AWS/AZURE/GCP

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AWS vs. Azure vs. Google Cloud: 2022 Cloud Platform Comparison

The competition for leadership in public cloud computing is a fierce three-way race: Amazon Web Services (AWS) vs. Microsoft Azure vs. Google Cloud Platform (GCP). Clearly these three top cloud companies hold a commanding lead in the infrastructure as a service (IaaS) and platform as a service (PaaS) markets.

AWS is particularly dominant. According to a 2020 report from Synergy Research Group, "Amazon growth continued to closely mirror overall market growth so it maintained its 33% share of the worldwide [cloud] market. Second ranked Microsoft again grew faster than the market and its market share has increased by almost three percentage points in the last four quarters, reaching 18%."
Meanwhile, Microsoft is particularly strong in SaaS, while Google Cloud, with its strength in artificial intelligence, is positioned for aggressive growth as the AI market grows – and is known for offering discounts.

Here's the summary cloud comparison between AWS vs. Azure vs. Google:

Amazon Web Services

With a vast toolset that continues to grow exponentially, Amazon's capabilities are unmatched. Yet its cost structure can be confusing, and its 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.

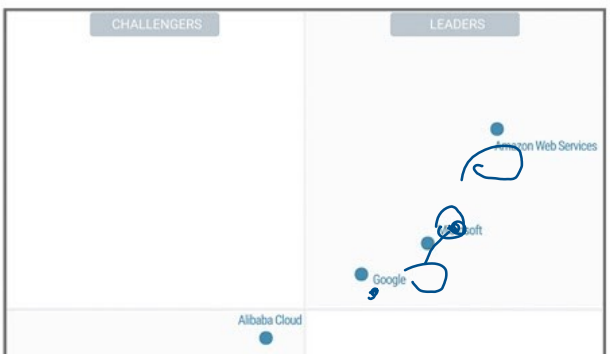
Google Cloud

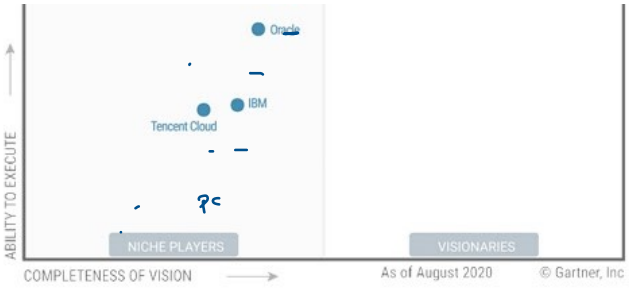
A well-funded underdog in the competition, Google entered the cloud market later and doesn't have as much of the enterprise focus that helps draw corporate customers. But its technical expertise is profound, and its industry-leading tools in deep learning and artificial intelligence, machine learning,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

More on Google: Google Cloud Platform Review

In-Depth Cloud Compare: AWS Vs. Azure Vs. GCP:

Figure 1. Magic Quadrant for Cloud Infrastructure and Platform Services





This Gartner magic quadrant shows the dominant position of AWS vs. Microsoft Azure vs. Google Cloud Platform. Expect this to change significantly over time as Alibaba Cloud, Oracle Cloud, and the IBM Cloud keep evolving.

AWS Vs. Azure Vs. Google: Overall Pros And Cons

Each of the leading vendors has particular strengths and weaknesses that make them a good choice for certain projects – there is no "one size fits all" cloud solution.

AWS Pros And Cons

Amazon's biggest strength is its dominance of the public cloud market. In its Magic Quadrant for Cloud Infrastructure as a Service, Worldwide, Gartner noted, "AWS has been the market share leader in cloud IaaS for over 10 years."

Part of the reason for its popularity is undoubtedly the massive scope of its operations. AWS has a huge and growing array of available services, as well as the most comprehensive network of worldwide data centers. The Gartner report summed it up, saying, "AWS is the most mature, enterprise-ready provider, with the deepest capabilities for governing a large number of users and resources."

Amazon's big weaknesses relate to cost. While AWS regularly lowers its prices, many enterprises find it difficult to understand the company's cost structure and to manage those costs effectively when running a high volume of workloads on the service.

In general, however, these cons are more than outweighed by Amazon's strengths, and organizations of all sizes continue to use AWS for a wide variety of workloads.

Microsoft Azure Pros And Cons

Microsoft came later to the cloud market, but gave itself a jump start by essentially taking its on-premises software – Windows Server, Office, SQL Server, Sharepoint, Dynamics Active Directory, .Net, and others – and repurposing it for the cloud.

A big reason for Azure's success: so many enterprises deploy Windows and other Microsoft software. Because Azure is tightly integrated with these other applications, enterprises that use a lot of Microsoft software often find that it makes sense for them to use Azure. This builds loyalty for existing Microsoft customers. Also, if you are already an existing Microsoft enterprise customer, expect significant discounts on service contracts.

On the con side, Gartner finds fault with some of the platform's imperfections. "While Microsoft Azure is an enterprise-ready platform, Gartner clients report that the service experience feels less enterprise-ready than they expected, given Microsoft's long history as an enterprise vendor," it said. "Customers cite issues with technical support, documentation, training, and breadth of the ISV partner ecosystem."

Google Cloud Platform Pros And Cons

Google has a strong offering in containers since Google developed the Kubernetes standard that AWS and Azure now offer. GCP specializes in high compute offerings like Big Data, analytics, and machine learning. It also offers considerable scale and load balancing – Google knows data centers and fast response time.

