

# AWS vs. Azure vs. Google

Hello everyone I am Onkar Gajanan Kulkarni , student of Smt.Kashibai Navale College Of Engineering , Pune. This is task number 6 which is given by TSF . I am going to write only report about all cloud computing systems that I know.

This is a report on cloud computing systems. In this report I am going to cover all strengths, weakness, computation, networking services and storage and key cloud tools etc. of all these systems.

First we will see the basics of these systems one by one –

➤ **AWS :**

With a vast tool set that continues to grow exponentially, Amazon's capabilities are unmatched. Yet its cost structure can be confusing, and its singular focus on public cloud rather than hybrid cloud or private cloud means that interoperating with your data center isn't AWS's top priority.

➤ **Microsoft Azure :**

A close competitor to AWS with an exceptionally capable cloud infrastructure. If you're an enterprise customer, Azure speaks your language few companies have the enterprise background (and Windows support) as Microsoft. Azure knows you still run a data center, and the Azure platform works hard to interoperate with data centers; hybrid cloud is a true strength.

➤ **Google Cloud :**

A well-funded underdog in the competition, Google entered the cloud market later and doesn't have the enterprise focus that helps draw corporate customers. But its technical expertise is profound, and its industry-leading tools in deep learning and artificial intelligence, machine learning and data analytics are significant advantages.

# COMPUTE

## 1. AWS Compute:

- **Elastic Compute Cloud:** Amazon's flagship compute service is Elastic Compute Cloud, or EC2. Amazon describes EC2 as "a web service that provides secure, resizable compute capacity in the cloud." EC2 offers a wide variety of options, including a huge assortment of instances, support for both Windows and Linux, bare metal instances, GPU instances, high-performance computing, auto scaling and more. AWS also offers a free tier for EC2 that includes 750 hours per month for up to twelve months.
- **Container services:** Within the compute category, Amazon's various container services are increasing in popularity, and it has options that support Docker, Kubernetes, and its own Fargate service that automates server and cluster management when using containers. It also offers a virtual private cloud option known as Lightsail, Batch for batch computing jobs, Elastic Beanstalk for running and scaling Web applications, as well as a few other services.

## 2. Microsoft Compute:

- **Virtual Machines:** Microsoft's primary compute service is known simply as Virtual Machines. It boasts support for Linux, Windows Server, SQL Server, Oracle, IBM, and SAP, as well as enhanced security, hybrid cloud capabilities and integrated support for Microsoft software. Like AWS, it has an extremely large catalog of available instances, including GPU and high-performance computing options, as well as instances optimized for artificial intelligence and machine learning. It also has a free tier with 750 hours per month of Windows or Linux B1S virtual machines for a year.
- **Additional Services:** Azure's version of Auto Scaling is known as Virtual Machine Scale Sets. And it has two container services: Azure Container Service is based on Kubernetes, and Container Services uses Docker Hub and Azure Container Registry for management. It has a Batch service, and Cloud Services for scalable Web applications is similar to AWS Elastic Beanstalk. It also has a unique offering called Service Fabric that is specifically designed for applications with microservices architecture.

## 3. Google Compute:

- **Compute Engine:** By comparison, Google's catalog of compute services is somewhat shorter than its competitors'. Its primary service is called Compute Engine, which boasts both custom and predefined machine types,

per-second billing, Linux and Windows support, automatic discounts and carbon-neutral infrastructure that uses half the energy of typical data centers. It offers a free tier that includes one f1-micro instance per month for up to 12 months.

- **Focus on Kubernetes:** Google also offers a Kubernetes Engine for organizations interested in deploying containers. Like all of the leading cloud vendors, it's set up to offer containers and microservices. And it's worth noting that Google has been heavily involved in the Kubernetes project, giving it extra expertise in this area.

## STORAGE

### 1. AWS Storage:

- **SSS to EFS:** AWS offers a long list of storage services that includes its Simple Storage Service (S3) for object storage, Elastic Block Storage (EBS) for persistent block storage for use with EC2, and Elastic File System (EFS) for file storage. Some of its more innovative storage products include the Storage Gateway, which enables a hybrid storage environment, and Snowball, which is a physical hardware device that organizations can use to transfer petabytes of data in situations where Internet transfer isn't practical.
- **Database and archiving** On the database side, Amazon has a SQL-compatible database called Aurora, Relational Database Service (RDS), DynamoDB NoSQL database, ElastiCache in-memory data store, Redshift data warehouse, Neptune graph database and a Database Migration Service. Amazon offers Glacier, which is designed for long-term archival storage at very low rates. In addition, its Storage Gateway can be used to easily set up backup and archive processes.

