cloud DA-1

Principles of cloud computing

gcp v/s aws v/s azure

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Amazon Web Services (AWS) presently dominates infrastructure, including scalable storage, networking, servers, mobile development, and cybersecurity solutions. Microsoft Azure, its chief rival, provides some of the most scalable and efficient software solutions. Google cloud Platform (GCP) offers high-end big data analytics solutions and allows easy interaction with other vendor products.

Certified cloud computing specialists are in demand, outperforming the disruptive move away from in-house servers and computing capacity toward the flexibility and scalability of cloud-based systems.

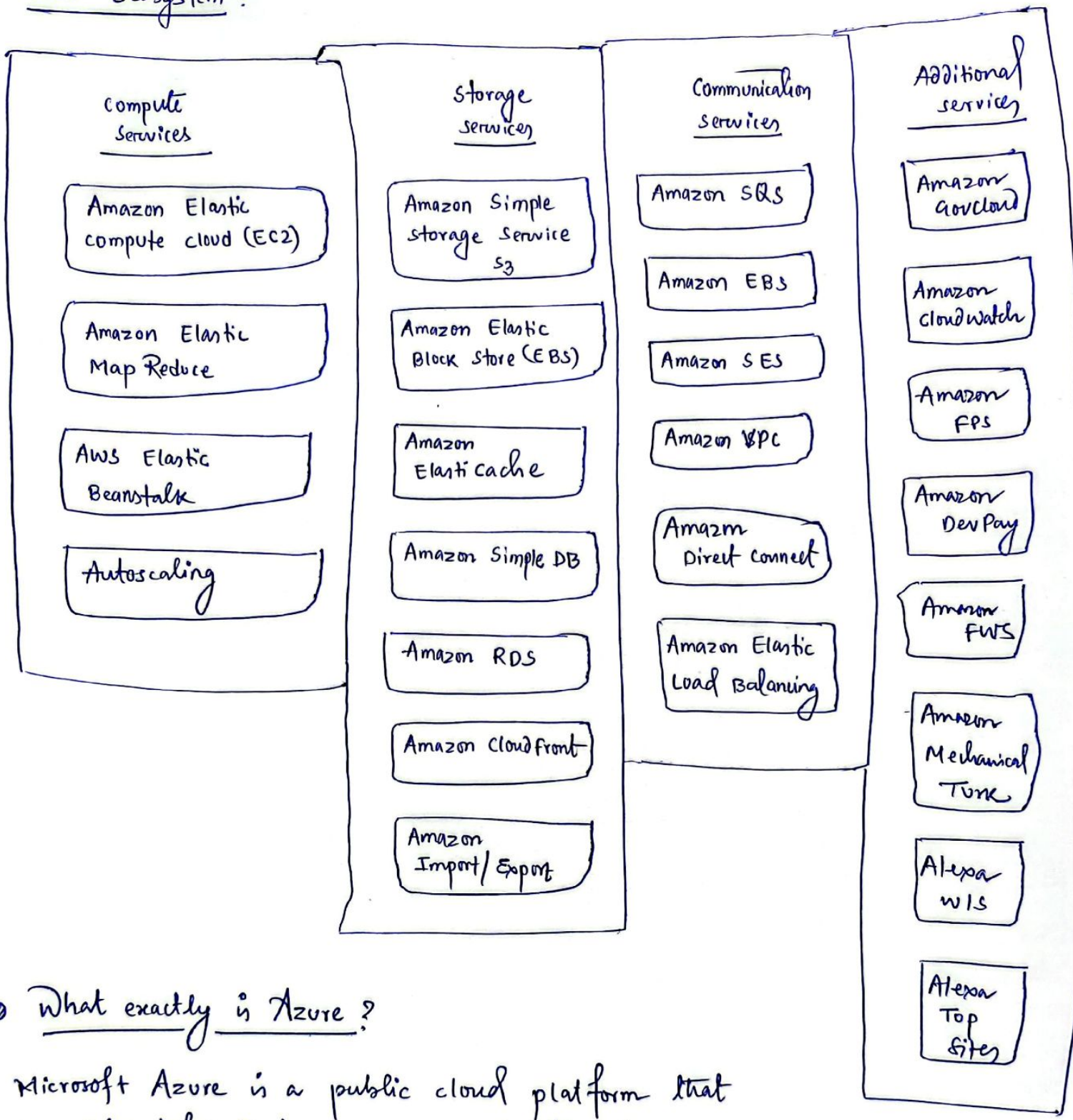
- What exactly is AWS?

