Cloud Computing

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1. Introduction

The use of cloud computing has been on the rise for a while now and that is for multiple reasons for example the elasticity that cloud computing provides or the ease of access, ease of use, flexibility and efficiency, and much more reasons. In this report we tried to compare the 3 most known cloud computing providers taking in consideration multiple aspects like the security, service model, pricing, and much more points. We also discussed the challenges faced by users that use cloud computing. Finally we gave our opinion. This Report is written based on literature review report format.

2. Comparative Evaluation and differences

In here we are going to show what each cloud service provider provides when it comes to service model, virtual machines, storage, OS environments offered, security, performance and scalability, pricing model, auto-scaling/elasticity, and monitoring tools/service provided

2.1   Amazon EC2 (AWS) [1]

2.1.1 Service Model: As a SaaS service provider, AWS facilitates its clients with complete solutions that are completely run and managed by AWS.

2.1.2 Virtual Machine

Within those greater families are unique instance types. Here's a list of instance types for just the General Purpose Family:

- t2.nano, t2.micro, t2.small, t2.medium, t2.large, t2.xlarge, t2.2xlarge

- t3.nano, t3.micro, t3.small, t3.medium, t3.large, t3.xlarge, t3.2xlarge

- m4.large, m4.xlarge, m4.2xlarge, m4.4xlarge, m4.10xlarge, m4.16xlarge

- m5.large, m5.xlarge, m5.2xlarge, m5.4xlarge, m5.12xlarge, m5.24xlarge

- m6.large, m6.xlarge, m6.2xlarge, m6.4xlarge, m6.12xlarge, m6.24xlarge

Notice that T2, T3, M4, M5, and M5d are the different instance types, each having varying sizing options that range from nano to 24xlarge.

2.13 Storage: A block-level storage volume made for single-instance attachment and up to 16 TB of storage space.

2.1.4 OS Environment Offered: Multiple Linux based distributions and Windows.

2.1.5 Security: The AWS CloudHSM is a cloud-based hardware security module (HSM) that enables you to easily generate and use your own encryption keys on the AWS Cloud.

2.1.6 Performance and Scalability: It is categorized by performance, there are Accelerated Computing, Compute-optimized, General Purpose, Memory-Optimized, and Storage Optimized. AWS also provides Auto Scaling that lets you set target utilization levels for multiple resources in a single, intuitive interface.

2.1.7 Pricing models: There are four pricing models for Amazon EC2 instances: On-Demand Instances, Reserved Instances, Spot Instances, and Dedicated Hosts.

2.1.8 Elasticity: Allows you to match the supply of resources—which cost money—to demand. Matching needs to utilization is critical for cost optimization. Demand includes external usage (number of customers who visit the website) and internal usage (application team using development and test environments). There are two types: Time-based elasticity (turning off resources when they are not being used) and Volume-based elasticity (matching scale to the intensity of demand)

2.1.9 Monitoring tools: There are SolarWinds® AppOptics™, SolarWinds Papertrail™, Zenoss ZenPack, Zabbix, and Weave Scope.

2.2 Azure [2]

2.2.1 Service model: The first cloud computing type is infrastructure-as-a-service (IaaS), which is used for Internet-based access to storage and computing power. The most basic category of cloud computing types, the second cloud computing type is platform-as-a-service (PaaS) which gives developers the tools to build and host web applications. The third cloud computing type is software-as-a-service (SaaS), which is used for web-based applications.

2.2.2 Virtual Machines: Azure Virtual Machines (VM) is one of several types of on-demand, scalable computing resources that Azure offers. Typically, you choose a VM when you need more control over the computing environment than the other choices offer. Azure virtual machines can be used in various ways. Some examples is: Development and test – Azure VMs offer a quick and easy way to create a computer with specific configurations required to code and test an application.

2.2.3 Storage: Azure storage is Microsoft's cloud object storage solution for storing massive amounts of unstructured data, such as text or binary data. Azure Storage is ideal for Submit photos or documents directly to the browser and File storage for distributed access.

2.2.4 OS Environment Offered: Multiple Linux based distributions and Windows.

2.2.5 Security: We know that security is job one in the cloud and how important it is that you find accurate and timely information about Azure security. One of the best reasons to use Azure for your applications and services is to take advantage of its wide array of security tools and capabilities.

