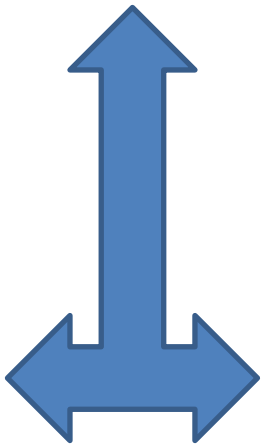
Cloud



Hey IT freeks , Lets talk about Cloud in Technology world. In this article we will cover.

1.)What is Cloud?
2.)Why Cloud?
3.)How many Providers of Cloud?
4.)Introduction of Aws?
5.)Introduction of Azure?
6.)Introduction of GCP?
7.)Services provided by Cloud?

What is Cloud?

Cloud computing is the on-demand delivery of IT resources through the internet with pay-to-use charges.

Instead of buying and maintaining computer products and services, you can pay to use a cloud computing service. It saves you the time, effort, and cost of doing it all by yourself!

How cloud computing works?

Cloud computing service models are based on the concept of sharing on-demand computing resources, software, and information over the internet. cloud computing uses a network (most often, the internet) to connect users to a cloud platform where they request and access rented computing services. A central server handles all the communication between client devices and servers to facilitate the exchange of data. Security and privacy features are common components to keep this information secure and safe.

Types of cloud computing

Public cloud

Public clouds are run by third-party cloud service providers. They offer compute, storage, and network resources over the internet, enabling

companies to access shared on-demand resources based on their unique requirements and business goals.

Private cloud

Private clouds are built, managed, and owned by a single organization and privately hosted in their own data centers, commonly known as “on-premises” or “on-prem.” They provide greater control, security, and management of data while still enabling internal users to benefit from a shared pool of compute, storage, and network resources.

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Types of cloud computing services?

Infrastructure as a service (IaaS)

Infrastructure as a service (IaaS) offers on-demand access to IT infrastructure services, including compute, storage, networking, and virtualization. It provides the highest level of control over your IT resources and most closely resembles traditional on-premises IT resources.

Platform as a service (PaaS)

Platform as a service (PaaS) offers all the hardware and software resources needed for cloud application development. With PaaS, companies can focus fully on application development without the burden of managing and maintaining the underlying infrastructure.

Software as a service (SaaS)

Software as a service (SaaS) delivers a full application stack as a service, from underlying infrastructure to maintenance and updates to the app software itself. A SaaS solution is often an end-user application, where both the service and the infrastructure is managed and maintained by the cloud service provider.

Why Cloud?

Flexibility

Users can scale services to fit their needs, customize applications and access cloud services from anywhere with an internet connection.

Efficiency

Enterprise users can get applications to market quickly, without worrying about underlying infrastructure costs or maintenance.

Strategic value

Cloud services give enterprises a competitive advantage by providing the most innovative technology available.

Flexibility

- **Scalability:** Cloud infrastructure scales on demand to support fluctuating workloads.
- **Storage options:** Users can choose public, private, or hybrid storage offerings, depending on security needs and other considerations.
- **Control choices:** Organizations can determine their level of control with as-a-service options. These include Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS).
- **Tool selection:** Users can select from a menu of prebuilt tools and features to build a solution that fits their specific needs.
- **Security features:** Virtual private cloud, encryption, and API keys help keep data secure.

Efficiency

- **Accessibility:** Cloud-based applications and data are accessible from virtually any internet-connected device.
- **Speed to market:** Developing in the cloud enables users to get their applications to market quickly.
- **Data security:** Hardware failures do not result in data loss because of networked backups.
- **Savings on equipment:** Cloud computing uses remote resources, saving organizations the cost of servers and other equipment.
- **Pay structure:** A “utility” pay structure means users only pay for the resources they use.

Strategic value

- **Streamlined work:** Cloud service providers (CSPs) manage underlying infrastructure, enabling organizations to focus on application development and other priorities.
- **Regular updates:** Service providers regularly update offerings to give users the most up-to-date technology.
- **Collaboration:** Worldwide access means teams can collaborate from widespread locations.
- **Competitive edge:** Organizations can move more nimbly than competitors who must devote IT resources to managing infrastructure.

