



Daffodil
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REPORT ON CLOUD COMPUTING

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CLOUD COMPUTING

1) OBJECT:

Cloud computing is the on-demand access to remote data centers hosted by cloud service providers through the Internet, computing resource applications, server data storage, development tools, networking capabilities, and more. CSP makes these resources available for monthly subscription fees or usage bills. Cloud computing is a technology that uses the Internet to store and manage data on a remote server and then access the data via the Internet. Cloud computing is the provision of on-demand computing services ranging from applications to storage and processing power, usually via the Internet and on a pay-as-you-go basis.

2) INTRODUCTION:

With the revolutionary commitment to make computing a 5th utility after cloud computing, water, electricity, gas and telephone, the face of information technology, especially service delivery and service management, has the potential to change. Although there are countless ways to define the phenomenon of cloud computing, we are highlighting one introduced by NIST. According to them, cloud computing is an enabling convenient model, on-demand network access to a shared pool of configurable computing resources that can be quickly managed and released with minimum management effort or service provider interaction. In a nutshell, Cloud Computing introduces a new way of setting up computing technology to give users the ability to access, operate, share and store information using the Internet. The cloud itself is a network of data centers, each consisting of thousands of computers that work together to perform software on personal or business computers, giving users access to powerful applications, platforms and services provided via the Internet. It is essentially a set of network capable services capable of providing scalable, customized and inexpensive computing infrastructure on demand, which can be easily accessed by a wide range of geographically diverse users.



3) RECENT WORK: Technology is gaining traction and changing our personal and professional lives with each passing day. The cloud computing business is growing at a similarly rapid pace. Here is some Cloud Computing Recent Work In 2021:

- I. **Cloud AI:** One of the most notable new trends for accessing huge datasets is the AI-enabled cloud. Using machine learning, they can use this data to optimize their core competencies. Artificial intelligence is also used to deal with various cloud-related challenges. As a result, cloud computing services will be the only way to scale AI systems that generate large amounts of data. On the other hand, cloud computing will be allow AI to present faster computing and better resource management.
- II. **Improving SaaS operations:** As SaaS has become more popular, it is creating more specialized solutions for migration and operations management. Such as BetterCloud, Cloud Manager and much more. This makes it possible to manage complete solution suites like Google G Suite, Microsoft Office 365 and other popular SaaS solutions.
- III. **Containerization by Industry Giants:** Containerization technologies will be rapidly and successfully adopted by any industries. As a result of the trend, the cloud computing sector will start working on containerization efforts as soon as possible. As a result, large corporations such as Amazon and Microsoft will soon be investing in their own containerization software suite.

- IV. **Integrated Blockchain technology:** Blockchain is a great technology that allows companies to track many stages of a product's life cycle. When the cloud is integrated with blockchain technology, it allows companies to understand the depth of items and their associated features.
- V. **Presence of Personal Cloud:** Previously, businesses communicated with the public without any clear goals or instructions. However, after corporations discovered the security risks and costs of using public cloud, it became less attractive. Reconstruction of private cloud infrastructure will be driven by the demand for improved security and efficiency.
- VI. **Cloud-native Applications:** As cloud-based solutions evolve, it is important for businesses to deliver products through the use of the cloud. In the years to come, the growth of cloud-native apps will accelerate. As a result, open source project management platforms will be widely disseminated and used.

4) METHODOLOGY: We the three members of our group read three papers about cloud computing. After reading three papers we wrote a summary of three papers in the form of an essay. The topics we will discuss in the methodology part are: 1)Past, Present & Future, 2)History, 3)Cloud computing technique methodologies, 4)Cloud Computing Architectures, 5)Types of cloud computing, 6)Cloud Deployments Model, 7)Cloud computing Applications, 8)Technology Outlook, 9)Cloud Optimized Applications, 10)Advantages of Cloud computing, 11)Disadvantages of Cloud Computing, 12)Future Plan.

HISTORY:

The three papers we have read, we get different history about cloud computing. But we gather all the history and then combine it. So for the first time in the 1990's, telecommunications companies, which previously offered primarily dedicated point-to-

point data circuits, began offering virtual private network services with comparable service quality, but at a lower cost. By changing the traffic to balance server usage, they can use the overall network bandwidth more efficiently. They have started using cloud symbols to define the boundaries between which providers are responsible and which users are responsible for. Cloud computing has expanded these boundaries to cover all servers as well as network infrastructure.

