not to worry about their data.

Data is stored in data centre, which could be explained as a location comprising of various physical equipments such as network equipments, peripheral devices, switches, routers, power related equipments and storage equipments. An entity using data and generated it could be referred to as data centre and it is these centre are managed by centre operation manager.

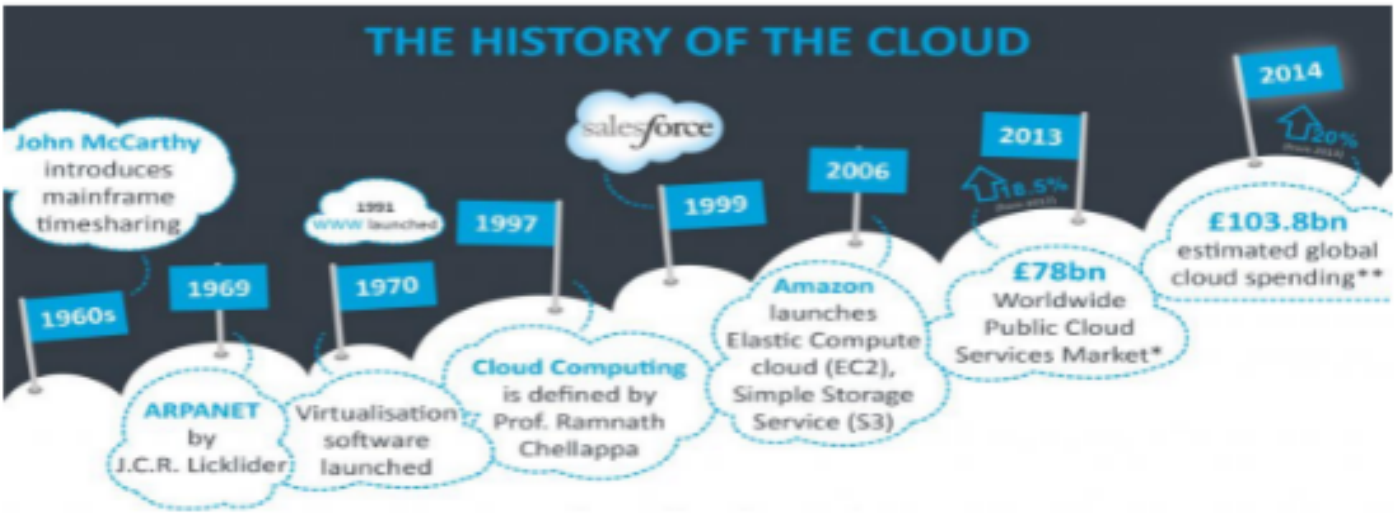
An important satisfactory point of this research is that both the user as well as the data service provider has compatibility in understanding what one expects from the other. To begin with, Cloud computing could be thought as of an online based computing technique in which user's data and information is stored on a remote server rather than any computer folder or device which could be easily accessed as and when user requires it, keeping the process light, simple, economic and clean. It uses a visualization technique that makes us being assured of the fact our data is in safe place and in order to access our data we simply just need a web browser.

Examples of Cloud Platforms: Facebook, Salesforce.com, Microsoft, Amazon, etc.

**Origin of Cloud Computing**

Before cloud computing came into picture, for data storage and retrieval, client-server model was used. It was around in 1961; John MacCharty suggested in a speech at MIT that computing can be sold like a utility, just like a water or electricity. Then after this, Salesforce.com in 1991 started giving services to users via a simple website and slowly and with greater speed other companies like Amazon, Google, Microsoft and many more joined with the technology.

Figure: The History of Cloud Computing




**Important Features of Cloud Computing**

- Agility
- Low cost
- Maintenance
- Device and location independence
- High scalability, availability and reliability

**Advantages of Cloud Computing**

- Mobility
- Data security
- Easy accessibility
- Improved Collaboration
- Back-up and restore data
- Low maintenance cost
- Unlimited storage capacity
- Pay per use model

There are many more advantages which require both theoretical and experimental discovery in this field.