How many Providers of Cloud?

1.) **Amazon Web Services**

2.) **Microsoft Azure**

3.) **Google Cloud Platform**

4.) **Alibaba Cloud**

Introduction of Aws Cloud.

AWS stands for Amazon Web Services which uses distributed IT infrastructure to provide different IT resources on demand.

Our AWS tutorial includes all the topics such as introduction, history of aws, global infrastructure, features of aws, IAM, Storage services, Database services, etc.

What is AWS?

- AWS stands for **Amazon Web Services**.
- The AWS service is provided by the Amazon that uses distributed IT infrastructure to provide different IT resources available on demand. It provides different services such as infrastructure as a service (IaaS), platform as a service (PaaS) and packaged software as a service (SaaS).
- Amazon launched AWS, a cloud computing platform to allow the different organizations to take advantage of reliable IT infrastructure.

Uses of AWS

- A small manufacturing organization uses their expertise to expand their business by leaving their IT management to the AWS.
- A large enterprise spread across the globe can utilize the AWS to deliver the training to the distributed workforce.
- An architecture consulting company can use AWS to get the high-compute rendering of construction prototype.
- A media company can use the AWS to provide different types of content such as ebox or audio files to the worldwide files.

Pay-As-You-Go

Based on the concept of Pay-As-You-Go, AWS provides the services to the customers.

AWS provides services to customers when required without any prior commitment or upfront investment. Pay-As-You-Go enables the customers to procure services from AWS.

- Computing
- Programming models
- Database storage
- Networking

Introduction of GCP

Google Cloud resources

Google Cloud consists of a set of physical assets, such as computers and hard disk drives, and virtual resources, such as virtual machines (VMs), that are contained in Google's data centers around the globe. Each data center location is in a *region*. Regions are available in Asia, Australia, Europe, North America, and South America. Each region is a collection of *zones*, which are isolated from each other within the region. Each zone is identified by a name that combines a letter identifier with the name of the region. For example, zone a in the East Asia region is named asia-east1-a.

This distribution of resources provides several benefits, including redundancy in case of failure and reduced latency by locating resources closer to clients. This distribution also introduces some rules about how resources can be used together.

Introduction of Azure Cloud.

Azure is Microsoft's cloud platform, just like Google has its Google Cloud and Amazon has its Amazon Web Service or AWS.000. Generally, it is a platform through which we can use Microsoft's resources. For example, to set up a huge server, we will require huge investment, effort, physical space, and so on. In such situations, Microsoft Azure comes to our rescue. It will provide us with virtual machines, fast processing of data, analytical and monitoring tools, and so on to make our work simpler. The pricing of Azure is also simpler and cost-effective. Popularly termed as *"Pay As* You *Go"*, which means how much you use, pay only for that.

Services Provided by Cloud

1. Software as a service (SaaS)
2. Platform as a service (PaaS)
3. Infrastructure as a service (IaaS)
4. Anything/Everything as a service (XaaS)
5. Function as a Service (FaaS)

These are sometimes called the **cloud computing stack** because they are built on top of one another. Knowing what they are and how they are different, makes it easier to accomplish your goals. These abstraction layers can also be viewed as a **layered architecture** where services of a higher layer can be composed of services of the underlying layer i.e, SaaS can provide Infrastructure.

Software as a Service(SaaS)

Software-as-a-Service (SaaS) is a way of delivering services and applications over the Internet. Instead of installing and maintaining software, we simply access it via the Internet, freeing ourselves from the complex software and hardware management. It removes the need to install and run applications on our own computers or in the data centers eliminating the expenses of hardware

as well as software maintenance.
SaaS provides a complete software solution that you purchase on a **pay-as-you-go** basis from a cloud service provider. Most SaaS applications can be run directly from a web browser without any downloads or installations required. The SaaS applications are sometimes called **Web-based software, on-demand software, or hosted software.**

Advantages of SaaS

1. **Cost-Effective:** Pay only for what you use.
2. **Reduced time:** Users can run most SaaS apps directly from their web browser without needing to download and install any software. This reduces the time spent in installation and configuration and can reduce the issues that can get in the way of the software deployment.
3. **Accessibility:** We can Access app data from anywhere.
4. **Automatic updates:** Rather than purchasing new software, customers rely on a SaaS provider to automatically perform the updates.
5. **Scalability:** It allows the users to access the services and features on-demand.

