

A
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CERTIFICATE

This is to certify that the seminar report entitles

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is a bonafide work carried out by above student under the supervision of Prof.Priyanka Kinage and it is approved for the partial fulfillment of the requirement of Savitribai Phule Pune University, Pune for the award of the degree of Bachelor of Engineering(Computer Engineering).

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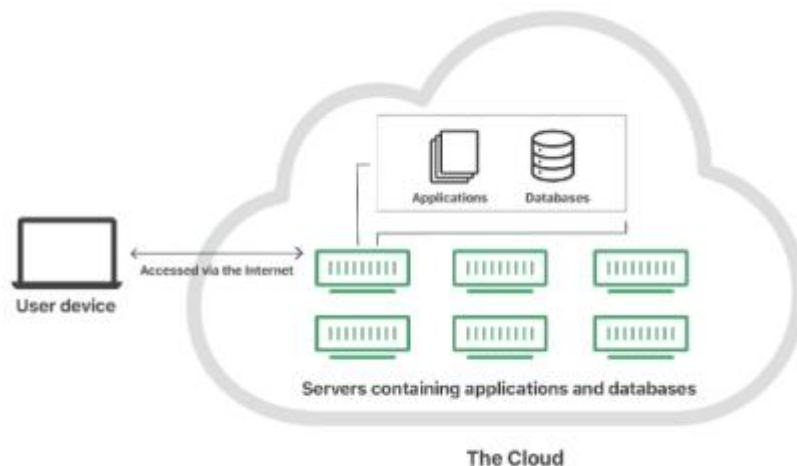
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1. INTRODUCTION

1.1 Cloud

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 1.1.1

1.2 Why we need 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 :

- 1) Invest heavily for setup .
- 2) Invest in resources
- 3) Lack of scalability
- 4) Less time to focus on business

1.3 How Cloud computing Helps?

Cloud computing analogous to Electricity come home.somebody manage by electricity services.you only pay the what you use electricity.cloud computing helps in storage,application,server and all management activity.

cloud computing enables on demand services like computation,storage ,networking etc. Which can access through internet user not requied to manage this services



Img 1.1.2

1.4 Feature of cloud computing?

Cloud computing provide different feature they are following:

- 1) On-Demand self service : It is one of the important and valuable features of Cloud Computing as the user can continuously monitor the server uptime, capabilities, and allotted network storage. With this feature, the user can also monitor the computing capabilities.
- 2) Large network Access : The user can access the data of the cloud or upload the data to the cloud from anywhere just with the help of a device

and an internet connection. These capabilities are available all over the network and accessed with the help of internet.

3) Scalable: According need of the user you can extend the service whatever he want .if any user required less sevices he also and do it.

4) Pay as he go :In cloud computing, the user has to pay only for the service or the space they have utilized. There is no hidden or extra charge which is to be paid. The service is economical and most of the time some space is allotted for free.

1.5) Cloud services model:

There are different cloud service model used they are provide the services to the user

1.5.1) IaaS (Infra-Structure as a service)

In this service user can decide the computational power ,operating system,Runtime environment,middleware,application etc. To be run on my server.violators decide the manage all remaining facility like networking ,storage, server,virtualization etc .



Img 1.1.3

1.5.2) PaaS(Platform as a service) : In this service user can decide the Data,application etc. To be run on my server.violators decide the manage all remaining facility like networking ,storage, server,virtualization ,computational power ,operating system,Runtime

environment,middleware etc .



Img 1.1.3

1.5.3)SaaS(Software as a service):

In this service user can not decide the any factor To be run on my server.violators decide the manage all remaining facility like networking ,storage, server,virtualization ,computational power ,operating system,Runtime environment,middleware etc .



Img 1.1.4

2. LITERATURE SURVER

Sr.No	Paper name	description	Problem found
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1	Toward Cloud Computing Reference Architecture	<p>In this paper they have focused on architecture of cloud computing.</p> <p>how cloud computing work exactly</p>	only basic information given
2	Evaluation of Highly Reliable Cloud Computing	<p>In this paper they have focused on Evaluation of cloud.</p> <p>it describe the history of the cloud computing.when it come in market and people use it</p>	No prediction of future result.
3	Utilising Amazon Web Services to provide an on demand urgent computing facility for climateprediction.net	<p>In this paper they have focused on urgent depmand computing facility for climatepredicion.net</p> <p>climateprediction.net volunteer computing project to investigate and reduce uncertainties in climate modelling</p>	No deep analysis of result

4	Evaluating Caching and Storage Options on the Amazon Web Services Cloud	<p>In this paper they have focused on Evaluation of AWS</p> <p>it describe the Evaluation of AWS and different services provide by AWS</p>	only collection of all topic provided
5	Comparison of the IoT Platform Vendors, Microsoft Azure, Amazon Web Services, and Google Cloud, from Users' Perspectives	<p>In this paper they have focus on the different cloud platform and comparison of this platform</p> <p>mostly focus on the users perspective how easily can use it and provide better environment</p>	only collection of all topic provided

3.Cloud provider

3.1) Amazon Web service

It is very popular service mostly used in 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.