### 2. Azure Storage:

- **Storage Services:** Microsoft Azure's basic storage services include Blob Storage for REST-based object storage of unstructured data, Queue Storage for large-volume workloads, File Storage and Disk Storage. It also has a Data Lake Store, which is useful for big data applications.
- **Extensive Database:** Azure's database options are particularly extensive. It has three SQL-based options: SQL Database, Database for MySQL and

Database for PostgreSQL. It also has a Data Warehouse service, as well as Cosmos DB and Table Storage for NoSQL. Redis Cache is its in-memory service and the Server Stretch Database is its hybrid storage service designed specifically for organizations that use Microsoft SQL Server in their own data centers. Unlike AWS, Microsoft does offer an actual Backup service, as well as Site Recovery service and Archive Storage.

### 3. Google Storage:

- **Unified Storage and more:** As with compute, GCP has a smaller menu of storage services available. Cloud Storage is its unified object storage service, and it also has a Persistent Disk option. It offers a Transfer Appliance similar to AWS Snowball, as well as online transfer services.
- **SQL and NoSQL** When it comes to databases, GCP has the SQL-based Cloud SQL and a relational database called Cloud Spanner that is designed for mission-critical workloads. It also has two NoSQL options: Cloud Bigtable and Cloud Datastore. It does not have backup and archive services.

## KEY CLOUD TOOLS

### 1. AWS Key Tools:

- **Pagemaker to Serverless:** As in other areas, AWS has the longest lists of services in each of these areas. Highlights include its SageMaker service for training and deploying machine learning models, the Lex conversational interface that also powers its Alexa services, its Greengrass IoT messaging service and the Lambda serverless computing service.
- **AI and ML:** Among its many AI-oriented services, AWS offers DeepLens, an AI powered camera for for developing and deploying machine learning algorithms to use with things like optical character recognition and image and object recognition. AWS has announced Gluon, an open source deep learning library designed to make it easy for developers and non-developers alike to build and quickly train neural networks without having to know AI programming.

### 2. Azure Key Tools:

- **Cognitive Services:** Microsoft has also invested heavily in artificial intelligence, and it offers a machine learning service and a bot service on Azure. It also has Cognitive Services that include a Bing Web Search API, Text Analytics API, Face API, Computer Vision API and Custom Vision Service. For IoT, it has several management and analytics services, and its serverless computing service is known as Functions.
- **Supporting MSFT Software** Not surprisingly, many of Azure's top tools are geared around supporting on-premises Microsoft software. Azure Backup is a service that links Windows Server Backup in Windows Server 2012 R2 and Windows Server 2016. Visual Studio Team Services hosts Visual Studio projects on Azure.

### 3. Google Key Tools:

- **Big on AI:** For Google Cloud Platform, AI and machine learning are big areas of focus. Google is a leader in AI development thanks to TensorFlow, an open source software library for building machine learning applications. The TensorFlow library is popular and well regarded. A testament to its popularity is that AWS recently added support for TensorFlow.
- **IoT to Serverless:** Google Cloud has strong offerings in APIs for natural language, speech, translation and more. Additionally, it offers IoT and serverless services, but both are still in beta previews.

## STRENGTHS AND WEAKNESSES

Vendor	Strengths	Weaknesses
AWS	<ul style="list-style-type: none"> <li>• Dominant market position</li> <li>• Extensive, mature offerings</li> <li>• Support for large organizations</li> <li>• Extensive training</li> <li>• Global reach</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to use</li> <li>• Cost management</li> <li>• Overwhelming options</li> </ul>
Microsoft Azure	<ul style="list-style-type: none"> <li>• Second largest provider</li> <li>• Integration with Microsoft tools and software</li> <li>• Broad feature set</li> <li>• Hybrid cloud</li> <li>• Support for open source</li> </ul>	<ul style="list-style-type: none"> <li>• Issues with documentation</li> <li>• Incomplete management tooling</li> </ul>

Vendor	Strengths	Weaknesses
Google	<ul style="list-style-type: none"> <li>• Designed for cloud-native businesses</li> <li>• Commitment to open source and portability</li> <li>• Deep discounts and flexible contracts</li> <li>• DevOps expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Late entrant to IaaS market</li> <li>• Fewer features and services</li> <li>• Historically not as enterprise focused</li> </ul>

## NETWORKING SERVICES

Services	AWS	Azure	GCP
Virtual Network	Amazon Virtual Private Cloud (VPC)	Virtual Networks (VNETs)	Virtual Private Cloud
Elastic Load Balancer	Elastic Load Balancer	Load Balancer	Google Cloud Load Balancing
Peering	Direct Connect	ExpressRoute	Google Cloud Interconnect
DNS	Amazon Route 53	Azure DNS	Google Cloud DNS