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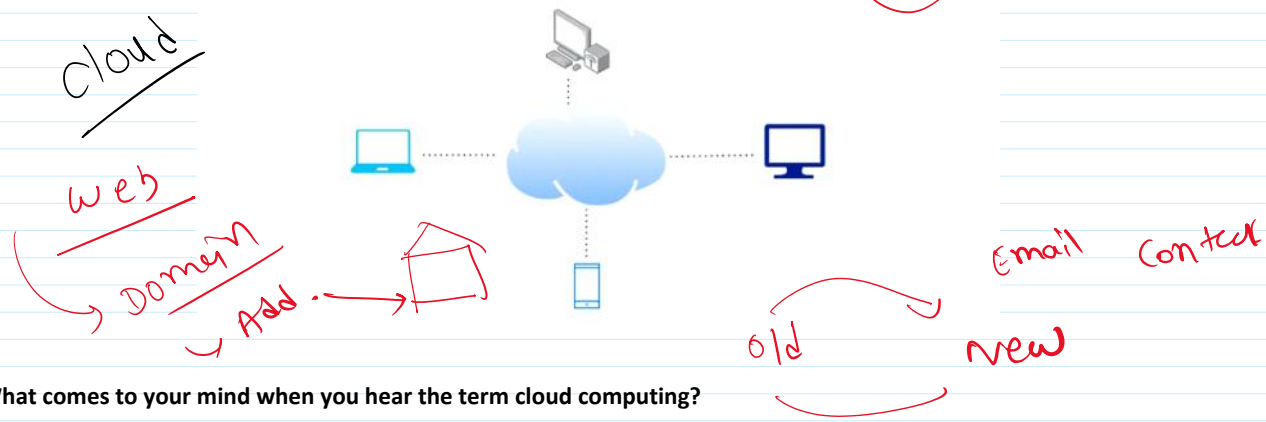
AWS Cloud Fundamentals & Deployment

AlmaBetter



What comes to your mind when you hear the term cloud computing?

Google Cloud or Amazon Cloud. Now, in the current situation, you might be using many cloud services, and you need to learn about them. You may use google photos to back up your photos. So these are the cloud service providers.

Cloud and cloud services

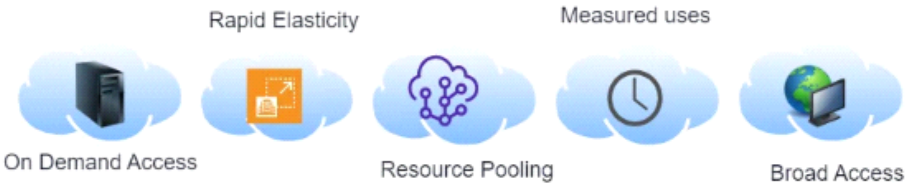
The cloud is a model for delivering IT services and helping businesses to grow by providing infrastructure, platforms, and software. There are a few **characteristics** of the cloud that you should look at.

- **On-demand access:** The cloud is a way to store information and access it from any device that has an internet connection. It is similar to using a service like Google Photos, where you can see your photos anywhere you have internet access. This ability to access the data stored in the cloud at any time and from any location is a crucial feature of cloud computing; it is often referred to as "**on-demand access**."

- It means you can access your data and information as soon as possible and don't have to wait for it to be available on your device. This makes it very convenient and efficient; you can use your data whenever and wherever.

- **Rapid Elasticity:** The cloud differs from a traditional server because it allows you to adjust the number of resources you use based on your needs. For example, Google Photos provides you with free 15GB storage. You can also pay for more storage; for example, you can get 100GB by paying a yearly fee. This ability to change the number of resources you use is called **scalability**.

- It means that you can increase or decrease the amount of storage or computing power you use, depending on your business needs. This can help to save money and make the service more efficient.

