What is Cloud Computing?

Cloud Computing refers to the delivery of computing services such as servers, storage, databases, networking, software, analytics, and intelligence over the internet with pay-as-you-go pricing. It's also called Internet-based computing, where users get resources and services through the internet. This offers benefits like faster innovation, flexible resources, and cost savings. The data that is stored can be files, images, documents, or any other storable document. Rather then buying, owning, and maintaining physical data centers and servers, Users can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider like AWS, GCP etc.
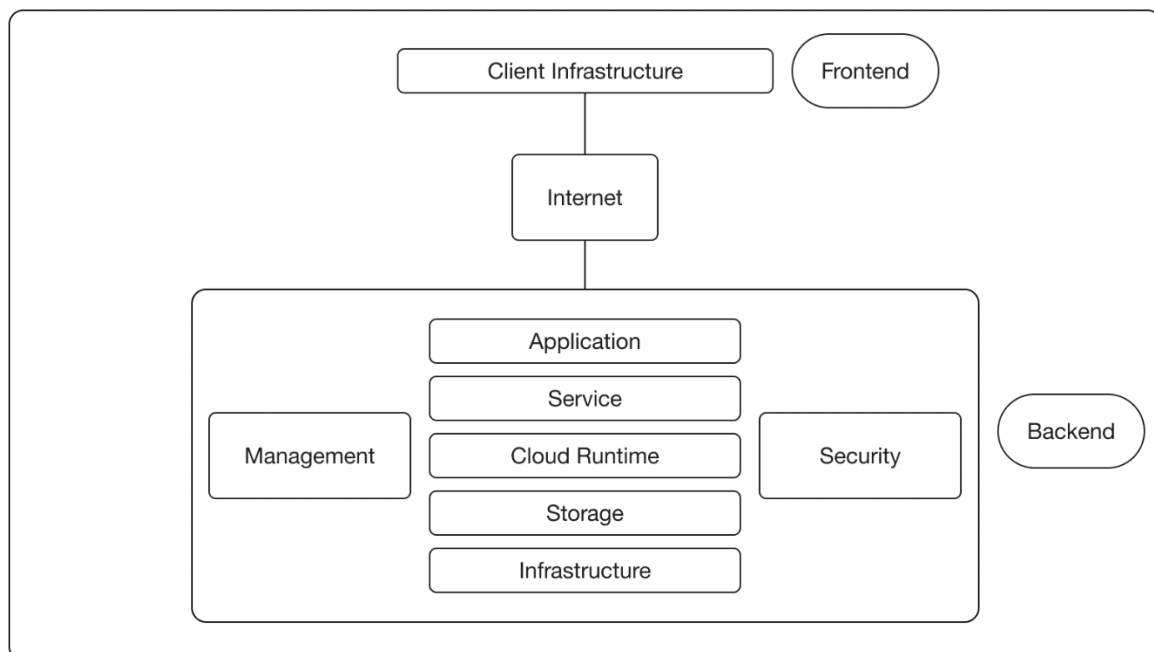
Cloud Computing Architecture

Architecture of cloud computing is the combination of both SOA (Service Oriented Architecture) and EDA (Event Driven Architecture). Client infrastructure, application, service, runtime cloud, storage, infrastructure, management and security all these are the components of cloud computing architecture.

The cloud architecture is divided into 2 parts, i.e.

1. Frontend
2. Backend

The below figure represents an internal architectural view of cloud computing.

Architecture of Cloud Computing

1. Frontend

Frontend of the cloud architecture refers to the client side of cloud computing system. Means it contains all the user interfaces and applications which are used by the client to access the cloud computing services/resources. For example, use of a web browser to access the cloud platform.

2. Backend

Backend refers to the cloud itself which is used by the service provider. It contains the resources as well as manages the resources and provides security mechanisms. Along with this, it includes huge storage, virtual applications, virtual machines, traffic control mechanisms, deployment models, etc.

