Implementation of Cloud computing Service Delivery Models (IAAS, PAAS) by AWS and Microsoft Azure: A Survey

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ABSTRACT
Cloud computing provides computing services, servers, storage, databases, networking, software over the Internet whenever it is required. Cloud is a shared pool of data one can use Cloud Computing to transforms the databases and application software to the huge data centers. In this paper, we focus on two major cloud computing services mainly Infrastructure as a service (IAAS), Platform as a service (PAAS) with respective service providers (AWS and Microsoft Azure) and their implementation in industries.

Keywords
Cloud service provider, IAAS, PAAS, cloud computing, SAAS, cloud service provider

1. INTRODUCTION
Cloud computing defined by NIST is a model for enabling sustainable, on-demand, network access to a shared pool of configurable computing resources that can be quickly provisioned and free with minimal management effort or service provider interaction. [1] Cloud is network-based environment that focus on sharing computation and resources. In cloud environment several kinds of virtual machines are loaded on same physical server as infrastructure (IAAS) In This paper, some papers dealing with the security issues and their solution methodology provided by service providers is focused. The work will be focusing as follows: In the first part we describe the overview of cloud computing service delivery models and in the second part, we discussed comparative study of different service providers. The third part, deals with security analysis and the fourth we end up with the conclusion.

1.1 Cloud Computing Service Delivery Models
Three models are used to deliver cloud computing: Software or Application as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). [10] Infrastructure-as-a-Service (IaaS): It provides the platform for computational requirements, computing resources and infrastructural utilities such as (storage and archiving, servers, and networking) to setup the needed environment for hosted applications. Example: Microsoft Azure, Amazon's EC2. Platform-as-a-Service (PaaS): It provides the platform for computational requirements, and the solution stack required by the customers to build their own applications and host their own data. Example: Google Apps, AWS Elastic Beanstalk. Software-as-a-Service (SaaS): It provides the platform for computational requirements and applications for the customers to utilize. Example: Office 365, Twitter, Myspace, and Facebook, and emails access. Figure fig: Cloud shows the different cloud service delivery models and their respective domains. Generally, Infrastructure as a Service (IaaS) give users/clients more controls and flexibility and Platform as a Service (PaaS) tend to be more opinionated but has less things to maintain and support. Currently there are different cloud service providers Amazon web services, Microsoft AZURE, Google cloud and many more. These service providers allow subscribers to use various cloud computing services on demand.

2. LITERATURE REVIEW
In this section we are going to discuss two major cloud service providers mainly Amazon web services and Microsoft Azure based on the type of IAAS and PAAS services offered by them.

The AWS Cloud infrastructure is built around Regions and Availability Zones (AZs) [5]. It consists of many cloud services that you can use in combinations fitted to your business or organizational needs. Some of the IAAS by AWS are Amazon EC2, Amazon Elastic Block Store, Autoscaling, Elastic Load Balancing. Amazon EC2 is used for Virtual Machine hosting to provide compute capacity in the cloud. Amazon EC2 provides you Linux and Windows based servers with cores in the range of 1 to 60+ and RAM in the range of 1.7 GB to 244 GB. Amazon EBS is used to provide storage to EC2 instances. With the help of Autoscaling feature you

can scale up or down an automatically. Amazon ELB is used to redirect traffic to healthy instance in order to handle incoming traffic [6].

PAAS offered by AWS is AWS Beanstalk, AWS Lambda [11] AWS Lambda is PAAS service offered by Amazon, it is a server less compute service than runs your code irrespective of no of request as it offers automatic scaling feature.

Microsoft Azure provides different IAAS services typically Azure Container service, AZURE load balancer, AZURE Autoscaling and Azure virtual machines. Where Azure container services and virtual machine services are responsible for things like Operating systems (OS), Antivirus and load balancing. Virtual machines use virtual hard disks (VHDs) to store their operating system (OS) and data. VHDs are also used for the images you can choose from to install an OS. App services, AZURE search and Azure CDN (content delivery network) are some of the PAAS services offered by Microsoft Azure [3].

3. SECURITY ANALYSIS
This section is about the security issues occurs in cloud

computing and their solution provided by Amazon web services and Microsoft AZURE. Some of the issues that are taken into consideration are Problems in secured data transfer, data storage, Multi Tenancy, Malicious Insiders and overall cost.