Second, in July 2002, Amazon subsidiary Amazon Web Services was created with the goal of "enabling developers to create their own innovative and entrepreneurial applications." Amazon launched its general storage service in March 2006 and Elastic Compute Cloud (EC2) in August of the same year. In April 2008, Google released a beta version of the Google App Engine which was a PaaS that provided users with a complete maintenance infrastructure and a deployment platform to build web applications using common languages / technologies such as Python, Node.js and PHP. In early 2008, NASA's Nebula, RESERVOIR, became the first open-source software for the European Commission-funded project to develop advanced, private and hybrid cloud deployments and for the cloud federation. In February 2010, Microsoft released Microsoft Azure and it was announced in October 2008. It's all about the history of cloud computing.

CLOUD COMPUTING TECHNIQUE METHODOLOGIES:

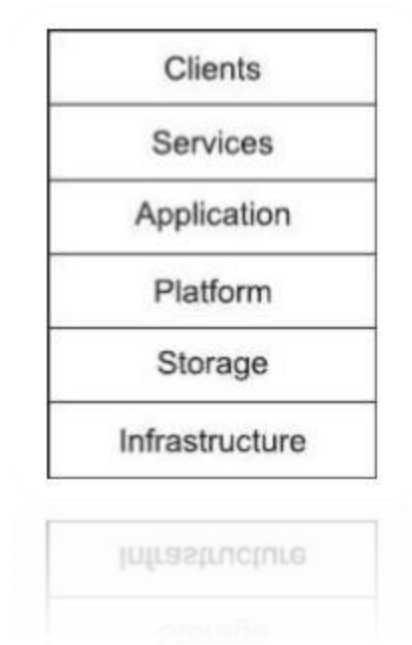
Generally Cloud Computing is based on two main techniques (i) Service Oriented Architecture and (ii) Virtualization. Here we will describe the two techniques of cloud computing.

- (i) **Service Oriented Architecture:** This architecture contains a bendable set of design principles used in the stages of system development and integration. The deployment of an SOA-based architecture will provide a smoothly integrated service that can be used across multiple business domains. The technologies enabled in SOA allow the discovery, design and execution of services. For example, when an end-user wants to accomplish a specific task, a service may be hired to discover the resources needed for the task. This will be followed by a composition service that will plan a roadmap to provide the end-user with the desired functionality and service quality.

- (ii) **Virtualization:** The idea of virtualization is to free the user from the burden of purchasing resources and installation. Cloud brings resources to users. Virtualization means hardware, memory, storage, data, and network virtualization has become an essential element for almost every cloud; the most obvious reason is abstraction and ease of encapsulation.

CLOUD COMPUTING ARCHITECTURES:

By reading the three papers it can be sure that the cloud architectures is depend on Clients, Services, Applications, Platform, Storage, Infrastructure.



Clients: Clients of a cloud include computer hardware and / or computer software that rely on the cloud's computational capabilities to deliver applications or services.

Services: This refers to the various service models offered by the cloud, such as SaaS (Software-As-A-Service), IaaS (Infrastructure-As-A-Service) and PaaS (Platform-As-A-Service).

Application: The cloud enables asset management and user activity tracking from a central location instead of each customer's site, enabling customers to access applications remotely via the Internet.

Platform: This allows the application to be installed without the expense and complexity of purchasing and managing the underlying hardware and software layers. This layer provides a computing platform and / or solution stack as a service, often adopting cloud infrastructure and maintaining cloud applications.

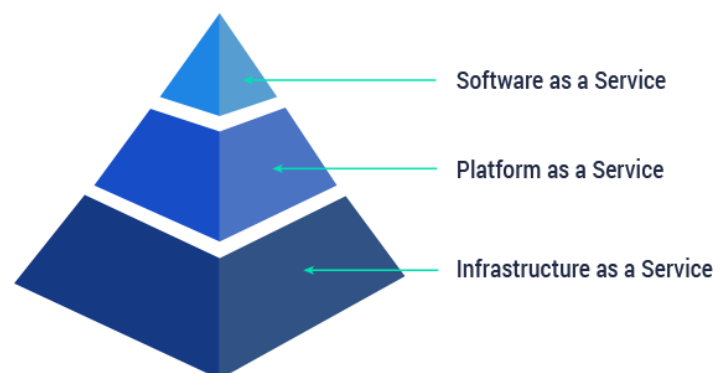
Storage: The storage layer contains computer hardware and / or computer software products specifically designed for the storage of cloud services. Computer hardware has huge data centers that are used for resource sharing.

