

A

**Seminar Report on**

**AMAZON WEB SERVICES**

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**THIRD YEAR COMPUTER ENGINEERING**

**SUBMITTED BY  
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**Under the guidance of  
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**Sinhgad Institutes**

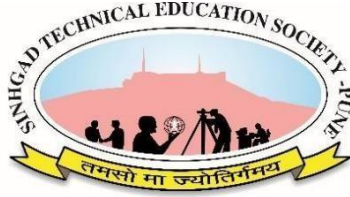
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**2022 - 23**



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### **CERTIFICATE**

This is to certify that the project report entitles

### **AMAZON WEB SERVICES**

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is a bona-fide work carried out by them under the supervision of Prof.A.A.Bhise and it is submitted towards the partial fulfillment of the requirement of **SAVTRIBAI PHULE PUNE UNIVERSITY, Pune** for the award of the degree (Computer Engineering)

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## **ABSTRACT**

Amazon Web Services offers a broad set of global cloud-based products including compute, storage, databases, analytics, networking, mobile, developer tools, management tools, IoT, security, and enterprise applications: on-demand, available in seconds, with pay-as-you-go pricing. From data warehousing to deployment tools, directories to content delivery, over 200 AWS services are available. New services can be provisioned quickly, without the upfront fixed expense. This allows enterprises, start-ups, small and medium-sized businesses, and customers in the public sector to access the building blocks they need to respond quickly to changing business requirements. This whitepaper provides you with an overview of the benefits of the AWS Cloud and introduces you to the services that make up the platform

In 2006, Amazon Web Services (AWS) began offering IT infrastructure services to businesses as web services—now commonly known as cloud computing. One of the key benefits of cloud computing is the opportunity to replace upfront capital infrastructure expenses with low variable costs that scale with your business. With the cloud, businesses no longer need to plan for and procure servers and other IT infrastructure weeks or months in advance. Instead, they can instantly spin up hundreds or thousands of servers in minutes and deliver results faster. In the Machine Learning Lens, we focus on how to design, deploy, and architect your machine learning workloads in the AWS Cloud. This lens adds to the best practices described in the Well-Architected Framework.

In the Hybrid Networking Lens, we focus on how to design, deploy, and architect hybrid networking for workloads in the AWS Cloud. Today, AWS provides a highly reliable, scalable, low-cost infrastructure platform in the cloud that powers hundreds of thousands of businesses in 190 countries around the world..

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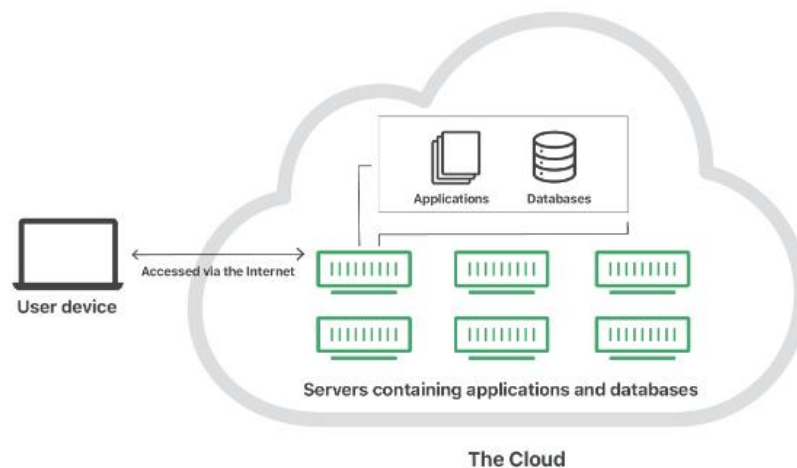


# **CHAPTER NO 01**

## **INTRODUCTION**

# **INTRODUCTION**

The “cloud” refers to servers that are accessed over the Internet, and the software and databases that run on those servers. Cloud servers are located in data centers all over the world. By using cloud computing, users and companies do not have to manage physical servers themselves or run software applications on their own machines.