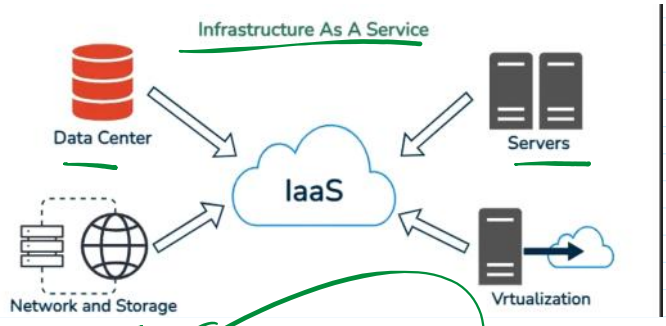


Cloud Service Models

Infrastructure as a Service (IaaS)

IaaS is the foundational layer of cloud computing and provides virtualized computing resources over the internet. With IaaS, users rent IT infrastructure on a pay-as-you-go basis. Key characteristics and components of IaaS include

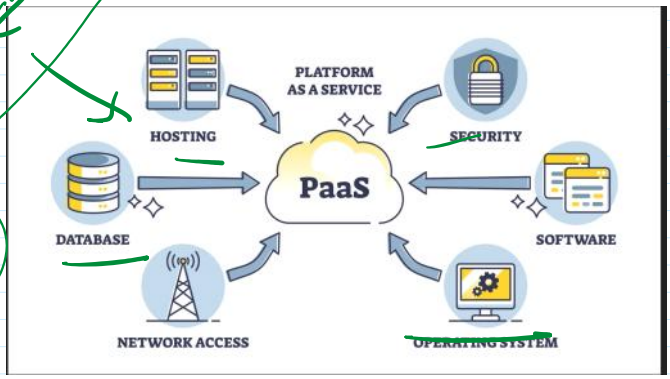
- **Virtualization:** IaaS relies heavily on virtualization technologies to abstract physical hardware. Users can provision and manage virtual machines (VMs) running on a hypervisor, allowing for flexibility and resource isolation.
- **Compute Resources:** IaaS offers virtualized compute resources, including CPU, memory, and storage. Users have control over the operating system, applications, and configuration of their VMs.
- **Storage:** IaaS provides scalable storage options, including block storage (e.g., Amazon EBS, Azure Disk), object storage (e.g., Amazon S3, Azure Blob Storage), and file storage (e.g., Amazon EFS, Azure Files).
- **Networking:** Users can configure networking components like virtual networks, subnets, load balancers, and firewalls to create complex network topologies.
- **Scalability:** IaaS resources can be easily scaled up or down based on demand, offering flexibility and cost-efficiency.
- **Examples:** Amazon Web Services (AWS) EC2, Microsoft Azure Virtual Machines, Google Compute Engine.



Platform as a Service (PaaS)

PaaS provides a higher-level abstraction by delivering a platform and environment for developers to build, deploy, and manage applications without dealing with the underlying infrastructure. Key features of PaaS include:

- **Development Frameworks:** PaaS offers development frameworks, runtime environments, and a set of tools that streamline application development and deployment.
- **Automated Management:** The platform handles tasks such as application scaling, load balancing, and database management, reducing the operational burden on developers.
- **Focus on Code:** Developers can primarily focus on writing code and building applications without worrying about infrastructure concerns.
- **Examples:** AWS Elastic Beanstalk, Azure App Service, Google App Engine.



Software as a Service (SaaS)

SaaS is the highest layer of cloud service models and delivers fully hosted applications over the internet. Users access software applications through web browsers without the need for installation or maintenance. Key characteristics of SaaS include:

- **Ready-to-Use Applications:** SaaS providers deliver a wide range of applications, such as email, customer relationship management (CRM), productivity tools, and more.
- **Multi-Tenancy:** Multiple customers share a single instance of the application, with each customer's data and configurations isolated from others.
- **Automatic Updates:** SaaS providers handle software updates, patches, and maintenance, ensuring users always have access to the latest version.

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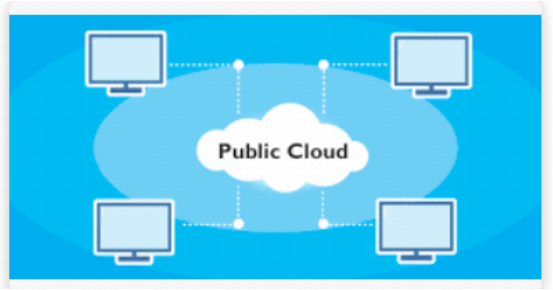
- **Pay-as-You-Go:** SaaS applications are typically subscription-based, with users paying for the services they consume.
- **Examples:** Salesforce (CRM), Google Workspace (formerly G Suite), Microsoft 365, Dropbox.