Components of Cloud Computing Architecture

Following are the components of Cloud Computing Architecture

1. **Client Infrastructure:** Client Infrastructure is a part of the frontend component. It contains the applications and user interfaces which are required to access the cloud platform. In other words, it provides a GUI (Graphical User Interface) to interact with the cloud.

2. **Application**: Application is a part of backend component that refers to a software or platform to which client accesses. Means it provides the service in backend as per the client requirement.

3. **Service**: Service in backend refers to the major three types of cloud based services like SaaS, PaaS and IaaS. Also manages which type of service the user accesses.

4. **Runtime Cloud**: Runtime cloud in backend provides the execution and Runtime platform/environment to the Virtual machine.

5. **Storage:** Storage in backend provides flexible and scalable storage service and management of stored data.

6. **Infrastructure:** Cloud Infrastructure in backend refers to the hardware and software components of cloud like it includes servers, storage, network devices, virtualization software etc.

7. **Management:** Management in backend refers to management of backend components like application, service, runtime cloud, storage, infrastructure, and other security mechanisms etc.

8. **Security:** Security in backend refers to implementation of different security mechanisms in the backend for secure cloud resources, systems, files, and infrastructure to end-users.
9. **Internet:** Internet connection acts as the medium or a bridge between frontend and backend and establishes the interaction and communication between frontend and backend.
10. **Database:** Database in backend refers to provide database for storing structured data, such as SQL and NOSQL databases. Example of Databases services include Amazon RDS, Microsoft Azure SQL database and Google CLoud SQL.
11. **Networking:** Networking in backend services that provide networking infrastructure for application in the cloud, such as load balancing, DNS and virtual private networks.
12. **Analytics:** Analytics in backend service that provides analytics capabilities for data in the cloud, such as warehousing, business intelligence and machine learning.

Cloud Computing Architecture Example

The following applications uses cloud computing architecture:

1. Online Learning App

Students are using GeeksforGeeks application for watching tutorials for learning purpose, they solve different coding problems and take quizzes also for testing their skills. They can use this anywhere by using their mobile phones, tablets or personal laptop. For storing videos and study materials Geeksforgeeks are using cloud services like Amazon S3. It also uses AWS Lambda to run small backend tasks like checking quiz answers or updating progress. For managing users and logins securely, services like AWS IAM (Identity and Access Management) are used. All of this helps the application work smoothly, keeps your data safe, and makes sure your learning experience is always available and fast.

2. Online Store (E-Commerce Website)

Everyone is using online websites like Amazon or Flipkart for online shopping. It uses cloud computing to run its website and manage orders. When you browse and buy products, you're using the front end. In the background, cloud services keep track of what's in your cart, handle payments, and update stock. Developers use platforms like AWS Elastic Beanstalk to run the website easily. The product photos are saved in cloud storage like Amazon S3, and customer details are stored in databases. Cloud tools also watch over the site to keep it secure and running fast.

3. Mobile App Backend (Food Delivery App)

Think of a food delivery app like Zomato or Swiggy. You use the app to order food, and everything works smoothly just because of cloud computing. The app you see on your phone is the front layer. When you order something, cloud services handle the process in the background like telling the restaurant, tracking your order, and handling payments. Platforms like Firebase help with storing user info and sending notifications. The servers that run the app live in cloud data centers like Google Cloud or AWS, and all your data is kept safe using secure login systems.

Benefits of Cloud Computing Architecture

The following are the benefits of cloud computing architecture:

- Makes overall cloud computing system simpler.
- Improves data processing requirements.
- Helps in providing high security.
- Makes it more modularized.
- Results in better disaster recovery.
- Gives good user accessibility.
- Reduces IT operating costs.
- Provides high level reliability.
- Scalability.

Conclusion

Cloud Computing architecture provides a structural framework for designing, implementing and managing cloud-based solutions. Cloud Computing Architecture provides benefits like scalability, flexibility, and cost-effectiveness. It also solve related to security, reliability, and performance.