**Img 1.1**

There are some needs of the cloud Computing, before the cloud computing lot of challenges to store a data. Companies had to store all their data and software on their own hard drives and servers. Companies facing lot of problem Different challenges before cloud computing:

- Invest heavily for setup
- Invest in resources
- Lake of scalability

## **CHAPTER 02**

## **LITERATURE SURVEY**

## **LITERATURE SURVEY**

<b><u>YEAR</u></b>	<b><u>DESCRIPTION</u></b>
<b>2019</b>	In this paper largest Internet of Things (IoT) cloud platform vendors are Microsoft Azure, Amazon Web Services, and Google Cloud. These companies are known as the big three, and have all agreed to join the IoT domain and concentrate on improving the services on their IoT platforms
<b>2020</b>	In this paper Advances in commercial cloud computing necessitate continual evaluation of the cloud's performance on a variety of applications.
<b>2020</b>	In this paper work looks at compute oriented instances from Amazon Web Services and Microsoft Azure cloud platforms and evaluates them with several high-performance computing benchmarks, including HPCC .
<b>2021</b>	HPCG Digital Media Distribution platforms are necessary for delivering multimedia content. Classic clientserver approaches and 3-tier architectures are not optimized for media processing.
<b>2022</b>	In this paper a new model of feedforward neural network with one hidden layer is proposed, capable of detecting DoS, DDoS, theft and reconnaissance activities over IP packet switching networks, aimed at particular victim machines.

## **CHAPTER 03**

# **CLOUD PROVIDERS**

## **CLOUD PROVIDERS**

**There are some cloud providers which provide the cloud services they are following :**

**1. Amazon web services :**

It is a very popular service mostly used in the world. Amazon Web Services, (AWS) is a subsidiary of Amazon that provides on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered pay-as-you-go basis. The genesis of AWS came in the early 2000s. Prior experience with building Merchant.com, Amazon's e-commerce-as-a-service platform for third-party retailers to build their own web-stores, led them to pursue service-oriented architecture as a means to scale their engineering operations. Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centers globally. Millions of customers including the fastest growing startups, largest enterprises, and leading government agencies are using AWS to lower costs, become more agile, and innovate faster.

**2. IBM Cloud :**

IBM is a cloud service provider which provides services like storage, security, database etc. The IBM Smart Cloud brand includes three primary services: the infrastructure, software, and platform services, each of which is offered through public, private and hybrid cloud delivery models. IBM places these offerings under three umbrellas: the Smart Cloud Foundation, Smart Cloud Services and Smart Cloud Solutions. IBM Cloud supports various programming languages, such as Java, Node.js, PHP and Python and extends to support other languages.

### 3. Google Cloud Platform :

The Google Cloud console provides a web-based, graphical user interface that you can use to manage your Google Cloud projects and resources. When you use the Google Cloud console, you either create a new project or choose an existing project, and then use the resources that you create in the context of that project 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-east. 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.



Img 3.1

# **CHAPTER 04**

## **AMAZON WEB SERVICES**



# AMAZON WEB SERVICE

The Amazon Web Service (AWS) Cloud which is being considered in this paper, is among one of the most utilized providers. It offers many ways for users to support such a data cache. In one approach, a cohort of virtual machine instances can be allocated, and data can be stored either on disk or in memory (for faster access, but with limited capacity). The costs of maintaining such a cache would also be much higher, as users are charged a fixed rate per hour, per instance allocated. This fixed rate is moreover dependent on the requested machine instances' processing power, memory capacity, and bandwidth. Alternatively, AWS's Simple Storage Service (S3) can also be used to store data. It could be a much cheaper alternative, as users are charged a fixed rate per GB stored per month. Data are also persisted on S3, but because of this overhead, we might expect some I/O delays.

The history of the Amazon web services, it contains start with the few services Benjamin Black and Chris Pinkman presented a paper that envisioned Amazon's retail computing infrastructure which was automated, standardized, and relied on web services extensively for processes like storage. The first service launched was called queueService. This service was built by a team in Cape Town, South Africa. Amazon was officially launched. Amazon stated that 180,000 developers signed up for AWS. All of Amazon.com retail web service transferred to AWS. Some parts of AWS suffered major outages. A part of the volume that utilizes the EBS or Elastic Block Store was stuck and so was unable to read and write request. It took 2 days for the problem to be fixed.

