

Abundance of AWS in the field of cloud

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Abstract: Now a days cloud computing is the most prominent demand of each company to benefit their economy for their growth. Various large as well as small companies are stepping ahead towards cloud to build their infrastructure. There is enough range of cloud services providing company and platforms. But AWS is at the peak in comparison to other companies. This paper's aim is to present an incisive description of cloud computing, its characteristics, cloud's service models and deployment models with the abundance of AWS in this field. This paper also describes about various AWS services and shows its uniqueness by comparing it with other clouds.

To have authenticity as well as clarity in my discussion about AWS services, I have taken the help of various published research works from reputed journals and some standard books.

Keywords: Cloud Computing, Characteristics of cloud computing, Architecture of cloud, Service Models, Deployment Models, Technology behind cloud computing, AWS and its services.

Introduction

“Cloud computing is a computational process for manipulating, configuring and accessing both hardware and software resources from a remote location.”

In cloud computing there is no intervention of hosting provider. Everything is on demand and self serviced[2]. One can scale up and scale down the services. One only pay for what they used[2]. Here payment is done on hourly basis. Cloud consists of large number of data centers. Each data center consists of 1000's of servers [1]. A person can provision resources in cloud whenever needed without requiring any human interaction with service provider[1]. If we take a real world scenario then we see that an organisation invests millions of dollar in building storage solutions or archiving solution and in buying servers[2]. This takes time and high investment. But using cloud it is a work of few minutes.

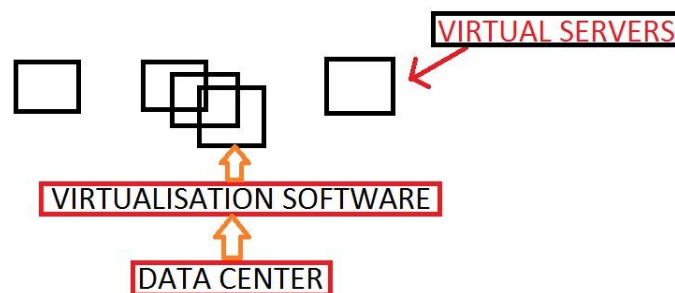


Fig. 1 AWS cloud

Cloud have virtual servers, virtualization software and data centers. Virtualization software allows to run multiple operating system on a single hardware i.e. one can run Linux with windows or Mac-OS with windows. Data centers have actual servers which are provided to user as virtual servers using virtualization software[1].

Characteristics of cloud computing

- 1) **Resource Pooling** - Wide range of resources or services are available on cloud for compute, storage, database, analytics, encryption, deployment and many more[4].
- 2) **On-Demand and self service** – One can create and launch the services and use them without interruption of service provider[2].
- 3) **Measured Service** – One will pay only for those services which they use, on hourly basis[3].
- 4) **Elasticity** – Adding and removing capacity or scaling up and scaling down of services. One can change hard disk size, memory and RAM capacity in cloud[3].

Architecture of cloud

Cloud has a front end (client side) and a back end (service provider side) connected through a network usually called internet . Client have components like client computer, client network and a client device to access service(ex-web browser). Service provider have components like servers, computers, data storage system, virtual machines, etc.

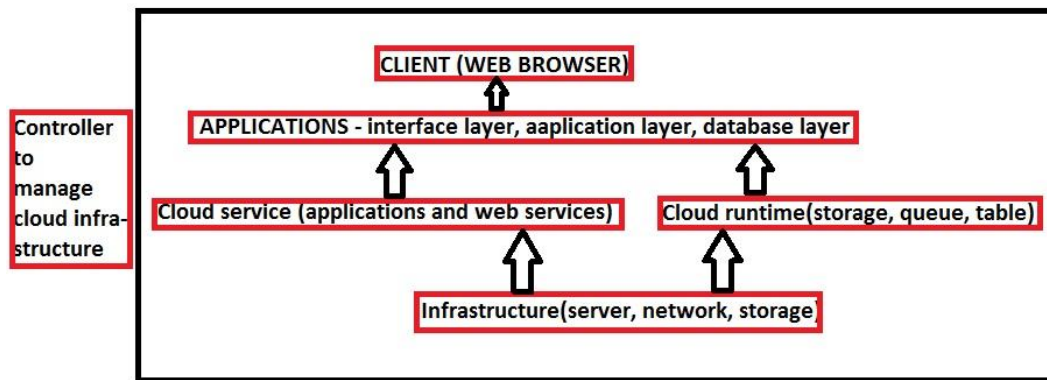


Fig. 2 Architecture of cloud[5]