3.2)IBM cloud

IBM is cloud service provider which provide services like storage,security,database etc. The IBM SmartCloud 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 SmartCloud Foundation, SmartCloud Services and SmartCloud Solutions

3.3) 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.

4. Amazon web service

4.1 what is AWS ?

The Amazon web service (AWS) is cloud service provider that enables on demand services like computation, storage, security etc which can be access through the internet and user is not required to manage the resources. Amazon start the cloud service in 2000 but it bit by bit ,actually In November 2004, AWS launched its first [infrastructure service](#) for public usage: [Simple Queue Service](#) (SQS).

History of AWS :

2003 : Benjamin Black and Chris Pinkman presented a paper that envisioned amazons retail computing infrastructure which was automated standardized and relied on web services extensively for processes like storage .

2004: The first service launched was called queueService. This service was built by a team in cape Town ,south Africa

2006: Amazon was officially launched

2007: Amazon stated that 180000 developers signed up for AWS

2010: All of Amazon.com retail web service transferred to AWS

2011 : 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.

In this way Amazon can start the AWS service for user

4.2 Benefits of AWS

There are several benefits of use 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 – 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 – 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 – 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.

5.AWS region and availability

Regions

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 data protection.

Availability Zones

An Availability Zone (AZ) is one or more discrete data centers with redundant power, networking, and connectivity in an AWS Region. AZs give customers the ability to operate production applications and databases that are more highly available, fault tolerant, and scalable than would be possible from a single data center. All AZs in an AWS Region are interconnected with high-bandwidth, low-latency networking, over fully redundant, dedicated metro fiber providing high-throughput, low-latency networking between AZs. All traffic between AZs is encrypted. The network performance is sufficient to accomplish synchronous replication between AZs. AZs make partitioning applications for high availability easy. If an application is partitioned across AZs, companies are better isolated and protected from issues such as power outages, lightning strikes, tornadoes, earthquakes, and more. AZs are physically separated by a meaningful distance, many kilometers, from any other AZ, although all are within 100 km (60 miles) of each other.



img 5.1.1

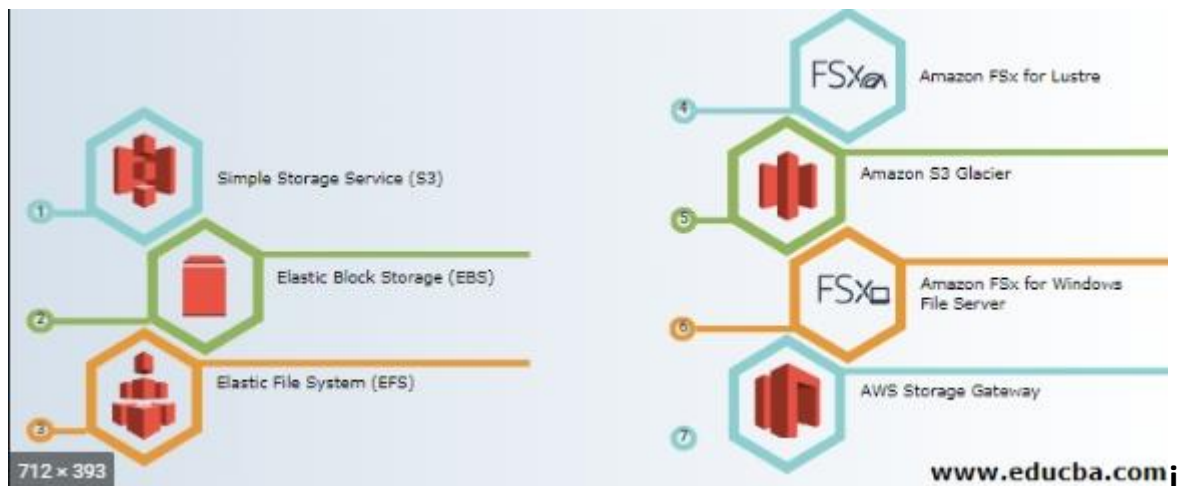
6. AWS core services

AWS provide different core services like data storage, load elastic ,security services ,database services, networking services etc. Lets we discuss the one by one.

6.1 Data storage in AWS

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



mg 6.2.1

6.2 cloud storage in AWS

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. You can use the service for backup and archiving, disaster recovery, cloud data processing, storage tiering, and migration. Your applications connect to the service through a virtual machine or hardware gateway appliance using standard storage protocols, such as NFS, SMB and iSCSI. The gateway connects to AWS storage services, such as Amazon S3, S3 Glacier, and Amazon EBS, and Amazon FSx for Windows File Server, providing storage for files, volumes, and virtual tapes in AWS. The service includes a highly-optimized data transfer mechanism, with bandwidth management, automated network resilience, and efficient data transfer, along with a local cache for low-latency on-premises access to your most active data.