Amazon Web Services (AWS) offers computer resources and services that may construct applications in minutes at pay-as-you-go prices. For example, you can rent a server on AWS to connect to, configure, protect, and run just like a physical server. The distinction is that the virtual server runs on top of an AWS-managed planet-scale network.

Notable users of AWS:

courserra, Expedia, Netflix, Coinbase, Formula 1, Intuit, Airbnb, Lyft, FDA, coca Cola.

AWS Ecosystem :



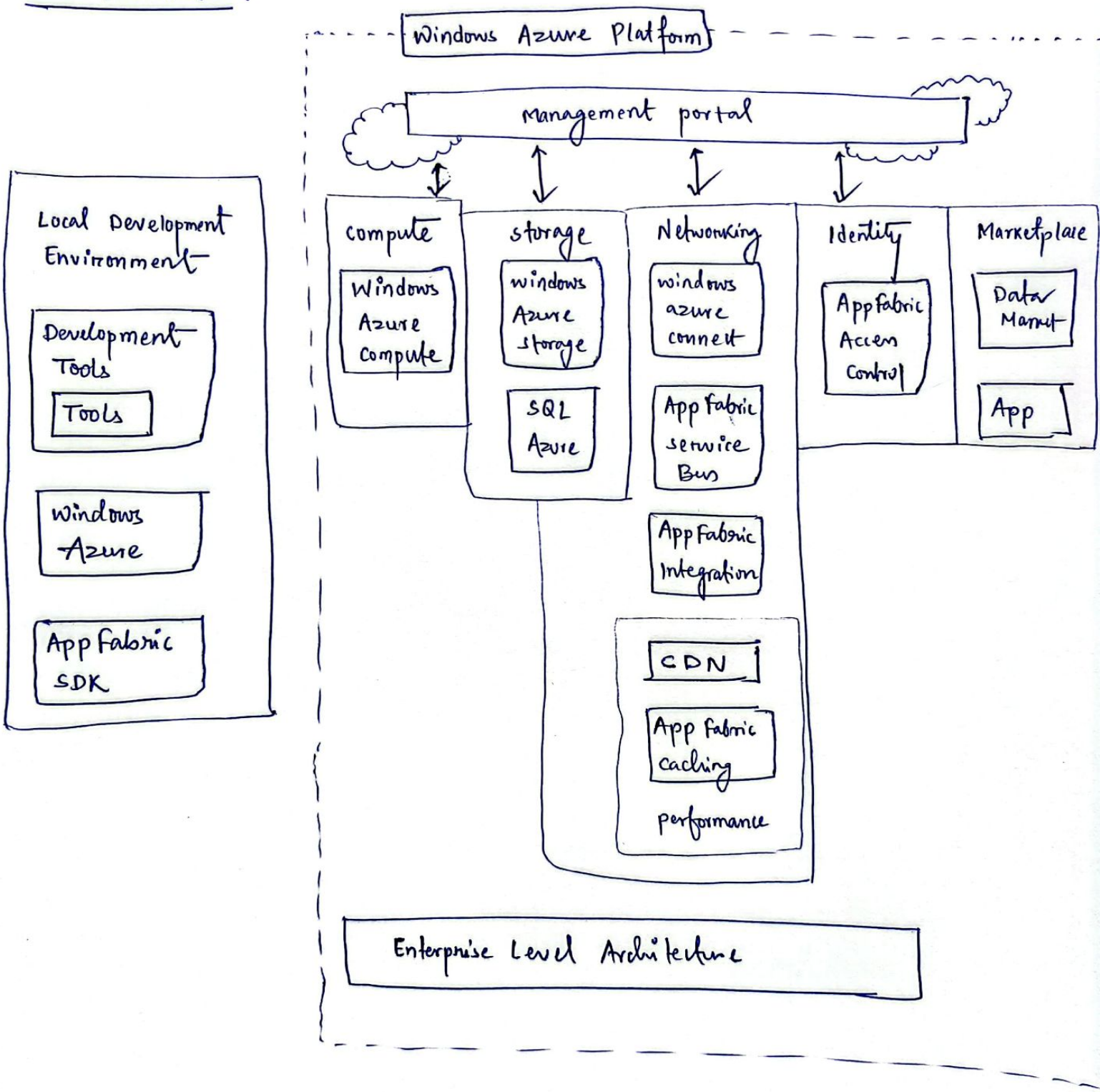
- **What exactly is Azure ?**

Microsoft Azure is a public cloud platform that provides infrastructure as a service (IaaS), PaaS, and SaaS solutions for analytics, virtual computing, storage, networking, and other services. It can enhance or replace your on-premise servers.