Using web browser client request for the access of services of cloud. On behind some applications are running to manage interface and database. There is a hard drive management controller used to manage cloud infrastructure.

Service Models

- 1) **IaaS (Infrastructure as a service)** – This model provides the infrastructure to the customer includes server, network and storage to run and deploy arbitrary software[2]. Ex- AWS, Digital Ocean.
- 2) **PaaS (Platform as a service)** – This model is used to provide the platform used in the building of applications running or deployed over cloud[4]. Ex- Google App Engine.
- 3) **SaaS (Software as a service)** - It is a cloud service model which allow the customer to access the application or online softwares running over cloud infrastructure using client device[4]. Ex- Google Docs, Office365.

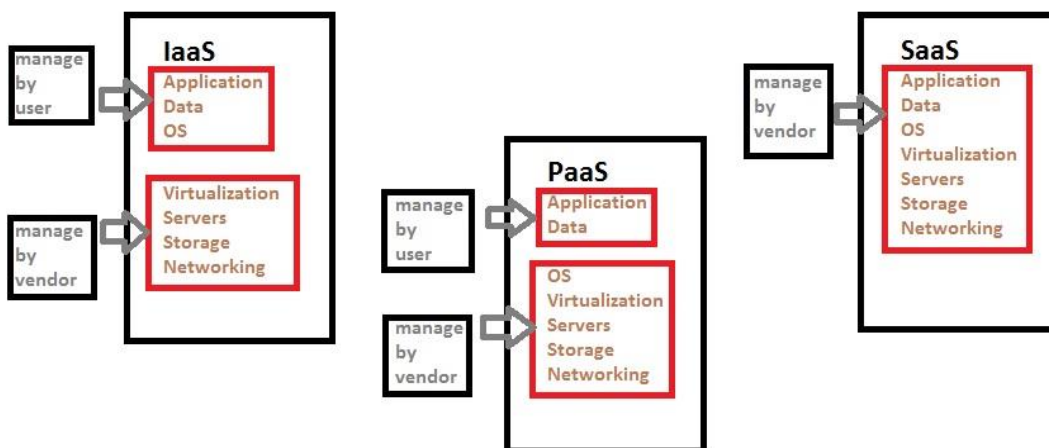


Fig. 3 Service Models

Deployment Models

- 1) **Public Cloud** – Here applications and resources are available to the general public over internet. There is very less or no management is needed. All is done by service providing company. Management of data centers is dependent on service providers not on the users[4].
- 2) **Private Cloud** - Also known as internal or corporate cloud. Private cloud provides infrastructure dedicated to a particular organisation and that organisation is responsible for its maintenance. There is need to buy on-premise hardware for private cloud[4].
- 3) **Hybrid Cloud** – A hybrid cloud is the combination of public and private cloud which makes them sharing the applications and data. This merges the benefit of both[4].

Need of Cloud

- Scalability (Capability to change capacity)

- Availability of resources or services[5]
- Less/ No maintenance[5]
- Expert Service