6.3 Load Elastic in AWS

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.
- Network Load Balancer is best suited for load balancing of TCP traffic where extreme performance is required. Operating at the connection level (Layer four), Network Load Balancer routes traffic to targets within Amazon Virtual Private Cloud (Amazon VPC) and is capable of handling millions of requests per second while maintaining ultra-low latencies. Network Load Balancer is also optimized to handle sudden and volatile traffic patterns.
- 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. This capability makes it well suited for working with third-party appliances for security, network analytics, and other use cases.
- Classic Load Balancer provides basic load balancing across multiple Amazon EC2 instances and operates at both the request level and connection level. Classic Load Balancer is intended for applications that were built within the EC2-Classic network.

6.4 Security services in AWS

There are different security services provided by the aws they are following

6.4.1 AWS IAM

AWS Identity and Access Management (IAM) is a web service for securely controlling access to AWS services. With IAM, you can centrally manage users, security credentials such as access keys, and permissions that control which AWS resources users and applications can access. Shared access to your AWS account You can grant other people permission to administer and use resources in your AWS account without having to share your password or access key. Granular permissions You can grant different permissions to

different people for different resources. For example, you might allow some users complete access to Amazon Elastic Compute Cloud (Amazon EC2), Amazon

6.4.2 AWS Shield

AWS provides two levels of protection against DDoS attacks: AWS Shield Standard and AWS Shield Advanced. AWS Shield Standard is automatically included at no extra cost beyond what you already pay for AWS WAF and your other AWS services. For added protection against DDoS attacks, AWS offers AWS Shield Advanced. AWS Shield Advanced provides expanded DDoS attack protection for your Amazon EC2 instances, Elastic Load Balancing load balancers, Amazon CloudFront distributions, and Amazon Route 53 hosted zones.

6.5 Database Services in AWS

6.5.1) Why we need database ?

The various reasons a database is important are –

Manages large amounts of data : 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.

Accurate : A 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.

Easy to update data : In a database, it is easy to update data using various Data Manipulation languages (DML) available. One of these languages is SQL.

Security of data : 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.

Data integrity : This is ensured in databases by using various constraints for data. Data integrity in databases makes sure that the data is accurate and consistent in a database.

Easy to research data : It is very easy to access and research data in a database. This is done using Data Query Languages (DQL) which allow searching of any data in the database and performing computations on it.

6.5.2)Amazon Aurora

Aurora includes a high-performance storage subsystem. Its MySQL- and PostgreSQL-compatible database engines are customized to take

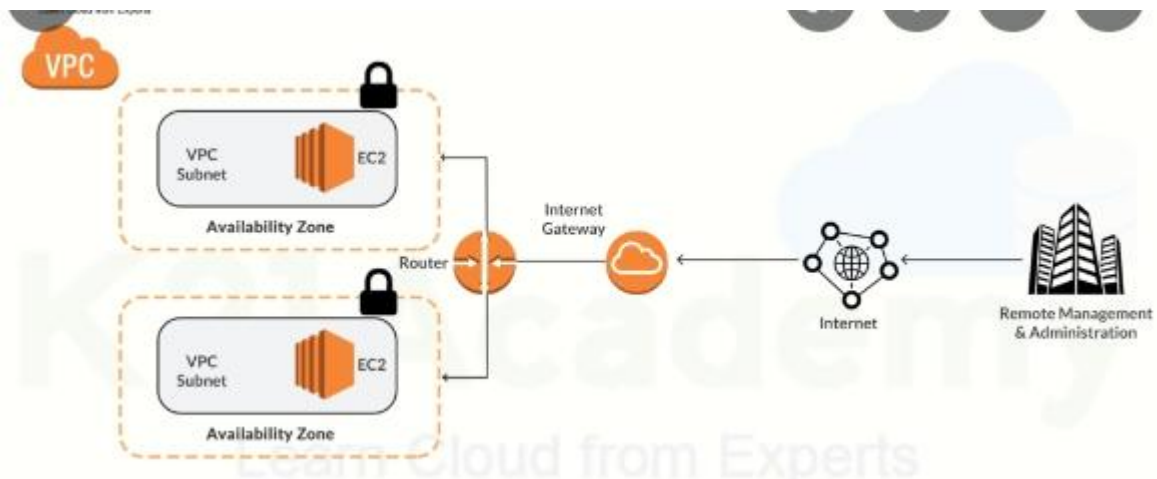
advantage of that fast distributed storage. The underlying storage grows automatically as needed. An Aurora cluster volume can grow to a maximum size of 128 tebibytes (TiB). Aurora also automates and standardizes database clustering and replication, which are typically among the most challenging aspects of database configuration and administration.