The various companies providing *Software as a service* are Cloud9 Analytics, Salesforce.com, Cloud Switch, Microsoft Office 365, Big Commerce, Eloqua, dropBox, and Cloud Tran.

Disadvantages of Saas :

1. **Limited customization**: SaaS solutions are typically not as customizable as on-premises software, meaning that users may have to work within the constraints of the SaaS provider's platform and may not be able to tailor the software to their specific needs.
2. **Dependence on internet connectivity**: SaaS solutions are typically cloud-based, which means that they require a stable internet connection to function properly. This can be problematic for users in areas with poor connectivity or for those who need to access the software in offline environments.
3. **Security concerns:** SaaS providers are responsible for maintaining the security of the data stored on their servers, but there is still a risk of data breaches or other security incidents.
4. **Limited control over data:** SaaS providers may have access to a user's data, which can be a concern for organizations that need to maintain strict control over their data for regulatory or other reasons.

Platform as a Service

PaaS is a category of cloud computing that provides a platform and environment to allow developers to build applications and services over the internet. PaaS services are hosted in the cloud and accessed by users simply via their web browser.

A PaaS provider hosts the hardware and software on its own infrastructure. As a result, PaaS frees users from having to install in-house hardware and software to develop or run a new application. Thus, the development and deployment of the application take place **independent of the hardware**.
The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment. To make it simple, take the example of an annual day function, you will have two options either to create a venue or to rent a venue but the function is the same.

Advantages of PaaS:

1. **Simple and convenient for users:** It provides much of the infrastructure and other IT services, which users can access anywhere via a web browser.
2. **Cost-Effective:** It charges for the services provided on a per-use basis thus eliminating the expenses one may have for on-premises hardware and software.
3. **Efficiently managing the lifecycle:** It is designed to support the complete web application lifecycle: building, testing, deploying, managing, and updating.
4. **Efficiency:** It allows for higher-level programming with reduced complexity thus, the overall development of the application can be more effective.

The various companies providing *Platform as a service* are Amazon Web services Elastic Beanstalk, Salesforce, Windows Azure, Google App Engine, cloud Bees and IBM smart cloud.

Disadvantages of Paas:

1. **Limited control over infrastructure:** PaaS providers typically manage the underlying infrastructure and take care of maintenance and updates, but this can also mean that users have less control over the environment and may not be able to make certain customizations.
2. **Dependence on the provider**: Users are dependent on the PaaS provider for the availability, scalability, and reliability of the platform, which can be a risk if the provider experiences outages or other issues.
3. **Limited flexibility:** PaaS solutions may not be able to accommodate certain types of workloads or applications, which can limit the value of the solution for certain organizations.

Infrastructure as a Service

Infrastructure as a service (IaaS) is a service model that delivers computer infrastructure on an outsourced basis to support various operations. Typically IaaS is a service where infrastructure is provided as outsourcing to enterprises such as networking equipment, devices, database, and web servers.

It is also known as **Hardware as a Service (HaaS).** IaaS customers pay on a per-user basis, typically by the hour, week, or month. Some providers also charge customers based on the amount of virtual machine space they use.
It simply provides the underlying operating systems, security, networking, and servers for developing such applications, and services, and deploying development tools, databases, etc.

Advantages of IaaS:

1. **Cost-Effective:** Eliminates capital expense and reduces ongoing cost and IaaS customers pay on a per-user basis, typically by the hour, week, or month.
2. **Website hosting:** Running websites using IaaS can be less expensive than traditional web hosting.
3. **Security:** The IaaS Cloud Provider may provide better security than your existing software.
4. **Maintenance:** There is no need to manage the underlying data center or the introduction of new releases of the development or underlying software. This is all handled by the IaaS Cloud Provider.