Infrastructure: This layer provides the computer infrastructure, typically a platform virtualization environment as a service. It also includes virtual asset management. Instead of purchasing servers, software, data center space or network equipment, clients purchase those resources as a complete outsourced service.

TYPES OF CLOUD COMPUTING:

We already know that cloud computing can be two types. One of them is Service Models and another is Deployments Models. There are three types of Service models. They are IaaS, SaaS, PaaS. On the other hand there are three types of deployments model and they are Public Cloud, Private Cloud, and Hybrid Cloud.

SERVICE MODELS:

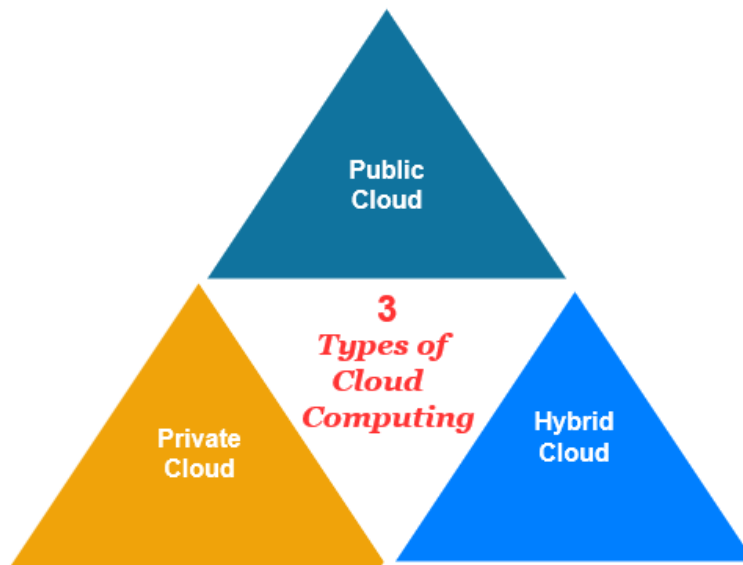


Infrastructure as a service (IaaS): IaaS is the most communal service method of cloud adding as it offers the fundamental infrastructure of virtual servers, network, operating systems and data storage drives. It consents for the flexibility, reliability and the scalability that many businesses pursue with the cloud, and remove the need for hardware in the office. This makes it model for minor and average sized structuring observing for a charge virtual IT explanation to provision occupational development. IaaS is an entirely speculate recompense-for-custom facility and is obtainable as a communal, isolated or mixture organization. Consumers are given an operating system instance on which they can install software and set up arbitrary services and applications. The IaaS provider takes care of the server hardware and network, usually using a virtualized environment. The responsibility for maintaining the operating system usually falls on the consumer.

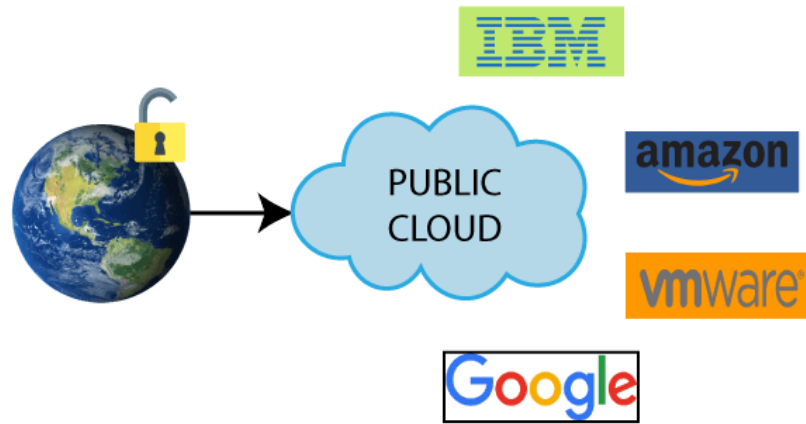
Platform as a service (PaaS): PaaS is where a cloud computing breadwinner arrays the infrastructure and the program substructure, but productions can grow and route their own appeal. Web use can be shaped rapidly and simply via PaaS, and the service is supple and vigorous sufficient to provision them. PaaS keys are ascendable and model for commercial surroundings where numerous designers are occupied on an only estimate. It is also convenient for circumstances somewhere an current information basis (such as CRM tool) wants to be leveraged. Consumers are given access to platforms where they can develop their custom applications (or hosted acquisition applications). Google App-Engine, Microsoft Azure and Force.com are examples of PaaS. PaaS users launch their applications using specific programming platforms supported by specific PaaS. The PaaS provider takes care of delivering the programming platform and all rudimentary software and hardware infrastructure.