**Disadvantages of Cloud Computing**

- Internet
- Limited Control
- Security
- Human attack

- Network attack
- Change of service providers leading to the vendor lock in

**Discussion about Limitations to Find a Solution**

**Internet:** Since, the technology of cloud computing is based on internet, it is necessary requirement. Without internet, it won't work. In the coming future, there might be a possibility that data is stored on cloud but can be uploaded without internet but its access could be given online else it would bring problem to the whole concept.

**Limited Control:** It all depends on the services provider what sort of transparency to be given to the users. Due to limited control, our data is safe and at a proper place.

**Security*:*** It will always be an area of concern for users as it's a matter of their data. Users need to trust the service they are opting and needs to have a formal mutual understanding with the platform they choose.

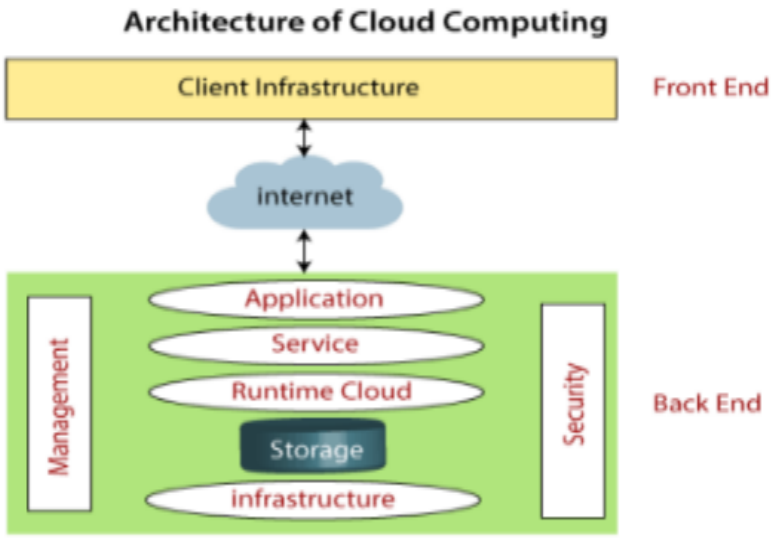
**Human Attack and Network Attacks*:*** Where there is development, there are a fear of losing it. Same is with this cloud technology. All it depends on the safe and efficient methods to retrieve and upload data. The service providers need to regulate strong authentication schemes and protocols to make data safe, integral and confidential.

**Cloud Computing Architecture**

Cloud computing architecture is basically combination of service oriented architecture and event oriented architecture as it displays itself in two ends- front-end and back-end.

**Front-end:** Used by clients such as web servers, thin and flat clients, etc.
**Back-end:** Used by service providers.

Figure: Architecture of Cloud Computing



**Components of Cloud Computer Architecture**

**1. Client Infrastructure:** Generally refers to front-end.
**2. Application*:*** Which is software or any program.
**3. Services*:*** There are three sorts of services:

- SAAS
- PAAS
- IAAS

**4. Runtime Cloud:** Refers to the network of data.
**5. Storage:** Mechanism for storage of data.
**6. Infrastructure:** In terms of services, three types of level exist:

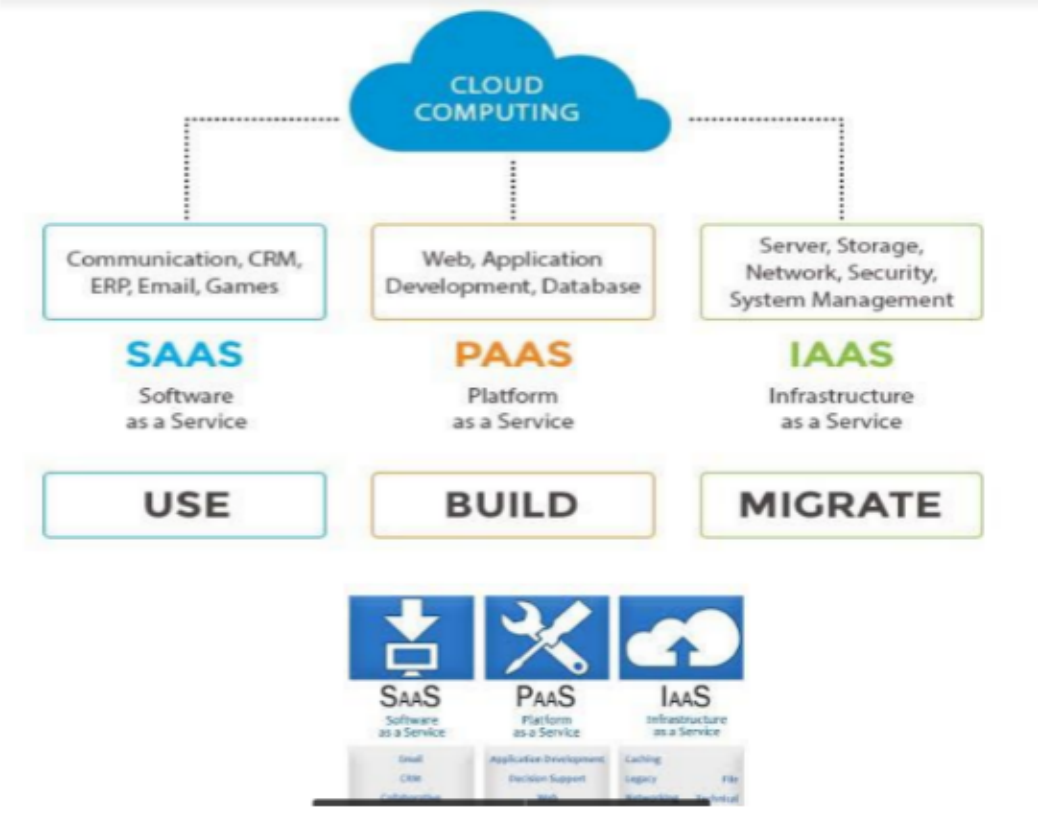
- Host Level
- Application Level
- Network Level

**7. Management:** For managing the whole system of cloud technology.
**8. Security:** To make sure data is in safe place and unaltered.
**9. Internet:** Basic necessity of cloud computing technology.

**Services Offered**

The clarity of concept allows us to further move to the basic services that are provided for sure in cloud computing. These services are:

1. Cloud Infrastructure Services
2. Cloud Platform Services
3. Cloud Application Services



The services offered are categorized into 3 parts:
1. SAAS (Software as a service)
2. PAAS (Platform as a service)
3. IAAS (Infrastructure as a service)

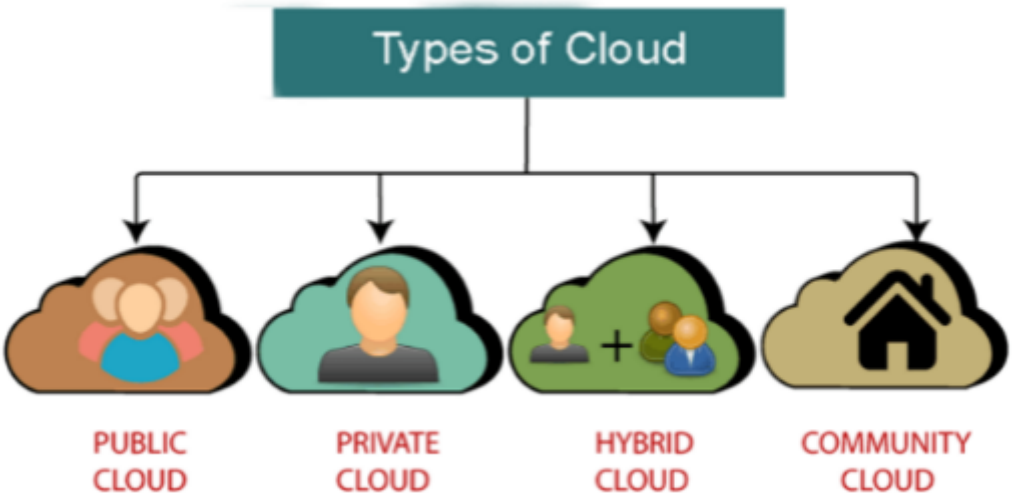
SAAS refers to the cloud application services. Examples: Google apps, Salesforce, DropBox etc.
PAAS refers to the cloud application services. Examples: Amazon Web Services, etc.
IAAS refers to the cloud application services. Examples: Windows Azure, force.com, etc.