Amazon S3 is a storage cloud solution for users and cloud application developers. The S3 service permits the storing of large files, with a maximum file size restriction of 5 TB. The files are uploaded as private files to S3 and are not available for file sharing without owner consent. This service is different from the EC2 storage service for virtual machines. S3 is a cheaper solution for static content storing. One main advantage is its integration with other AWS Services. Because the S3 storage is

decoupled from EC2 virtual machine storage, the number of input/output operations are reduced, especially when it comes to small file sizes. The S3 service structure cost comes from bandwidth consumption, storage class and the number of requests to files. If the files from S3 are cached by CloudFront, there are no bandwidth cost from S3 to the Cloud Front services.

We noted previously that another persistent method are EBSvolumes. One difference between EBS and S3 is that EBSvolumes are less accessible. They must first be mounted onto an EC2 instance. But because they are mounted, it alludes to the potential for higher throughput than S3, whose communications is only enabled through high-level SOAP/REST protocols that ride over HTTP. Also in contrast to S3, EBS volumes are not unlimited in storage, and their size must be predefined by users. In terms of cost, however, EBS invokes a storage and request overhead to the hourly-based EC2 instance allocation costs. In the next we evaluate these options in depth.



Img 4.1

There are the some benefits of uses the aws they are following Trade fixed expense for variable expense – Instead of having to invest heavily in data centers and servers before you know how you're going to use them, you can pay only when you consume computing resources, and pay only for how much you consume. Benefit from massive economies of scale in that By using cloud computing, you can achieve a lower variable cost than you can get on your own. Because usage from hundreds of thousands of customers is aggregated in the cloud, providers such as AWS can achieve higher economies of scale, which translates into lower pay as-you-go prices.

Stop guessing capacity in that Eliminate guessing on your infrastructure capacity needs. When you make a capacity decision prior to deploying an application, you often end up either sitting on expensive idle resources or dealing with limited capacity. With cloud computing, these problems go away. You can access as much or as little capacity as you need, and scale up and down as required with only a few minutes' notice.

Increase speed and agility In a cloud computing environment, new IT resources are only a click away, which means that you reduce the time to make those resources available to your developers from weeks to just minutes. This results in a dramatic increase in agility for the organization, since the cost and time it takes to experiment and develop is significantly lower.

Stop spending money running and maintaining data centers – Focus on projects that differentiate your business, not the infrastructure. Cloud computing lets you focus on your own customers, rather than on the heavy lifting of racking, stacking, and powering servers. Go global in minutes in Easily deploy your application in multiple regions around the world with just a few clicks. This means you can provide lower latency and a better experience for your customers at minimal cost.

All of Amazon.com retail web service transferred to AWS. Some parts of AWS suffered major outages. A part of the volume that utilizes the EBS or Elastic Block store was stuck and so was unable to read and write request. It took 2 days for the problem to be fixed. The first service launched was called queue Service.