Cloud Deployment Models

Public Cloud

In a public cloud deployment, cloud services are owned, operated, and maintained by a cloud service provider and are made available to the general public or a large customer base. Multiple organizations and users share the same physical infrastructure and resources, but each has its own isolated virtual environment.



- **Cost-Efficiency:** Public clouds are cost-effective due to economies of scale. Users pay only for the resources they consume on a pay-as-you-go basis.
- **Scalability:** Public clouds offer unlimited scalability, allowing users to scale resources up or down based on demand.
- **Low Maintenance:** Cloud providers handle infrastructure management and maintenance tasks, reducing the operational burden on users.
- **Global Reach:** Public cloud providers typically have data centers in multiple geographic regions, enabling users to deploy applications closer to their target audience for improved performance.
- **Shared Resources:** While sharing resources can be cost-effective, it may lead to resource contention and security concerns, especially in multi-tenant environments

Private Cloud

A private cloud is dedicated to a single organization, whether it's hosted on-premises or by a third-party provider. It provides the same benefits of cloud computing, such as scalability and resource allocation flexibility, while maintaining a higher degree of control and privacy.

- **Control:** Private clouds offer greater control over infrastructure, security policies, and data management compared to public clouds.
- **Customization:** Users can customize the private cloud environment to meet specific business requirements.
- **Data Isolation:** Resources are not shared with other organizations, which enhances security and compliance.
- **Costs:** Private clouds can be more expensive due to dedicated infrastructure and management, making them a better fit for organizations with specialized needs.
- **Use Cases:** Private clouds are commonly used by organizations with stringent data privacy and regulatory compliance requirements, such as financial institutions, healthcare providers, and government agencies.

Hybrid Cloud

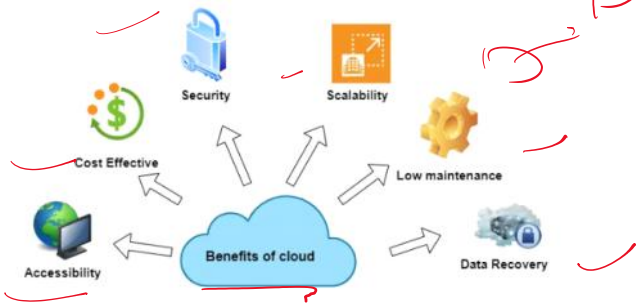
A hybrid cloud combines both public and private cloud environments, allowing data and applications to move between them. This model offers greater flexibility and optimization of resources.

- **Interoperability:** Hybrid clouds enable seamless integration and data sharing between public and private cloud components.
- **Scalability:** Organizations can leverage public cloud resources during peak demand periods while maintaining sensitive data in a private cloud.
- **Cost Optimization:** It provides cost-effective solutions by allowing organizations to use public cloud resources for non-sensitive workloads and reserve private cloud resources for critical applications.
- **Data and Application Mobility:** Applications and data can be moved between environments based on changing needs.

Benefits of Cloud

Benefits of using cloud

As we have seen earlier, what are the challenges faced while working with traditional servers? Let us see out to overcome these challenges with the cloud. Let us understand this by taking the example of Lens kart.



- **Cost Effective:** We know it is expensive to set up a server for any industry, but renting it out is cost-effective. If **Lenskart** sets up its server, it will eat up more than half of its working capital, but if they rent it out to any cloud service provid er, it will cost them less than one-tenth of the money.
- **Scalability**: If **Lenskart** wants to expand to the entire country, they need to add up more servers and support systems, but as they have already moved to the cloud, they will increase their cloud consumption and rent. Thus cloud provides better scalability over the typical servers.
- **Low maintenance:** Maintenance is a significant benefit of the cloud over traditional servers. Since the organization does not own any server, so zero maintenance cost; as in the above example, **Lenskart** now doesn't own any server, so they do not worry about its maintenance. They need not check whether 24*7 electricity is available because the service provider will manage these things.
- **Accessibility:** It is an essential factor when talking about servers. If any server goes down, another will be working to improve accessibility. It is scarce when Leskart goes down because the cloud service provider makes a copy of their client's data and saves it to a different location.
- **Security**: Data stored in the cloud is more secure than traditional servers because they have a solid, robust firewall and a team of ethical hackers constantly improving their safety. So Lenskart need not worry about their data.
- **Data Recovery:** A natural disaster can take place anywhere. If Lenskart's server is in disaster affected zone, they might face a huge loss, but since they moved to the cloud, their data will be safe because the cloud service provider makes copies of the data they have and saves it to many different locations. So **data recovery** is easy.