Technology Behind Cloud Computing

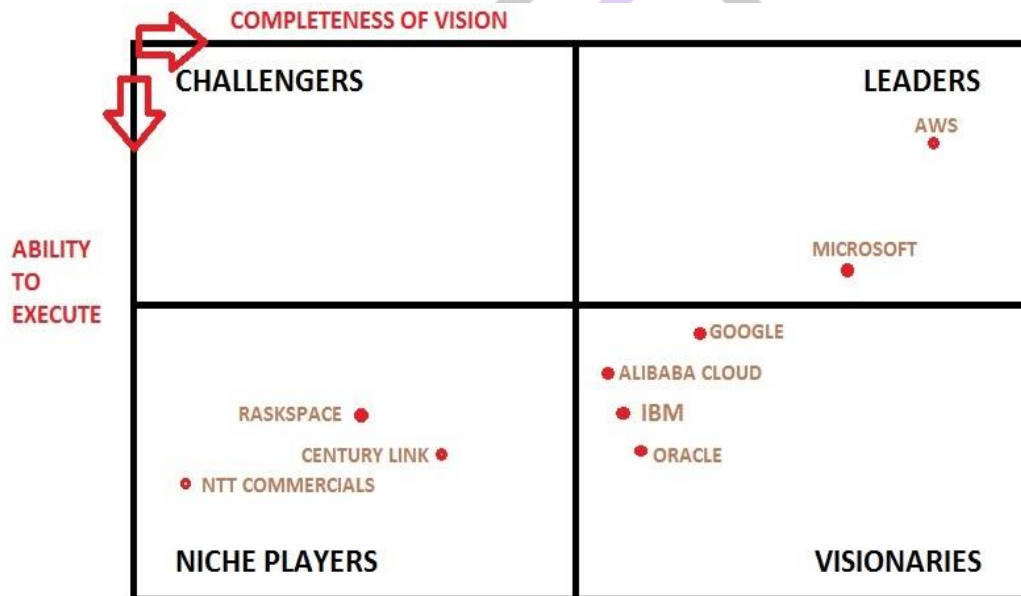
- 1) **Virtualization** – It is defined as the sharing of a single resource among multiple organisation[1].
- 2) **Grid Computing** – It is defined as the collection of computing resources, distanced from each other but work towards a common goal[5].
- 3) **Utility Computing** – It is a service provisioning model in which a service provider makes computing resources and infrastructure management available to the customer as needed[5].

AWS (Amazon Web Services)

It is a public cloud service provider. It has more than 50+ services, greater than other cloud providing companies. AWS provides all three service models facility (SaaS, IaaS, PaaS). It is spreaded across the world.

AWS has broad range of services available for compute, storage, database, analytics, encryption, deployment and many more.

AWS Abundance using Gartner’s Magic Quadrant



AWS Cloud is the first launched cloud in 2002 so it became the earliest competitor in the field of cloud[8]. Until 2009 none of the company entered in the cloud field and this 7 year gap made AWS more powerful and undefeated. AWS has large capital, large infrastructure, 50+ services, better and more scalable as compared to other clouds[7]. AWS can increase its infrastructure and services anytime if it wants due to sufficient capital while other cloud companies have to think twice.

AWS is more secured and flexible with good performance and great deployment speed. It has reasonable pricing[3]. All these features make AWS unique and abundant. It is spreaded over 16 regions with total 44 availability zones(2 or more AZs in each region).

Few popular AWS services:

- 1) **EC2 (Amazon Elastic Compute cloud)** - It provides virtual servers in AWS cloud. EC2 is an instance created and launched by the user. While launching the server one should need to configure security group to prevent your server from hacking. One can start and stop the instance any time by just one click and pay as they use this service (mins based service)[3].
- 2) **NACL(Network ACL)** – It is an initial layer of defence, stateless in nature and operate at subnet level instead of instance level like security groups. All subnets in VPC must be associated with NACL. We need to enable NACL to protect our instance as traffic first reaches to NACL then to security groups[6].

3) EBS (Elastic Block Store) – There is two types of root device one is EBS and other is instance store. EBS is a permanent block storage while instance store is temporary [7]. It is elastic in nature. It has 99.999999999% availability and automatic replication in AZs. There is replication but still we need backup because there is chances of losing data.

4) AWS S3 – It is an object storage designed to store and retrieve any amount of data from anywhere. It is durable. S3 consists of two things one is bucket and the other is objects. Buckets can be said as unique containers and objects are like files. Buckets name is unique always as it is shared among all AWS users. We can upload objects (photos, video files, etc.) in the bucket.