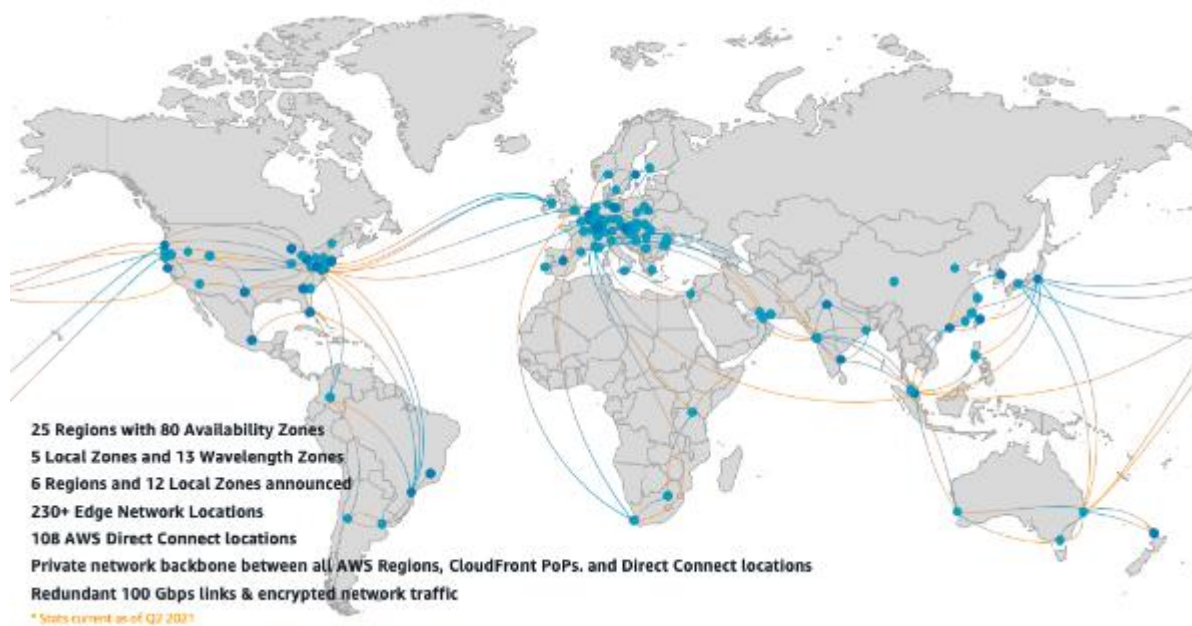
## **CHAPTER 05**

### **REGION AND AVAIBALITY** **ZONES**

## **REGION AND AVAILABILITY ZONES**

These are various region and availability zones are provided by the Amazon Web Services they are following :

- **Region:** AWS has the concept of a Region, which is a physical location around the world where we cluster data centers. We call each group of logical data centers an Availability Zone. Each AWS Region consists of multiple, isolated, and physically separate AZs within a geographic area. Unlike other cloud providers, who often define a region as a single data center, the multiple AZ design of every AWS Region offers advantages for customers. Each AZ has independent power, cooling, and physical security and is connected via redundant, ultra-low-latency networks. AWS customers focused on high availability can design their applications to run in multiple AZs to achieve even greater fault-tolerance. AWS infrastructure Regions meet the highest levels of security, compliance, and protection
- **Availability zone:** Because NTA tools attribute behaviors to entities, ample context is available for detection and response workflows. This means security professionals no longer need to sift through multiple data sources such as DHCP and DNS logs, configuration management databases and directory service infrastructure in an attempt to gain comprehensive visibility. Instead, they can quickly detect anomalies, decisively track them down, determine the root cause and react accordingly. In order to be able to provide such real-time event attribution analysis, model simulations are performed ahead of an extreme weather event occurring by utilising seasonal forecast sea surface temperatures.



**Img 5.1**

An availability zone is a logical data center in a region available for use by any AWS customer. Each zone in a region has redundant and separate power, networking and connectivity to reduce the likelihood of two zones failing simultaneously. A common misconception is that a single zone equals a single data center. In fact, each zone is backed by one or more physical data centers, with the largest backed by five. While a single availability zone can span multiple data centers, no two zones share a data center. Abstracting things further, to distribute resources evenly across the zones in a given region.

This means the us-east-1a availability zone for one account may not be backed by the same data centers as us-east-1a for another account. In each zone, participating data centers are connected to each other over redundant low-latency private network links. Likewise, all zones in a region communicate with each other over redundant private network links. These intra and inter-zone links are heavily used for data replication by a number of AWS services including storage and managed databases. Why are availability zones such an important and foundational concept in Amazon Web Services? The diagram below illustrates a region with two zones where only one is being utilized. The architecture mirrors what a typical three-tier application.

**CHAPTER 06**  
**CORE SERVICES**

## **CORE SERVICES**

**There are some core services provided by the amazon web services they are following:**

- **Elastic load balance service:** Elastic Load Balancing (ELB) automatically distributes incoming application traffic across multiple targets, such as Amazon EC2 instances, containers, and IP addresses. It can handle the varying load of your application traffic in a single Availability Zone or across multiple Availability Zones.

Elastic Load Balancing offers four types of load balancers that all feature the high availability, automatic scaling, and robust security necessary to make your applications fault tolerant. Application Load Balancer is best suited for load balancing of HTTP and HTTPS traffic and provides advanced request routing targeted at the delivery of modern application architectures, including microservices and containers. Operating at the individual request level (Layer seven), Application Load Balancer routes traffic to targets within Amazon Virtual Private Cloud (Amazon VPC) based on the content of the request.

