Comparative Study of Cloud Platforms: Microsoft Azure and Amazon

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1 Introduction

There has been a heightened interest in companies embracing cloud computing over the past decade. Cloud computing promises the ability to quickly and cost-effectively reshape the way companies procure and handle their computing resource requirements. Cloud computing is considered a revolutionary model for IT service sourcing that creates value for the adopting businesses, in line with the notion of shared services. Cloud computing helps companies to concentrate on their core business operations, thereby increasing efficiency. Due to the scalability, versatility, agility, and convenience it provides to companies, the adoption of cloud computing is growing rapidly. A recent cross-sectional analysis of enterprise adoption rates of cloud computing found that a high percentage of large enterprises are cloud adopters, while some small and medium-sized enterprises (SMEs) are cloud adopters.

2 Comparative Evaluation

Table 2. Comparison Between Amazon EC2 and Microsoft Azure [1][2][3]

Cloud Server	Amazon EC2	Microsoft Azure
Pricing types	On-Demand, Saving Plans, Reserved Instances, Spot Instances and Per-second Billing	Pay as you go pricing

Auto-Scaling/ Elasticity	1. automatically scale your capacity up or down according to conditions you define. 2. ensure that the number of Amazon EC2 instances you are using scales up seamlessly during demand spikes to maintain performance, and scales down automatically during demand drops to minimize costs. 3. enabled by Amazon CloudWatch and no additional charge. 4. automatically registered to use Auto Scaling features via the Auto Scaling APIs or Command Line Tools.	1. enables customers to easily scale their applications to any size. 2. a fully automated self-service platform that allows customers to provision resources within minutes. 3. Elastically grows or shrinks the resource usage based on application demand. 4. pay for the resources their applications use. 5. practical limitations 6. charged by the hour and costly
Virtualization		
Virtual Machine (VM) instance types	1. Standard 2. Micro 3. High-Memory 4. High CPU 5. Cluster Compute 6. Cluster GPU	1. Balanced CPU-to-memory ratio (General purpose) 2. High CPU-to-memory ratio (Compute Optimized) 3. High memory-to-CPU ratio (Memory optimized) 4. High disk throughput and IO (storage optimize) 5. Single or multiple NVIDIA GPUs (GPU) 6. Azure's fastest and most powerful CPU VMs (High Performance compute)
OS environments offered		
Server OS Type	Linux and Windows	Linux and Windows

Preconfigured Operating Systems	1. Amazon Linux 2. Cent OS 3. Debian 4. Oracle Linux 5. Red Hat Linux 6. Ubuntu 7. Windows Server	1. Cent OS 2. FreeBSD 3. OpenSUSE Linux 4. Oracle Linux 5. Ubuntu 6. Windows server
Available runtimes	1. .NET 2. PHP 3. JAVA 4. Python 5. Ruby	1. .NET 2. PHP 3. JAVA 4. Python 5. Ruby 6. Node
Performance and Scalability		
Cloud Advisor	Trusted advisor	Advisor
DevOp Tooling and Services	1. Microservices 2. Infrastructure as Code 3. Monitoring and Logging 4. Platform as Server 5. Version Control	1. Repos 2. Pipelines 3. Boards 4. Test Plans 5. Artifacts 6. DevOps Server
Administration & Compliance Detail	1. Access Management 2. Compliance Monitoring 3. Detailed Invoices	1. FedRAM 2. HIPAA Compliant 3. ISO 27001 Certified 4. Network Uptime Guarantee 5. PCI Compliant 6. SOC 2 7. SSAE16 Audited Facility
Service Model		
Service model provided	IaaS, PaaS, and SaaS with major contributions in IaaS.	IaaS, PaaS, and SaaS with major contributions in PaaS.

Major contributions services	Security and Identity services: 1. Active Directory 2. Identity management 3. Certificate manager 4. CloudHSM Monitoring infrastructure resource management tools: 1. CloudWatch 2. Cloudtrail 3. Config	App Services: 1. Web Apps 2. Mobile Apps 3. Logic Apps 4. Function Apps 5. Web Jobs Content Delivery Network: Connective Search Cosmos DB SQL databases Synapse Analytics
Storage		
Storage devices	1. AWS S3 2. EBS 3. Glacier	1. Blob Storage 2. Disk Storage 3. Standard Archive
Security		
Identity and access management	**IAM** does not need additional charges. It can manage hybrid environments only by fuse it with other on-premises tools.	**Active Directory** provides free tier data limits and different paid tiers with some advanced features such as the ability to manage hybrid environments.
Key-based encryption of data	CloudHSM service separated with **KMS** (Key Management Service)	HSM (hardware security module) is part of **Key Vault**.
Virtual private network	**VPC** and Direct Connect use layer 2 routing.	**ExpressRoute** and **Virtual Network** use layer 3 routing.
Storage data encryption	**S3** provides options for AWS to manage keys or customers manage their own keys by themselves.	**Blob** does not support customer-managed keys, but this feature is on their plan.
Monitoring	**CloudWatch** merges both services and monitoring into a single service.	Service is separated. **Azure Monitor** controls all Azure services while Azure **Application Insights** monitor running applications**.**