Overview of AWS

AWS is a service that allows companies like Mama earth to store and manage their data online. Mama earth, in this case, uses a specific service within AWS called S3 to store its customer and sales information. This helps them keep track of their customers and sales and use that information to improve their business.

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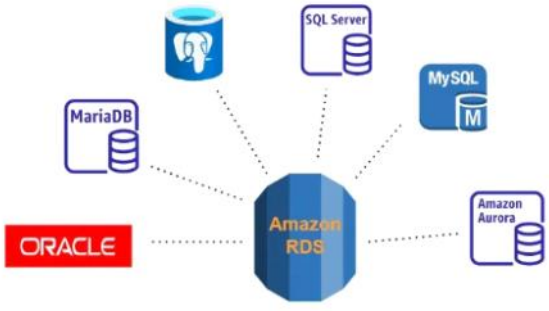
What is AWS?

Amazon Web Services (AWS) is a cloud computing platform that provides a range of services, including computing, storage, networking, database, analytics, machine learning, security, and more. These services can be accessed over the Internet and are designed to help businesses and individuals build, scale, and operate applications and infrastructure more efficiently and cost-effectively.

AWS also offers a variety of tools and resources for managing and optimizing cloud usage, including monitoring, billing, and cost management. It has a global network of data centers and points of presence, allowing users to access its services anywhere in the world with low latency.
Some of the popular services offered by AWS include:

- **Amazon Elastic Compute Cloud (EC2):** A web service that provides resizable computing capacity in the cloud. EC2 allows users to rent virtual machines on which they can run their own applications and services. Users can choose from a variety of instance types, including those optimized for computing, memory, or storage, and can also choose the operating system and software they wish to run on the instances. Examples of organizations using this instance are **Netflix, NASA**, and **Airbnb**.

- **Amazon Simple Storage Service (S3)**: It is an object storage service that allows users to store and retrieve large amounts of data, such as files, videos, images, and backups. It is designed in such a way that data is highly durable and is always available. It has various use cases backup and disaster recovery, content delivery, archiving, and managing big data. Some examples of organizations using S3 are **Netflix, Airbnb, Adobe, NASA,** and others.



- **Amazon Relational Database Service (RDS):** RDS is a service that makes it easy for you to use a database on the internet. You don't have to worry about setting up or managing the database, Amazon takes care of that for you. RDS supports many popular databases like MySQL, PostgreSQL, Oracle, and Microsoft SQL Server. RDS also takes care of updating the software and backing up your data, and you can change the size of your database as needed. RDS can be used for many things like web and mobile apps, e-commerce, gaming, and more.