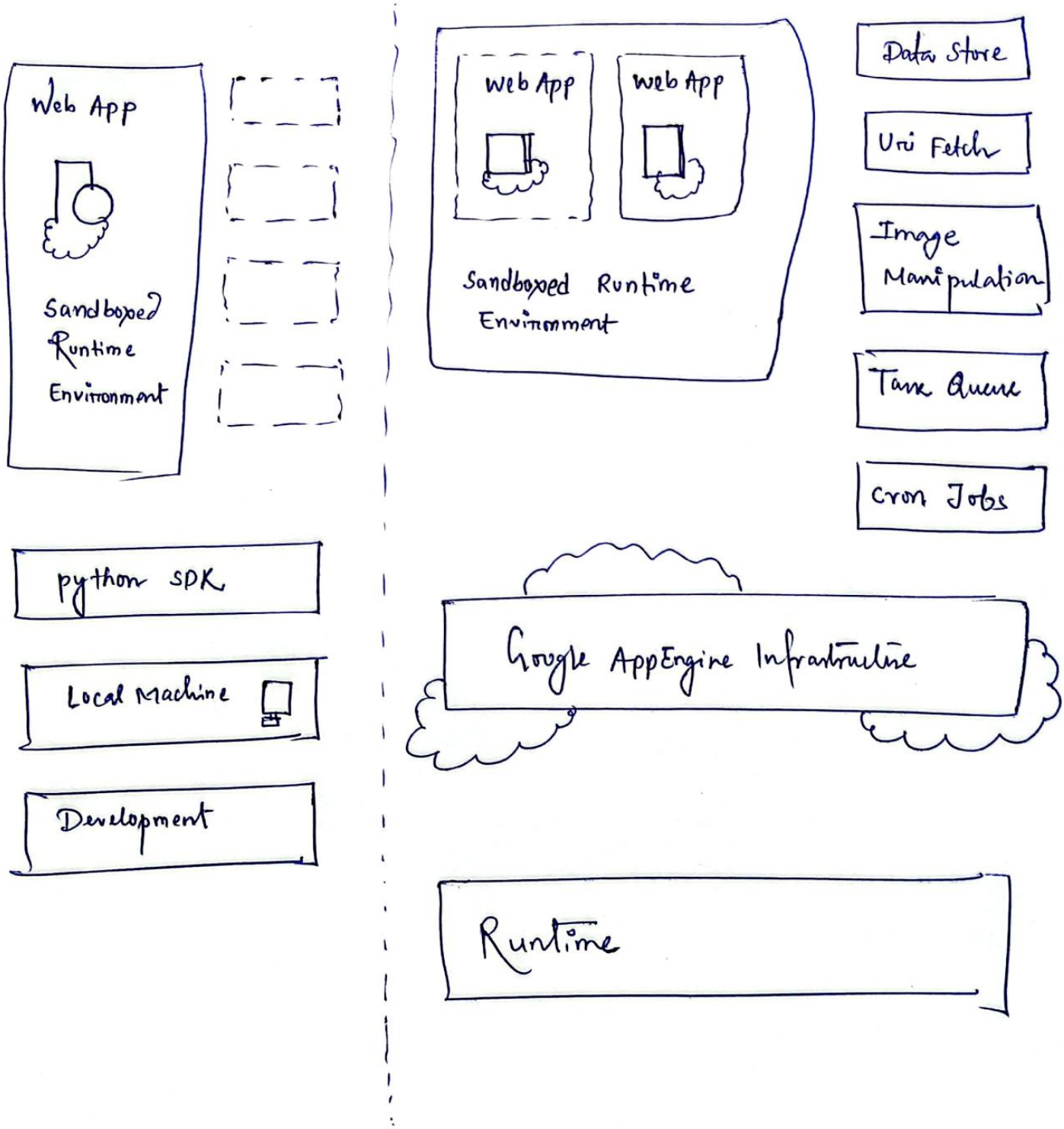
Notable users of Microsoft Azure:

Bosch, Audi, ASOS, HSBC, starbucks, Walgreens, 3M, FedEx, Walmart, HP, Mitsubishi Electric, Renault

Azure Architecture:



Google App Engine - Architecture :



What exactly is Google Cloud?