Software as a service (SaaS): SaaS cloud calculating explanation includes the disposition of software over the internet to several productions which pay via contribution or a pay-per-use model. It is a valued tool for CRM and for requests that need a lot of web or mobile charge — such as mobile sales organization software. SaaS is accomplished from a dominant position so trades don't have to concern about sustaining it themselves, and is model for short-term schemes. Consumers are given access to the provider's applications that runs on a cloud infrastructure. Examples of SaaS include Google's G-Mail, Microsoft 365 and Salesforce.com. These SaaS clients access applications using a variety of clients, such as a web browser or even a mobile application. Infrastructure management, operating environment, platform services and application configuration are left to the cloud provider.

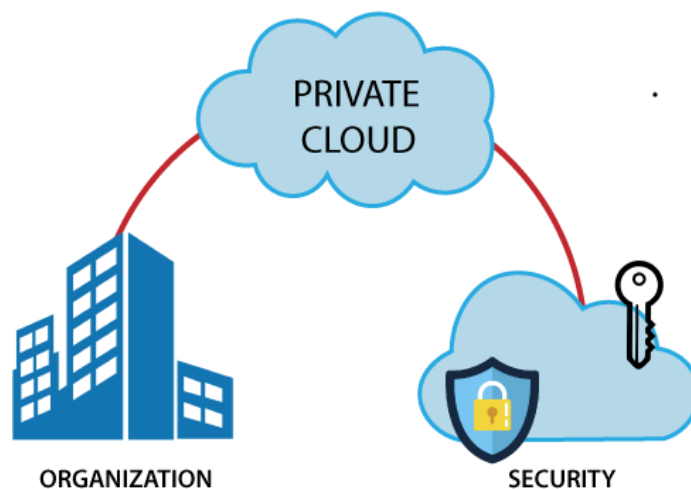
DEPLOYMENTS MODELS: There are three types of cloud deployments. They are public Cloud, Private Cloud & Hybrid Cloud. Here we will discuss about these deployments model.



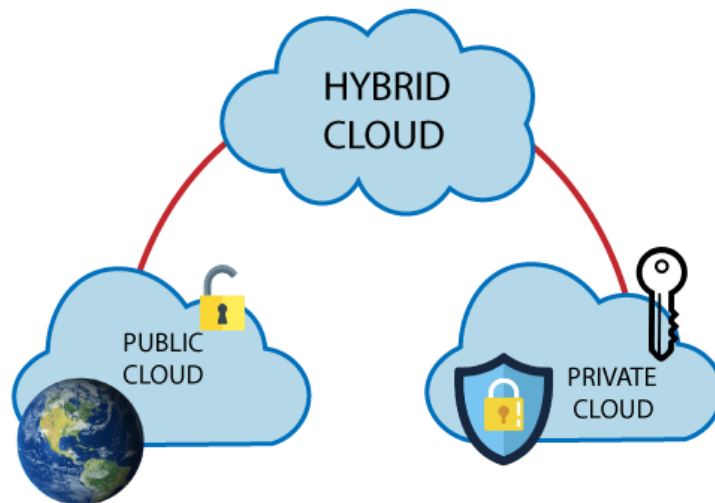
Public Cloud: A public cloud environment is maintained by an externalized cloud provider, and many businesses can be reached via the Internet in a pay-per-view model. This distribution model provides services and organization to businesses who want to save money on IT operational costs, but it's the cloud provider who is responsible for the invention and safeguarding of the resources. Public clouds are model aimed at secondary with average magnitude businesses with a constricted budget requiring a quick and easy platform in which to deploy IT resources. Merits of a public cloud Easy scalability No geographical restrictions Cost effective highly reliable Easy to manage Demerits of a public is not examine the safest option for sensitive data. It is a cloud infrastructure operated by a cloud provider that is available for public consumption. These multi-tenant clouds serve a variety of customers and usually enjoy the largest scale and utilization efficiency. There are two well-known public cloud providers and they are Amazon Web Services and Microsoft Azure.