The various companies providing *Infrastructure as a service* are Amazon web services, Bluestack, IBM, Openstack, Rackspace, and Vmware.

Disadvantages of IaaS :

1. **Limited control over infrastructure:** IaaS providers typically manage the underlying infrastructure and take care of maintenance and updates, but this can also mean that users have less control over the environment and may not be able to make certain customizations.
2. **Security concerns**: Users are responsible for securing their own data and applications, which can be a significant undertaking.
3. **Limited access:** Cloud computing may not be accessible in certain regions and countries due to legal policies.

Anything as a Service

It is also known as Everything as a Service. Most of the cloud service providers nowadays offer anything as a service that is a compilation of all of the above services including some additional services.

Advantages of XaaS:

1. **Scalability:** XaaS solutions can be easily scaled up or down to meet the changing needs of an organization.
2. **Flexibility:** XaaS solutions can be used to provide a wide range of services, such as storage, databases, networking, and software, which can be customized to meet the specific needs of an organization.
3. **Cost-effectiveness**: XaaS solutions can be more cost-effective than traditional on-premises solutions, as organizations only pay for the services.

Disadvantages of XaaS:

1. **Dependence on the provider:** Users are dependent on the XaaS provider for the availability, scalability, and reliability of the service, which can be a risk if the provider experiences outages or other issues.
2. **Limited flexibility**: XaaS solutions may not be able to accommodate certain types of workloads or applications, which can limit the value of the solution for certain organizations.
3. **Limited integration:** XaaS solutions may not be able to integrate with existing systems and data sources, which can limit the value of the solution for certain organizations.

Function as a Service :

FaaS is a type of cloud computing service. It provides a platform for its users or customers to develop, compute, run and deploy the code or entire application as functions. It allows the user to entirely develop the code and update it at any time without worrying about the maintenance of the underlying infrastructure. The developed code can be executed with response to the specific event. It is also **as same as PaaS**.

FaaS is an event-driven execution model. It is implemented in the serverless container. When the application is developed completely, the user will now trigger the event to execute the code. Now, the triggered event makes response and activates the servers to execute it. The servers are nothing but the Linux servers or any other servers which is managed by the vendor completely. Customer does not have clue about any servers which is why they do not need to maintain the server hence it is **serverless architecture.**

Both PaaS and FaaS are providing the same functionality but there is still some differentiation in terms of Scalability and Cost.

FaaS, provides auto-scaling up and scaling down depending upon the demand. PaaS also provides scalability but here users have to configure the scaling parameter depending upon the demand.

In FaaS, users only have to pay for the number of execution time happened. In PaaS, users have to pay for the amount based on pay-as-you-go price regardless of how much or less they use.

Advantages of FaaS :

- **Highly Scalable:** Auto scaling is done by the provider depending upon the demand.
- **Cost-Effective:** Pay only for the number of events executed.
- **Code Simplification:** FaaS allows the users to upload the entire application all at once. It allows you to write code for independent functions or similar to those functions.
- Maintenance of code is enough and no need to worry about the servers.
- Functions can be written in any programming language.

- Less control over the system.

The various companies providing Function as a Service are Amazon Web Services – Firecracker, Google – Kubernetes, Oracle – Fn, Apache OpenWhisk – IBM, OpenFaaS,

Disadvantages of FaaS :

1. **Cold start latency**: Since FaaS functions are event-triggered, the first request to a new function may experience increased latency as the function container is created and initialized.
2. **Limited control over infrastructure:** FaaS providers typically manage the underlying infrastructure and take care of maintenance and updates, but this can also mean that users have less control over the environment and may not be able to make certain customizations.
3. **Security concerns:** Users are responsible for securing their own data and applications, which can be a significant undertaking.
4. **Limited scalability**: FaaS functions may not be able to handle high traffic or large number of requests.