Google cloud (GCP), originally App Engine, is a cloud computing services suite established by Google in 2008. GCP offers enterprises all around the world infrastructure as a service (IaaS), PaaS, and (SaaS). GCP, for example, is primarily a service for developing and maintaining original applications that can be published from its hyper-scale data centers.

Notable users of GCP:

Toyota, Equifax, Nintendo, Spotify, The Home Depot, Target, Twitter, Paypal, UPS

AWS vs. Azure vs. GCP — the key differences

Features	Amazon	Azure	Google cloud
1. Age →	11 years old	5 years old	6 years old
2. pricing →	per second pricing with a 60-second minimum	per-minute basis	per-minute basis
3. compute →	EC2 provides all the computing admin. The program oversees VMs, which can either be designed by the owner or have preconfigured.	With Azure, you can create VMs and scale sets for VMs.	As part of GCP, GCE (Google Compute Engine) does a similar function.

Services	AWS	Azure	GCP
4. VM → (compute Instance)	EC2 (Elastic compute)	Azure Virtual Machine	Google compute Engine
5. PaaS →	Aws Elastic Beanstalk	App Service	Google App Engine
6. Container →	Aws Kubernetes service	Azure Kubernetes Service (AKS)	Google Kubernetes Engine
7. Serverless function →	Aws Lambda	Azure Function	Google Cloud Functions
8. Smallest Instance pricing →	Aws charges roughly US$ 69 per month for a primary instance with 2 virtual CPUs and 8 GBs of RAM	In Azure, the same type of instance, i.e., an instance with 2 CPUs and 8 GB of RAM will cost roughly US$ 70 per month	Compared to AWS, GCP will supply you with the most basic instance, including 2 virtual CPUs and 8 GBs of RAM, at a 25% lower cost. As a result, it costs around US$ 52 per month.
9. Largest Instance → pricing	The most expensive AWS instance, with 3.84 TB of RAM and 128 CPUs will cost you roughly US$ 3.97/hour	Azure's largest instance includes 3.89 TB of RAM and 128 CPUs. It costs about $ 6.79 per hour.	GCP leads the pack with its largest instance, 3.75 TB of RAM and 160 CPUs, costing approx. US$ 5.32/hour.

Services	AWS	Azure	GCP
10. RDBMS →	Amazon Relational Database Service	SQL Database	Google Cloud SQL
11. NoSQL: Key-value →	Amazon Dynamo DB	Table storage	Google Cloud Datastore
12. NoSQL: Indexed →	Amazon Simple DB	Azure Cosmos DB	Google Cloud Bigtable
13. Security →	• Data isolation through firewalls & granular IAM • AWS inspector for vulnerability assessment. • API activity monitoring • Guard Duty for threat intelligence.	• Central security sys. • Anti-malware option for malware protection. • 256-bit AES encryption for Azure keys • penetration tests to test security measures.	• Security from privileged accen attacks. • Google KMS to manage cryptographic keys. • Google IAM for granular accen control. • Google cloud security scanner to identify potential threats

Amazon AWS vs. Microsoft Azure vs. Google GCP

→ Machine Learning.

For their different machine learning systems, all cloud providers particularly enjoy using containers, and for good reason; Containers can be moved around easily and are comparatively light and portable.

For particular iterations of the ML frameworks that are designed for training, validation, and inferences, all 3 providers offer push-button container deployment. For those who want to do things themselves, each provider also offers platform-optimised virtual machines for each of the main frameworks. The latter is typically used by those who already have a model that has been trained locally.

- For model training, AWS provides Habana Gaudi ASIC instances and a special processor they call AWS Trainium. Additionally, AWS provides an inferential ASIC for ML inferences.

- A range of FPGA-based virtual machines optimised for ML workloads is available from Azure.
- The Tensore Processing Unit (TPU) from GCP is a specially designed ASIC-optimized TPU for the TensorFlow framework.

There is always a tradeoff. Although these specialised Hardware platforms are excellent at ML tasks, they are not very effective for other activities economically. Since they are significantly more adaptable, CPU and GPU-based computers are typically used first while ML models are developed and improved.

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⑧ Aws vs Azure vs GCP —— pros and Cons.

PROS

aws	azure	gcp
1. Aws is a stablish market leader.	Azure is Open to hybrid cloud systems.	GCP specialises in high compute offerings like Big Data, ML.