3.1 Problems in secured data transfer

Problem of secured data transfer arise as soon as the cloud services becomes popular in organizations and academics as the media of data transfer in Internet and the security aspects are not fully trustable. AWS comes with the services like Amazon kinesis firehose ref fig.1, AWS Import/Export Snowball and AWS Direct connect which provides secure appliances for large amounts of data and transfer of streaming data using AWS lambda function. Amazon Kinesis Data Firehose this service offers you only pay for the amount of data you transmit through the service. There is no minimum fee or setup cost. It can batch, compress, and encrypt the data before loading it, minimizing the amount of storage used at the destination and increasing security.

Microsoft Azure provides transit encryption technologies like shared access signatures (SAS) to use secure HTTPS protocol for secured communication over the Internet.

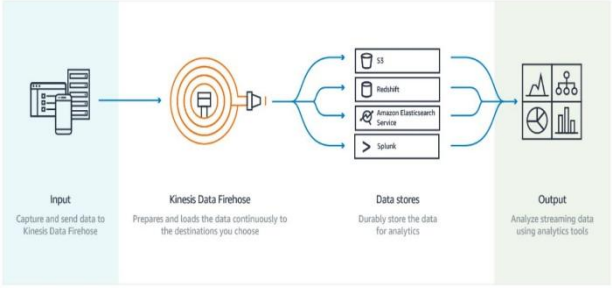

Fig 1: Amazon kinesis firehose working mechanism

3.2 Multi Tenancy

This issue occurs when multiple individual client shares the same physical medium in cloud computing.AWS offers Amazon DynamoDB which includes three variations separate database, shared database and shared everything schema [8].

Microsoft Azure uses sharded multi-tenant model and elastic SQL database to overcome the multi tenancy problem [4].

3.3 Malicious Insiders

This issue is mainly caused by ex-employee or the one with the administrative privileges. To overcome this issue Microsoft Azure manages antimalware client and service, antimalware classic deployment model, antimalware power-shell cmdlets and Azure diagnostics extension. AWS Marketplace provides various firewall model like virtual

firewalls around EC2 instances, web application firewall and next generation firewalls also provide data backup services.

3.4 Scaling problems

scaling is referred as the ability for an IT resource to deal with the growing or decreasing demands in a capable manner. By implementing cloud scalability, you can enable your resources to grow as your traffic or organization grows, and vice versa. Amazon provides AWS Auto Scaling to overcome scaling problems, which monitors your applications and automatically adjusts capacity to maintain balanced, predictable performance at the lowest possible cost. Microsoft Azure comes with the Azure Autoscale.Azure Autoscaling is a inbuilt feature of Cloud Services, which helps applications to perform their best when demand changes. Some of the key features are maximize App responsiveness, scale by any metric, save money by not wasting servers, anticipate load with different schedules etc.

3.5 Overall Pricing

Overall pricing includes operational cost, server, power, network infrastructure cost and personnel cost. AWS pricing is based on multiple factors like storage, period, (per month or per year). Microsoft Azure also follows pay only for what you use basis.

4. CONCLUSION

In this paper Amazon web services and Microsoft Azure are

the two cloud service providers compared and the comparison is based on the different cloud computing service delivery models mainly IAAS and PAAS as shown in Table I. Then in the security analysis we considered different cloud computing issues and the cloud services offered by these two service providers for the comparative study analysis. From this analysis we can conclude that both the services are providing their up to the mark services to the users/clients on respective cloud service delivery models like IAAS and PAAS.

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7. APPENDIX

Table 1 Microsoft Azure vs AWS: Cloud Comparison

Area	Amazon Web Service	Microsoft Azure
Compute Services	Elastic Compute Cloud, Amazon Elastic Beanstalk	Virtual Machines (VMs), Azure websites and Apps
Scaling Options	Autoscaling	Azure Autoscale
Network	Virtual Private Cloud	Virtual Network
Storage Option	Amazon Simple Storage service (S3)	Azure Storage (Blobs, Tables, Queues, Files)
Database	Amazon Relation Database (RDS), Amazon Redshift	Azure SQL Database
Administration	AWS Directory Service, AWS Identity and Access Management (IAM)	Azure Active Directory
Encryption	AES-128, AES-256	AES-256, RSA-256
Hybrid Cloud Capability	Amazon Snowball Edge	Azure Storesimple, Hybrid SQL Server, Azure Stack
Pricing Model	Play as you go model, charge per hour	Play as you go model, charge per Minute
Data Recovery	Yes	Yes