**Types of Cloud**
There are 4 types of cloud:

**1. Public Cloud:** The public cloud is a computing service supplied by the third party providers to the public [7]. These services are available for any user who wants to use them and they have to pay only for those services they consumed.

**2. Private Cloud:** The computing services provided over the internet or private network come under cloud the private cloud and these services are offered only to the selected users in place of common people [2, 7]. A higher security and privacy is delegated by private clouds through the firewall and internal hosting.

**3. Hybrid Cloud:** Hybrid cloud is the combination of public cloud and private cloud. In the hybrid cloud, each cloud can be managed independently but data and applications can be shared among the clouds in the hybrid cloud [2, 7].




**General Information on Cloud Adoption**
Due to various advantages of cloud computing, adoption has increased significantly over time. Here are some broad facts concerning cloud adoption in general:

- Businesses moved 61% of their workloads to the cloud in 2020 alone.
  The COVID-19 Pandemic had a significant effect on a lot of American enterprises. Many companies started creating employee remote work policies for security reasons; the majority of these policies wouldn't have been feasible without cloud usage.

- In the cloud, businesses opt to keep their most crucial data in 48% of cases.
  In fact, 60% of all business information would be kept in the cloud as of 2023. The majority of firms utilize the cloud for storage, and over half are confident enough in its security and dependability to keep their most important data there.
- Through 2026, the CAGR for the worldwide cloud computing industry is predicted to be 16.3%.
  The global cloud computing market, which was already impressively valued at $445.3 billion in 2021, is anticipated to increase to $947.3 billion by 2026. That represents growth of more than $500 million in only five years.

**Cloud Deployment Statistics by the Best Adoption Benefits**

- After using the cloud, 94% of firms report major increases in internet security.
- 80% of businesses say their operations have improved since adopting the cloud.
- After implementing cloud technology, 82% of small and medium firms claim lower costs.
- A whopping 93% of organizations rank cloud security as their top worry.

**Cloud Computing as Career**

Cloud computing, a vast area provides a great career. Below are the requirements to be a part of cloud:

- Understanding and experience with cloud service providers- It includes Oracle, Microsoft Azure, etc.
- Database Management and Programming- There is a need of Linux, SQL and No SQL
- Programming Languages Such as java, JavaScript and Python.
- Artificial Intelligence and Machine Learning.

**Tips to Begin with a Career in Cloud Computing**

1. Get an IT or computer science degree.
2. Build good connections.
3. Get certifications related to cloud trainings.
4. Get references
5. Built your portfolio.

**Top Cloud Computing Career**

It is found that IT cloud services helped organizations of all sizes and all vertical sectors around the world generate more than $400 billion in revenue and 1.5 million new jobs [4].

Below are the various careers that can lead to job opportunities along with the cloud technology:

1. **Cloud Administrator:** He is the one managing company's infrastructure and cloud space. They create policies for providing access to the users about the services.
2. **Cloud Architect:** He is the company's architect who develops plans and strategies to manage cloud. He takes care of the budget and make sure everything goes on smoothly within the boundaries.
3. **Cloud Consultant:** He is the one having very deep knowledge of cloud and guides companies related to the different cloud tools and services.
4. **Cloud Security Analyst:** His job is to ensure integrity and confidentiality of the cloud and stored data.
5. **Cloud Engineers:** One who work along with architect to make implementations to the services.
6. **Cloud Automation Engineer:** One who frees human worker from repetitive tasks.

## Conclusion

In this paper, the explanation about the cloud computing technologies beginning from its objectives, emergence, architecture types, job opportunities along with the limitations and advantages are being presented. This is just a brief explanation about the technology, its use and concepts. Being a vast area of concern, it's growing from decades and rising in every other company whether big or small. Every organization is adopting cloud so as to decrease the requisition of hardware and software at client side. Its features and characteristics have made it an interesting topic of research. The concepts are simple and understandable. Talking about the future research, cloud computing is having great more inventions to come in future leading to the discovery of many new advantages and future trends. The concepts would go on increasing focusing on the limitations to cope up and come up as a revolution. Along with services, cloud computing offers various job opportunities leading to begin a career with high jump. To conclude with, cloud computing will continue to be a subject of further research in future as well leading to one among the top technology.

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