PROS contd.

	aws	azure	gcp
2.	High Transfer stability: Minimal data loss during servers and storage transfer.	Easy integration with Microsoft tools and software.	Easy integration with other GCP services like Compute Engine, Kubernetes engine, or, App Engine.
3.	Easy availability of data: Users can choose to store data close to their location.	Azure has a more profound knowledge of enterprise needs.	Well-detailed documentation, including aws API reference guide.
4.	54 Azure regions available across 140 countries (which is the highest in all cloud giants).	Higher availability zones (76) with 24 countries	outstanding reputation in the open-source community.

CONS

	AWS	Azure	GCP
1.	Incomplete and weak Hybrid strategy	Integration with non-Microsoft is complex	Google's App Engine is limited to Java, python, PHP and Google Go.
2.	No demonstrated support for hybrid cloud outputs is still in its nascence.	Restrictive platforms, Less flexible with non-windows server platforms	The cost of downloading data from Google Cloud storage is relatively high.
3.	Large and complex scale offerings that can potentially manipulate.	Low-quality support.	Quite costly-support fee of about $150 per month for the silver class, which is the most basic of services.

Miscellaneous Comparison :

I've already compared these platforms on quite a few pointers, however, there are quite a few other pointers these platforms can be compared on.

Here is an overall miscellaneous comparison. Let's start with Amazon Web Services.

AWS

What makes AWS stand out? Firstly its head start, meaning it has had that extra valuable years to firm its dominance in the market. This can be proven with facts.

Another reason for this success is the number of services it provides, it almost provides double the services the second-best competitor provides in terms of the sheer number of services it has to offer.

Microsoft Azure

Microsoft always had a stronghold and contributions to the On-premise service market.

Another reason why Azure is so popular and is so widely used is because Azure integrates with most of the Microsoft stack of products with easy; it is claimed to be enterprise-ready.

Google Cloud platform

It offers fairly strongly (offerings) in containers. It has developed a standard for Kubernetes, and high computation capabilities in terms of Big Data Analytics, and ML. It also offers decent enough load balancing and scalability.