- **Database storage service :** A database stores and manages a large amount of data on a daily basis. This would not be possible using any other tool such as a spreadsheet as they would simply not work. The database is pretty accurate as it has all sorts of build in constraints, checks etc.

This means that the information available in a database is guaranteed to be correct in most cases. In a database, it is easy to update data using various Data Manipulation languages (DML) available. One of these languages is SQL. Databases have various methods to ensure security of data. There are user logins required before accessing a database and various access specifiers. These allow only authorised users to access the database. Gateway Load Balancer makes it easy to deploy, scale, and run third-party virtual networking appliances. Providing load balancing and auto scaling for fleets of third-party appliances,



Gateway Load Balancer is transparent to the source and destination of traffic.

- **Storage service:** Millions of customers use AWS storage services to transform their business, increase agility, reduce costs, and accelerate innovation. Choose from a broad portfolio of storage solutions with deep functionality for storing, accessing, protecting, and analyzing your data.

Amazon Simple Storage Service (Amazon S3) is an object storage service that offers industry-leading scalability, data availability, security, and performance. This means customers of all sizes and industries can use it to store and protect any amount of data for a range of use cases, such as websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics. Amazon S3 provides easy-to-use management features so you can organize your data and configure the different services in the system.

- **Networking service :** The previous two configurations do not account for persisting data. That is, upon node failure, all data is presumed lost even if stored on disk. Moreover, it can be useful to stop and restart a cache, perhaps during peak/nonpeak times, to save usage costs. The simplest persistent method is to directly utilize S3 to store cached data.

This avoids any indexing logic from the application developer, as we can subscribe directly S3's simple API. It is very inexpensive to store data on S3 and more importantly, because S3 is independent from EC2, we further elude instance allocation costs. However, due to S3's reliability and availability guarantees, it implements an architecture which supports replication and consistency, which would likely impact performance. Also, although storage costs are low, the data transfer costs are equivalent to those of EC2 instances, which leads to the expectation that high-throughput environments may not benefit cost-wise from S3. We noted previously that another persistent method are EBS volumes. One difference between EBS and S3 is that EBS volumes are less accessible. They must first be mounted onto an EC2 instance. But because they are mounted, it alludes to the potential for higher throughput than S3.

# **CHAPTER 07**

## **AWS CAREER**

## **AWS CAREER**

There are different roles that provide the AWS like cloud administrator, cloud developer, and cloud architect etc.

- **Cloud Developer:** In addition to the design and implementation of cloud infrastructures, cloud developers also ensure the effective design of business processes in the cloud. They have a deep understanding of cloud provider architectures and are able to monitor cloud maintenance, planning, security and usage across the company. Tasks include scaling of application components, security issues related to encryption and access rights, and ongoing optimization of efficiency and performance.
- **Cloud Administrator :** Work closely with IT security to monitor the company's cloud privacy. Respond to technical issues in a professional and timely manner. Offer guidance in infrastructure movement techniques, including bulk application transfers into the cloud. Identify the top cloud architecture solutions to successfully meet the needs of the company. Lead our organization through cloud adoption and establish best practices. Vet and select cloud providers and third-party services.
- **Cloud architect:** Cloud administrators fulfill a wide variety of responsibilities. Some days, you will communicate with clients to determine their needs while setting up their cloud infrastructures. Other days, you will be responsible for the ongoing management of those cloud-based applications to ensure continued functionality. The individual responsibilities of a cloud administrator can include, managing all aspects of a company's cloud-based application including its comprehensive user access permissions. Setting up cloud-based applications according to a company's specifications and needs. Training a company's employees in the correct use of cloud-based applications. Controlling cloud application access to ensure that all company employees receive access.

**CHAPTER 08**  
**CONCLUSION**

## **CONCLUSION**



AWS provides building blocks that you can assemble quickly to support virtually any workload. With AWS, you'll find a complete set of highly available services that are designed to work together to build sophisticated scalable applications. You have access to highly durable storage, low-cost compute, high-performance databases, management tools, and more. All this is available without up-front cost, and you pay for only what you use. These services help organizations move faster, lower IT costs, and scale. AWS is trusted by the largest enterprises and the hottest start-ups to power a wide variety of workloads, including web and mobile applications, game development, data processing and warehousing, storage, archive, and many others..

## **CHAPTER 09**

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