Private Cloud: This cloud distribution model is a modified infrastructure maintained by a single business. It offers a precise environment in which contact to IT resources is additionally centralized within the business. The current imitator is probably apparently introduced to the deserved handle internally. Even though solitary cloud introducing deserved valuable, as largest productions it could be action a developed equal of safety and extra self-sufficiency to modify the storing, interacting and calculate mechanisms toward ensemble their IT necessities. It is a cloud infrastructure that is managed only for one organization. Such single tenant clouds may be managed by the organization or a third party and may be hosted within the organization's premises or in a third party data center.



Hybrid Cloud: A hybrid cloud is a combination of a public cloud and a private environment, such as a private cloud or on-premises resource, which remains separate entity but binds together, allowing multiple deployment models. Hybrid Cloud can also mean the ability to integrate familiar, managed and / or dedicated services with cloud resources. Gartner defines a hybrid cloud service as a cloud computing service consisting of a merger of personal, public and community cloud services from a variety of service providers. A hybrid cloud service separates and transcends the boundaries of the provider so that it cannot be placed in a category of private, public or community cloud services. It allows a cloud service to expand its capabilities through integration, integration or customization with other cloud services. A hybrid cloud is a cloud that is placed across two or more cloud deployment models. Successful hybrid cloud implementation requires integration that enables data and application portability between different cloud services. The most common hybrid clouds consist of a combination of private and public clouds where the workload overflows from the private cloud to the public cloud.



CLOUD APPLICATIONS:

Let's go to the application of cloud computing. Cloud applications are not only created with a business perspective but also consider activities based on socialization and information sharing. This information can be more sensitive in nature, such as checking for news headlines or searching for basic or health or medical information. Thus cloud computing is often a better option than local servers running such applications.

The main advantage of a cloud computing application is that the provider can run multiple instances of an application with minimal labor and cost. A cloud service provider needs to

anticipate a few issues before launching its application in a cloud computing environment. With problems in mind, an application should be designed to easily scale, withstand failure, and include management tools. We will discuss these issues in the following section.

Scale: Applications need to have maximum scalability in a cloud environment and to ensure this, start building applications in the simplest way, avoiding complex design types and extensions. The next step would be to split the functions of an application and integrate them separately. The most important step in ensuring on demand scalability of an application is sharing, which can be described as splitting up the system into many smaller clusters instead of single systems are being scaled to serve all users.

Failures: For one reason or another, any application is bound to fail at some point. To withstand failure, an application must work in an asynchronous fashion and spread the load across multiple clusters so that the effects of failure are distributed. The best way to deal with failure is to test the application for all types of failure situations and users should be aware of the actual cost if an application encounters any type of failure.

Management Tools: Having a proper management tool helps automate application configurations and updates, thereby reducing management overhead. Management systems not only help reduce economic costs but also lead to optimized use of resources. The most difficult and expensive problem that can be managed with proper management tools is variability. It helps to provide an application that can boast of consistent performance.

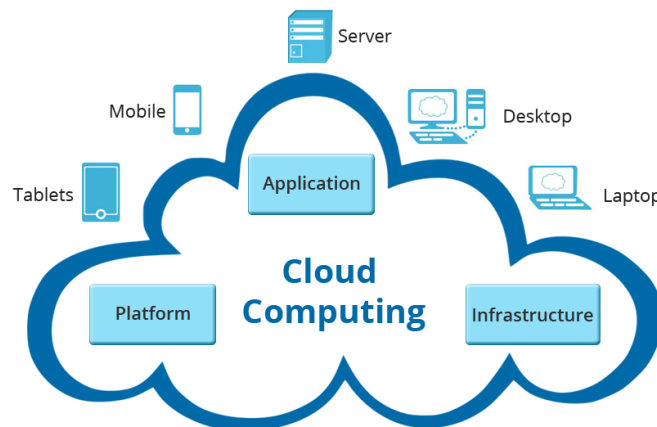
TECHNOLOGY OUTLOOK:

Consistent with the vision of a seamless, automated and service-oriented cloud, several technologies in the pipeline are well suited for adoption in the near future. We will describe this table in details. The Technology Adoption table above illustrates technologies according to the resources and requirements identified earlier. Adoption is generally defined as the moment when the accelerated installation of a particular technology is adopted by its target customers. The timeline of adoption is estimated as relatively immediate (less than three years), in the midterm (three to five years) and in the longer term.

	< 3 yrs	3~5 yrs	5~10 yrs
Services	Community Clouds Personal Cloud Services	DevOps Tools Cloud Optimised Apps	Cloud Standards - Interoperability
Data	Data aaS Cloud Big Data	Public Cloud Storage	
Compute	Virtualisation	Hybrid Cloud	Cloud Bursting
Network		Internet 2.0 Software Defined NW	
Security	Security aaS IAM aaS	Cloud Security Stds Data Tracking	
SLA	Cloud Broker	SLA based Charging Federated Clouds	

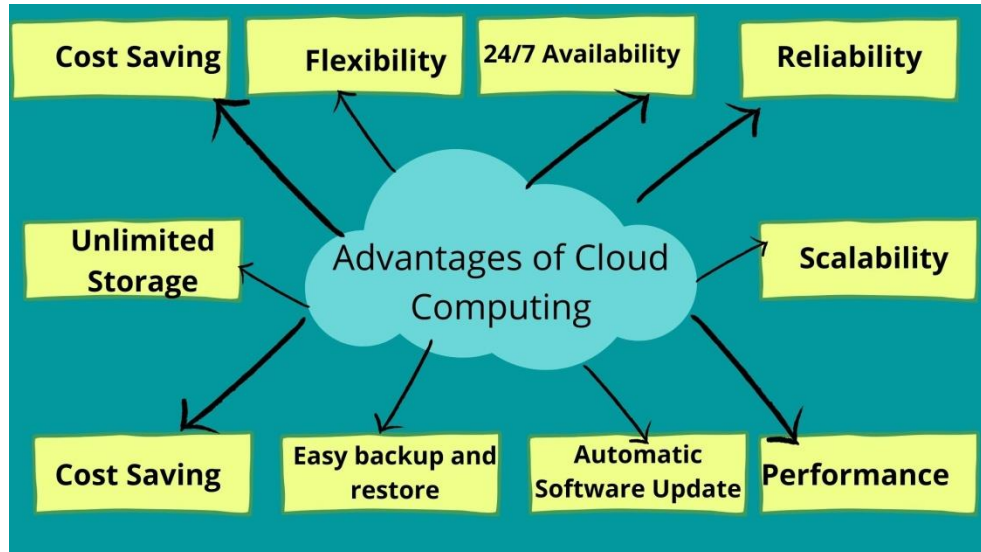
CLOUD OPTIMISED APPLICATIONS:

Applications are traditionally designed to run in a single-threaded environment. Given the right platform, such applications can be moved to a cloud without modification. Cloud computing, however, presents many features that can be exploited to improve scalability and reliability. A cloud-optimized application interfaces directly with the programmatic interface of the underlying cloud, be it private, public or hybrid, to take advantage of its scale and elasticity. The design goals of such applications can be to achieve reliability beyond the cloud provider, extreme and automatic scalability, or cost efficiency. Netflix's video delivery service is an example of a cloud-optimized application that is designed to survive disruption of the underlying cloud provider. In April 2011, the design was tested when an Amazon Web Services (AWS) data center experienced a major service disruption. The application was able to continue serving Netflix's customers from unaffected AWS data centers.