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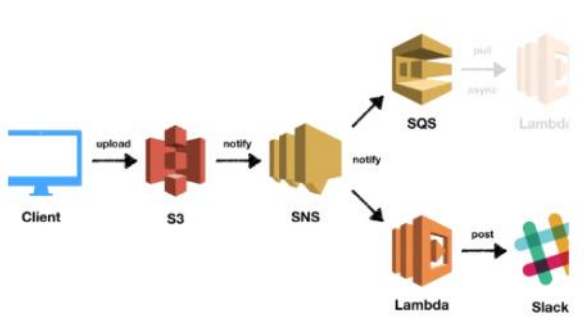
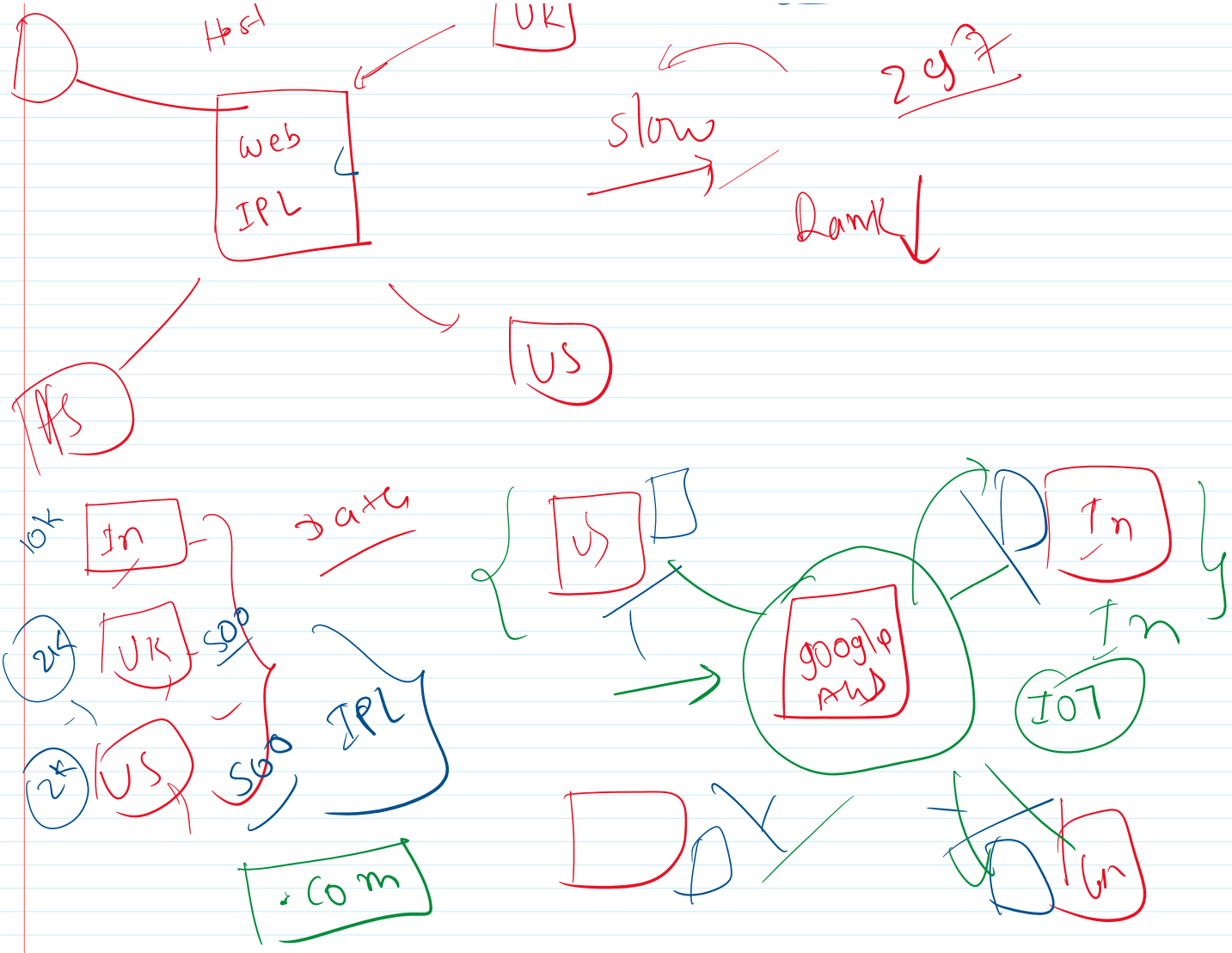
- **Amazon Lambda:** Amazon Lambda is a service from Amazon that lets you run your code without having to set up or manage servers. AWS Lambda can be used for a wide range of use cases, such as backend processing, event-driven computing, internet of Things.

- **Amazon CloudWatch:** AWS provides monitoring services that allow the user to monitor their AWS resources and the applications they run on the cloud. It provides data and operational intelligence for various resources such as Amazon EC2 instances, RDS DB instances, Lambda functions, and many more. Users can collect and track metrics, collect and monitor log files, and set alarms to automatically react to a specific metric or log pattern using Cloudwatch.



- **Amazon SNS(Simple notification service):** Amazon SNS is actually a messaging service by AWS. It is a fully managed messaging service for application-to-application (A2A) and application-to-person (A2P) communication. Using this, you can send messages to multiple recipients via a variety of channels, including SMS, email, and mobile push notifications. Additionally, it can also trigger AWS Lambda functions and invoke HTTP/S endpoints. It allows you to send messages to a large number of recipients with a single API call. SNS is a highly available, durable, and scalable service.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