2.2.6 Performance and Scalability: Scaling is adaptability of the system to the changed amount of workload or traffic to the web application. One of the great features of Azure service is its ability to auto scale according to the demands of the application usage.

2.2.7 Pricing Model: When using Azure under a capacity reservation contract, companies can save up to 60% on service cost depending on the capacity reservation specified compared to pay-as-you go contracts. Pricing for capacity reservations is also based on their specific location across the US or overseas. Pricing starts at $ 100 per 100GB per day for sites and goes up to $ 200 per 100GB per day for sites in southern Brazil.

2.2.8 Auto scaling / Elasticity : Auto scale is a built-in feature of Cloud Services, Mobile Services, Virtual Machines, and Websites that helps applications perform their best when demand changes.

2.2.9 Monitoring Tools/Service Provided: Azure Monitor helps you maximize the availability and performance of your applications and services. It delivers a comprehensive solution for collecting, analysing, and acting on telemetry from your cloud and on-premises environments.

2.3 Google Computing [3] [4]

2.3.1 Service Model: As a PaaS service provider, Google Cloud has many facilities and services for its clients, such as computing and hosting, storage, databases, etc.

2.3.2 Virtual Machine: A machine type is a set of virtualized hardware resources available to a virtual machine (VM) instance, including the system memory size, virtual CPU (vCPU) count, and persistent disk limits. In Compute Engine, machine types are grouped and curated by families for different workloads. Google cloud's clients can choose from general-purpose, memory-optimized, and compute-optimized families.

2.3.3 Storage: Google allows its clients to use 15 GB of free Google online storage, and a paid subscription may be required if they exceed this amount.

2.3.4 OS environment offered: Multiple Linux based distributions and Windows.

2.3.5 Security: Google Cloud has the same end-to-end security system, built-in protection, and a global network that Google uses to protect information, identities, applications and devices. And it is transparent & private to make it easier for its users to control how their data is used and shared.

2.3.6 Performance and Scalability: Google Cloud provides products and features to help you build scalable, efficient apps like Compute Engine VM and Google Kubernetes Engine (GKE) clusters integrate with autoscalers that let you grow or shrink resource consumption based on metrics that you define. Then, Google Cloud's serverless platform provides managed compute, database, and other services that scale quickly from zero to high request volumes, and you pay only for what you use. Database products like BigQuery, Cloud Spanner, and Cloud Bigtable can deliver consistent performance across massive data sizes.

2.3.7 Pricing Models: Google cloud has many pricing models, such as Free, Subscription-based pricing, Usage-based pricing, Combined pricing.

2.3.8 Elasticity: Managed instance groups (MIG) offer autoscaling capabilities that let GCP's clients automatically add or delete virtual machine instances from a MIG based on increases or decreases in load. Autoscaling helps their apps gracefully handle increases in traffic and reduce costs when the need for resources is lower.

2.3.9 Monitoring tool: Cloud Monitoring provides endpoint checks to web applications and other internet-accessible services running in the user's cloud environment. Users can configure uptime checks associated with URLs, groups or resources, such as instances and load balancers.

4. Opinions:
4.1 Anas:

I personally would choose AWS as my cloud service provider because of the depth of services provided.

4.2 Abdullah

I prefer Microsoft Azure because it supports a wide range of programming languages, frameworks, operating systems, databases, and devices.

4.3 Angwin : I think all these service providers are good, Microsoft Azure, Google Cloud, and Amazon EC2 already provide good facilities.

4.4 Rayhan:

Me myself prefer on Amazon EC2 or AWS, it provide several services including security for the user to make sure that their data is totally safe.

3. Challenges [5]:

No deny that cloud computing has been on the rise for long time now, it is being used by all range of corporate, however like everything there are some challenges that face the users when using cloud computing some of these challenges are security issues, lack of expertise, high expectations and loss of control.

4. Conclusion:

No doubt that cloud computer has helped a lot in many fields and that it comes with a lot of benefits, and although there are some issues/challenges that users face when using cloud computing, most of these issues just need some time to get fixed and not permanent, which cloud provider to use is going to highly depend on your company type and your needs.

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