ADVANTAGES OF CLOUD COMPUTING:

Cloud computing has been around for almost two decades, and while data points to business efficiency, cost-effectiveness, and competitive advantage, a large segment of the business community continues to operate without it. According to a recent survey by International Data Group, 69% of businesses are already using cloud technology in one form or another, and another 18% say they plan to implement some aspects of cloud-computing. At the same time, Dell reports that companies that invest in big data, cloud, motility and security enjoy 53% faster profit growth than their competitors. As this data shows, a growing number of technology-shrewd businesses and industry leaders are acknowledging the many benefits of the cloud-computing trend. But more than that, they use this technology to run their organizations more rapidly, better serve their customers, and dramatically increase their overall profit margins. The advantages of cloud computing are:



- I) **COST SAVINGS:** Cloud computing saves our cost. A 2015 Bit Glass survey found that half of CIOs and IT leaders reported using cloud-based applications to save money.
- II) **FLEXIBILITY:** Cloud hosting on a local server versus provides more flexibility to businesses as a whole. And, if we need extra bandwidth, a cloud-based service can meet that demand immediately, rather than undergoing a complex (and expensive) update to our IT infrastructure. This improved independence and flexibility can make a significant difference in the overall efficiency of your organization.
- III) **MOBILITY:** Cloud computing through smartphones and devices allows mobile access to corporate data, which is used by more than 2.6 billion smartphones worldwide today. This is a great way to make sure no one is left out of the loop.

Employees with busy schedules, or those who live far away from the corporate office, can use this feature to keep up to date with clients and coworkers.

- IV) **INSIGHT:** Many cloud-based storage solutions offer integrated cloud analysis for your data bird's eye view. With data stored in the cloud, you can easily implement tracking methods and create customized reports for comprehensive analysis of data agencies. With this insight, you can build efficiency and create action plans to meet organizational goals. Beverage Company Sunny Delight, for example, was able to increase profits by about \$ 2 million a year and reduce stuffing costs by \$ 195,000 through cloud-based business insights.
- V) **INCREASED COLLABORATION:** Cloud computing makes collaboration a simple process. Across a cloud-based platform team members can view and share information easily and safely. Some cloud-based services provide collaborative social space to connect employees with any organization, thus increasing interest and engagement. Without a cloud-computing solution collaboration may be possible, but it will never be easy or effective.
- VI) **QUALITY CONTROL:** All documents are stored in one place in a single format on a cloud-based system. You can maintain consistency in the data, avoid human error, and keep a clear record of any corrections or updates with everyone having access to the same information. Conversely, managing information in Silo may result in employees accidentally saving different versions of the document, which confuses confusion and data.
- VII) **DISASTER RECOVERY:** One of the factors that achievement to the success of a business is control. Woefully, no matter how much control you have over your organization's own processes, there will always be things that are completely out of your control and that can have a tremendous negative impact on today's market, even with a small amount of unproductive downtime. Downtime on your services leads to productivity, revenue and brand reputation. But while you may not have a way to prevent or even predict disasters that could potentially harm your organization, there is something you can do to help speed up your recovery. Cloud-based services are capable of providing fast data recovery in all kinds of major emergencies, from natural disasters to power outages.
- VIII) **LOSS PREVENTION:** If you are not in the cloud, you run the risk of losing all locally stored information. With a cloud-based server, however, all the information you upload to the cloud is secure and easily accessible from any computer, including the Internet connection, even if the computer you use regularly doesn't work.
- IX) **AUTOMATIC SOFTWARE UPDATE:** Automatically refreshes and updates cloud-based applications, instead of forcing the IT department to perform a manual company-wide update. This saves valuable IT staff time and money spent on outside IT consulting. PC World lists that 50% of cloud subscribers need less in-house IT resources as a cloud facility.
- X) **COMPETITIVE EDGE:** Although the popularity of cloud computing is increasing day by day, there are some people who like to keep everything local. It's their

choice, but doing so puts them at a disadvantage when competing with those who have the advantage of the cloud at their fingertips. If you implement a cloud-based solution in front of your competitors, you will go advance further along the learning curve while by the time they are caught. A recent Verizon survey found that 77% of businesses give cloud technology their competitive advantage and 16% believe that this advantage is significant.

- XI) SUSTAINABILITY:** Real sustainability requires solutions that address waste at every level of a business. Hosted in the cloud is more environmentally friendly and results in less carbon footprint. Cloud infrastructure supports environmental activation, strengthens virtual services instead of physical products and hardware, and reduces paper waste, improves energy efficiency, and (given that it allows workers access from anywhere with an Internet connection) reduces passenger-related emissions. A Pike Research report predicts that the adoption of cloud computing and other virtual data options will reduce data center energy costs by 31% between 2010 and 2020.