By default access permission of object is private but we can set access control policies to grant permission to others. Inside the bucket folders can also be created in which object exist.

S3 storage classes: There are 4 types of storage classes and each class is different from each other on the basis of availability, durability and pricing.

- **General purpose Storage class (Standard S3)** – Highly durable and available with high pricing.
- **Infrequent Access Storage class (Standard IA)** – In this storage class data accessed less frequently but require rapid access when needed. It has same durability but less availability then Standard S3 with less pricing than Standard S3.
- **RRS (Reduced redundancy storage)** – It stores data at lower levels of redundancy with chances of data loss. It has reduced cost with less durability and availability.
- **Archive (Glaciers)** – It is used for storing long term backups. It is much cheaper and takes huge time to retrieve data so generally used for backups. One can not upload files directly in archive storage. They need to upload in one of the 3 rest storage classes then they can upload that file in archive.

S3 life cycle policy: Storage should be durable and affordable. This can be achieved by following cycle-

- First store a new log upto 3 months in S3 standard after 3 months that data is not required so frequently, that's why store that data in Standard IA and when data would get 1 year older then transfer it to the glacier. One can make it automatic by adding lifecycle rule.

5) Databases – Databases are used to store data in systematic way. They also provide the mechanism to query, create, update, modify and delete the data. It consists of rows and column. Row represents actual information and column represents the type of information stored.

- **RDS-** It is a fully managed relational database (store data in form of relationship) service on cloud. It is managed because AWS manages all underlying hardware, OS, Security, software patching, automated failure detection and recovery [7]. One needs to directly connect with the database.

Benefits of RDS-

- 1) Automated minor updates of versions of RDS.
- 2) Multi AZ deployments
- 3) Automated failure recovery
- 4) Automated backups
- 5) No need to manage underlying OS and security

- **Redshift** – It is a fully managed, fast scalable data warehouse.
- **DynamoDB** – It provides managed NoSQL database. It offers schema flexibility, fast read and write performance, virtually limitless scaling and high availability. It is ideal to manage structured and unstructured data.
- **Elastic Cache-** It is an in- memory caching service.

6) Cloud Watch – It is a monitoring service for AWS cloud resources and applications. We can use cloud watch for collecting and monitoring log files, set alarms and also automatically react to change in AWS resources [7].

One can set up alarms based on cloud watch logs to prevent from hackers as logs of accessing instance comes on cloud watch.

7) SNS (Simple Notification Service) – It is fully managed messaging and mobile notification service for delivering message to the subscribed end points [6].

8) DNS (Domain Name System) – Many attacks happens on DNS to slow down performance. DNS converts domain name to IP address. Every server has unique IP address.

- **Route S3** - It is an AWS DNS. It manages cloud services. It routes traffic to your domain name to a resource such as virtual server or load balancer [6].

9) AWS Lambda – It is a compute service that runs code on virtual server from Amazon EC2 in response to events [6]. One just need to write code in language support by AWS lambda i.e. Node.js, java, C# and Python.

10) VPC (Virtual private network) – It provides an isolated virtual network for the virtual servers. It is a virtual private cloud dedicated to one's account.

11) Cloud Front – Cloud front is a CDN (Content Delivery Network) service that makes your website content available from data centers around the world.

Conclusion:

In this world of intelligence everyone wants to run their business smartly with less input and maximum output. Everyone wants to be economically strong and desires to gain more by investing low. We know that IT industries demands servers, networks, storage, backups, disaster recovery and many things to run but their implementation is cost worthy. So what about using cloud services which comprises of all these services in virtual form [6]. It costs very low as comparative to old tradition of installing or implementing these things in your own company [2][3]. That's why many companies are switching over cloud. If we calculate or compare the different clouds then AWS has many services which are not possessed by other clouds. But one needs to run the services over AWS cloud very carefully otherwise you face a huge loss[3][6]. This field have a wide scope and need and we have thought to discover other services of AWS with aim of further study in AWS cloud.

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