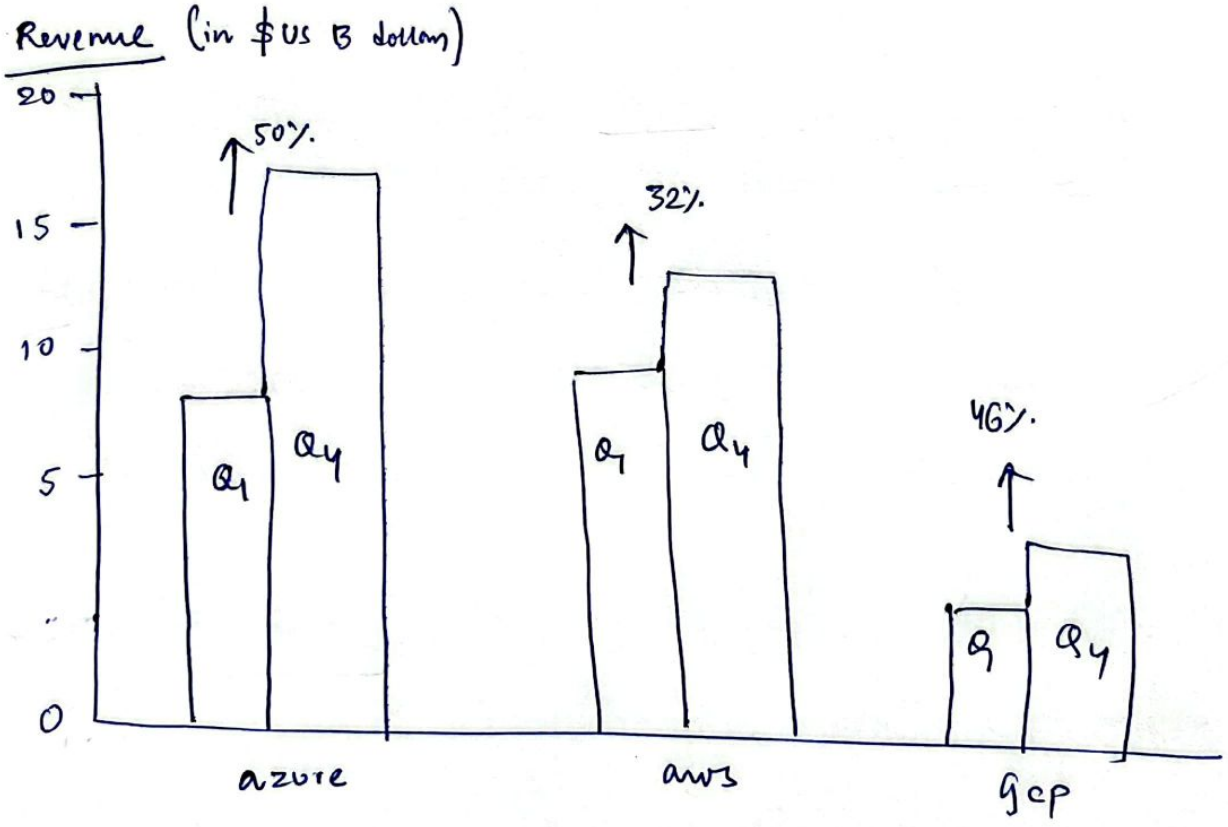

Fig. Growth rate of top 3 cloud vendors

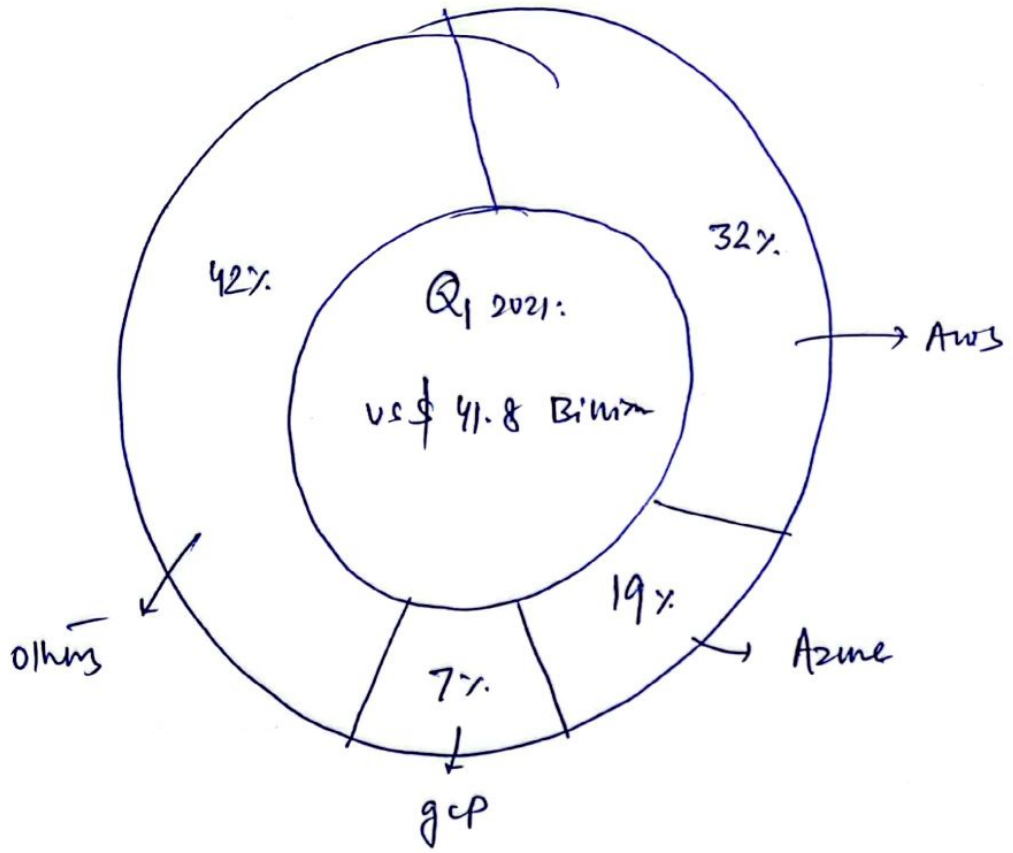

Fig: Market share of the top cloud providers

AWS vs Azure vs GCP — Which is better?

Now, let's wrap up the Azure vs Aws vs GCP fiasco, by examining the most important advantages & disadvantages of these 3 cloud giants.

- **Establishment**: Aws is clearly the winner in this category, with a 5-year head start.

2. Availability zones: AWS wins in this category, because it has a greater number of regions and availability zones.

3. Market shares: With roughly 1/3rd of market shares in its name, AWS is the clear winner here.

4. Growth rate: GCP wins the growth rate category with a nearly 100% growth rate.

5. Who uses them: It's a tie, with various high-end customers using all three cloud platforms!

6. Services: AWS is the clear winner, followed by Azure.

7. pricing models: GCP comes out on top with more customer-friendly pricing models and discount models.