DISADVANTAGES OF CLOUD COMPUTING:

Although cloud computing has many advantages, it is not without its problems. Here are some disadvantage of cloud computing are.



- I) **DOWNTIME:** Downtime is often cited as the biggest problem with cloud computing. Since cloud computing systems are Internet-based, service disruptions are always an unfortunate possibility and can happen for any reason. In this case, the services need to be designed with high availability and disaster recovery in mind. Take advantage of the multi-availability zones provided by Cloud Vendors on your infrastructure. If your services are less tolerant of failures, consider setting up multi-zones with automated failovers to ensure the best possible business continuity.
- II) **SECURITY & PRIVACY:** Although cloud service providers apply the best security and industry testimonials, storing data and important files on external service providers is always considered risky. Security and privacy must be mentioned in any discussion involving data, especially when it comes to handling sensitive data. Of course, any cloud service provider is expected to manage and fully secure the hardware fundamental built into an installation. However, with the user's access management your responsibilities lie, and it is up to you to weigh all the risks carefully.
- III) **LIMITED CONTROL & FLEXIBILITY:** Since the cloud infrastructure is wholly owned, operated and supervised by the service provider, it transfers minimal control to the customer. To varying degrees (depending on the specific service), cloud users may find less control over the functionality and performance of services within the cloud-hosted infrastructure.
- IV) **VULNERABILITY TO ATTACK:** In cloud computing, every element is online, which reveals potential vulnerabilities. Even the best teams are subject to serious attacks and security breaches from time to time. Since cloud computing is built as a universal service, it's easy to run before you learn to walk. After all, none of the cloud vendors test your administrative skills before giving you an account: all you need to get started is usually a valid credit card.
- V) **COST CONCERNS:** Adopting cloud solutions on a small scale and for short-term projects can be considered expensive. However, the most significant cloud computing advantage is in terms of IT cost savings. Cloud services may offer more flexibility and lower hardware costs, but the overall price tag may exceed your expectations.

FUTURE PLAN:

We see the future of cloud computing as a blending of cloud-based software products and on-premises computers that will help create hybrid IT solutions. The modified cloud is scalable and flexible, which will provide data center security and control. One of the fundamental parts of cloud computing will be the organized process and a good way of processing data.



- i) **INCREASE STORAGE CAPACITY:** Today, data is being created in high volume and it is difficult to store it securely. Most companies need a place to store their data securely. So many businesses are embracing cloud computing and it is predicted that cloud providers will provide more data centers at lower prices because of the fierce competition between them. This will allow you to store more information about your company.
- ii) **SECURITY:** Data stored in the cloud is protected but not completely. Smaller companies providing cloud services may or may not provide adequate data security. So in the future we can protect against cyber-attacks by providing better security. Cloud providers provide better security measures to balance the fight against cyber-attacks.
- iii) **MODULAR SOFTWARE:** Companies are using a lot of software, which has not changed yet. This leads to the fact that cloud computing requires improved software, which will provide better security and convenience. In the future, this software will be more user-friendly and flexible to use. A big advantage of this software is that it saves time as well as overall cost. As we can see from the graph below, service and software providers are also improving.
- iv) **ENHANCED PERFORMANCE OF INTERNET:** The Internet of Things can be used to increase the value of the Internet. With IOT and cloud computing, we can store data in the cloud, perform more analytics, and provide better performance. Users expect high-quality fast-loading services and applications. The given network will be faster and the ability to receive and distribute that data will be faster.

5) CONCLUSION:

After successfully reading three research papers on cloud computing, it can be said that cloud computing is a new technological development that is capable of making a huge impact in the world. There are many benefits that it provides for users and businesses. For example, the advantages it offers to businesses are that they reduce operating costs by spending less on maintenance and software upgrades, and focus more on business. But there are other challenges that cloud computing must overcome. People are very suspicious about whether their data is secure and private. There is no standard for data provided worldwide through cloud computing. Europe has data protection laws but the United States, one of the most technologically advanced countries, has no data protection laws. Users are also concerned about who can disclose their data and who owns their data. But once global standards and controls are in place, cloud computing will revolutionize the future.

REFERENCE:

PAPER 1

PAPER 2

PAPER 3