6.6) AWS networking Services

Get the broadest and deepest set of networking and content delivery services in the world with AWS. Run applications with the highest level of reliability, security, and performance in the cloud.

AWS Security Hub is a cloud security posture management service that performs automated, continuous security best practice checks against your AWS resources. Security Hub aggregates your security alerts (i.e. findings) from various AWS services and partner products in a standardized format so that you can more easily take action on them. To maintain a complete view of your security posture in AWS, you need to integrate multiple tools and

services including threat detections from Amazon GuardDuty, vulnerabilities from Amazon Inspector, sensitive data classifications from Amazon Macie, resource configuration issues from AWS Config, and AWS Partner Network products. Security Hub simplifies how you understand and improve your security posture with automated security best practice checks powered by AWS Config rules and automated integrations with dozens of AWS services and partner products. Security Hub enables you to understand your overall security posture via a consolidated security score across all of your AWS accounts, automatically assesses the security of your AWS accounts resources

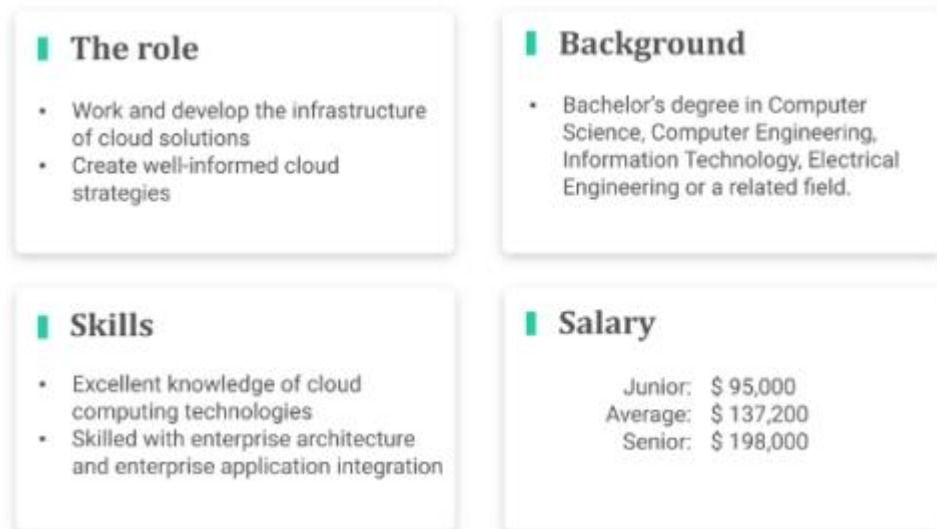


Img 6.5.2.1

7) AWS Career

AWS provide different role in IT sector some role are following

7.1) Cloud Architect



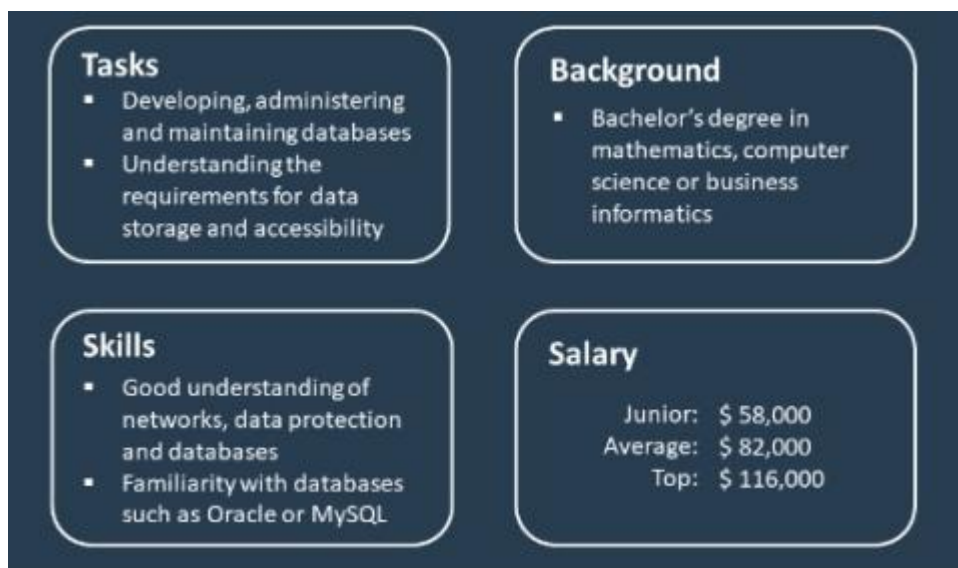
Img 7.1

7.2) Cloud Developer



Img7.2

7.3) Cloud Administer



img 7.3

8.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.

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