3 Opinion

AWS services are designed to work with each other in such a way that they produce a scalable and effective result. The services offered by AWS are classified into three types, such as Infrastructure as a Service (IaaS), Software as a Service (SaaS) and Platform as a Service (PaaS). Launched in 2006, AWS has become the best cloud platform among the cloud platforms currently available. These platforms offer various advantages such as management overhead reduction and cost minimization which is very beneficial to the companies nowadays. While for Microsoft Azure, it has emerged as one of the largest providers of commercial cloud services which launched in 2010. It offers a wide range of integrated cloud services and features that integrate seamlessly with your environment to achieve efficiency and scalability, such as analytics, computing, networking, databases, storage, mobile and web applications. According to statistics, there are 210,931 companies using Microsoft Azure including United States Security Associates Inc**.** In our own opinion, pricing wise, most users will get the benefit by using Azure. To run Windows Server and SQL Server, Amazon's AWS costs about 5 times than Microsoft's Azure. Also, Azure costs 4% to 12% less than AWS in most cases. Also, Microsoft offers pay based on what the users use in Virtual Machine, which will likely save most people some money while AWS charges the usage per second. For database and virtualisation, Amazon EC2 provides the most virtualisation options whilst Azure provides the least database options. However, for virtual machine types, both does not really compare. In this section, if the user seeks for more database options, they should go for EC2. In terms of Operating Systems usage, both also works on the same OS which is Linux and Windows. EC2 has the highest number of pre-configured OS, which makes it the clear choice of a more versatile cloud services in the category of performance and scalability, Amazon EC2 earn the title of trusted advisor while Microsoft Azure only earn the title of advisor. So, from this we know that there are more people believe and using Amazon EC2. In DevOp Tooling and Services, Microsoft Azure had bigger demand since Amazon EC2 focusing more on code, monitoring and logging while Microsoft Azure Repos, pipelines, board, test plans and DevOps server which have more people use. In the administration & compliance details, Azure have ISO 27001 Certified and Network Uptime Guarantee which can make sure the systematic and safety of their customers information. In service model, Amazon EC2 provide security and identity services so as monitoring infrastructure resource management tools while for Microsoft Azure, it provides app services which include web apps, mobile apps, logic apps, function apps and web jobs which currently is used by many of the users nowadays. But in security, identity, and access management for Amazon EC2 is far better than Microsoft Azure because it does not need any additional charges while Microsoft Azure active directory provides free tier data limit but for advanced tiers need to be paid. Key-based encryption of data for Amazon EC2 which is CloudHSM service separated with KMS.

(Key Management Service) while for Microsoft Azure HSM (hardware security module) is part of Key Vault.in this features, Microsoft Azure have more advantage than Amazon EC2. For the feature of virtual private network, Amazon EC2 have VPC and Direct Connect which use layer 2 routing and for Microsoft Azure, it uses ExpressRoute and Virtual Network which use layer 3 routing. In this case, we know that Microsoft Azure is safer as it provides more layer of routing compare to Amazon EC2.

Thus, for the advantages and disadvantages we mentioned above, we can conclude that Microsoft Azure have more advantage compare to Amazon EC2.

4 Conclusion

Nowadays, there is a very huge and high amount of data consumption by the user. Therefore, we need a very high-speed data processing. Also, very large-scale storage solutions are always necessary. Therefore, cloud platforms are developed to provide the solution for these problems by creating more virtual machines than usual on one physical machine through a virtualisation process. This results in high processor efficiency and less idle time for the processor.
The two cloud platforms compared above have their own benefits which makes them good in their own respective ways. Since the Amazon EC2 is the oldest of its kind and has the support for maximum number of pre-configured operating systems, it lacks in its availability of support. The Microsoft Azure platform has the highest supports out between those two but lacks severely in database supports.
Hence, we would wrap this up with a conclusion that the selection of the cloud platform is highly dependent on the requirements of the user which differs user to user. Therefore, we would advise users to carefully do some research or study before throwing in some cash into the cloud platform.

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