On the downside, Google is a distant third in market share, perhaps because it doesn't have the traditional relationship with enterprise customers. However, it is quickly expanding both its offerings and its footprint of global data centers.

Gartner said that its "clients typically choose GCP as a secondary provider rather than a strategic provider, though GCP is increasingly chosen as a strategic alternative to AWS by customers whose businesses compete with Amazon, and that are more open-source-centric or DevOps-centric, and thus are less well-aligned to Microsoft Azure."

See Related:

AWS vs. Google: Cloud Comparison

Google vs. Azure: Cloud Comparison

Azure vs. Google: Cloud Comparison

See Full Table

Vendor	Strengths	Weaknesses
AWS	• Dominant market position • Extensive, mature offerings • Support for large organizations • Extensive training • Global reach	• Difficult to use • Cost management • Overwhelming options
Microsoft Azure	•Second largest provider • Integration with Microsoft tools and software • Broad feature set • Hybrid cloud • Support for open source	•Issues with documentation • Incomplete management tooling
Google	• Designed for cloud-native businesses • Commitment to open source and portability • Deep discounts and flexible contracts • DevOps expertise	• Late entrant to IaaS market • Fewer features and services • Historically not as enterprise focused

AWS Vs. Azure Vs. Google: Compute

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.

Microsoft Compute:

Virtual Machines

Microsoft Azure's primary cloud-based compute service is known 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. Azure 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.

Google Compute:

Compute Engine

By comparison, Google's catalog of compute services is somewhat smaller 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

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

See Full Table

Vendor	Compute Services
AWS	• EC2 • Elastic Container Service • Elastic Container Service for Kubernetes • Elastic Container Registry • Lightsail • Batch • Elastic Beanstalk • Fargate • Auto Scaling • Elastic Load Balancing • VMware Cloud on AWS
Microsoft Azure	• Virtual Machines • Virtual Machine Scale Sets • Azure Container Service (AKS) • Container Instances • Batch • Service Fabric • Cloud Services
Google Cloud	• Compute Engine • Kubernetes • Functions • Container Security • Graphics Processing Unit (GPU) • App Engine • Knative

AWS Vs. Azure Vs. Google: Storage

AWS Storage:

SSS To EFS

AWS's storage services include 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

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.

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.

Google Storage:

Unified Storage And More

GCP has a growing 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.

See Full Table

Vendor	Storage Services	Database Services	Backup Services
AWS	• Simple Storage Service (S3) • Elastic Block Storage (EBS) • Elastic File System (EFS) • Storage Gateway • Snowball • Snowball Edge • Snowmobile	• Aurora • RDS • DynamoDB • ElastiCache • Redshift • Neptune • Database migration service	· Glacier
Azure	• Blob Storage • Queue Storage • File Storage • Disk Storage • Data Lake Store	•SQL Database • Database for MySQL • Database for PostgreSQL • Data Warehouse • Server Stretch Database • Cosmos DB • Table Storage • Redis Cache • Data Factory	• Archive Storage • Backup • Site Recovery
GCP	•Cloud Storage • Persistent Disk • Transfer Appliance • Transfer Service	•Cloud SQL • Cloud Bigtable • Cloud Spanner • Cloud Datastore	· None

AWS Vs. Azure Vs. Google: Key Cloud Tools

Looking ahead, experts say that emerging technologies like artificial intelligence, machine learning, the Internet of Things (IoT), and serverless computing will become key points of differentiation for cloud vendors. All three leading vendors have begun experimenting with offerings in these areas and are likely to expand their services in the coming year.

AWS Key Tools:

Sagemaker To Serverless

As in other areas, AWS has the longest list 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 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.

Azure Key Tools:

Cognitive Services

Having invested heavily in artificial intelligence, Microsoft 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, some of Azure's top tools are geared toward 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.

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.

See Full Table

Vendor	AI/ML	IoT	Serverless
AWS	•SageMaker •Comprehend • Lex • Polly •Rekognition •Machine Learning • Translate •Transcribe •DeepLens • Deep Learning AMIs • Apache MXNet on AWS • TensorFlow on AWS	• oT Core •FreeRTOS •Greengrass • IoT 1-Click • IoT Analytics • IoT Button • IoT Device Defender • IoT Device Management	• Lambda • Serverless Application Repository
Azure	• Machine Learning • Azure Bot Service • Cognitive Services	• IoT Hub • IoT Edge • Stream Analytics • Time Series Insights	· Functions
GCP	•Cloud Machine Learning Engine • Dialogflow Enterprise Edition • Cloud Natural Language • Cloud Speech API • Cloud Translation API • Cloud Video Intelligence • Cloud Job Discovery (Private Beta)	· Cloud IoT Core (Beta)	· Cloud Functions (Beta)

AWS Vs. Azure Vs. Google: Hybrid And Multicloud Options

Although all of these vendors have barely dipped their toes into the hybrid and multicloud spaces, they each now offer different tools to give customers more cloud setup flexibility:

AWS Hybrid And Multicloud

- AWS Outposts
- AWS Wavelength
- AWS Local Zones
- AWS Snowball
- AWS Snowcone
- VMware Cloud on AWS
- Amazon ECS Anywhere
- Amazon EKS Anywhere

Azure Hybrid And Multicloud

- Azure Arc
- Azure Stack
- Azure Active Directory
- Azure Backup
- Azure Blob Storage
- Azure Security Center
- Azure Centinel

Google Hybrid And Multicloud

- Anthos
- Looker
- Operations
- Cloud Build

- Traffic Director
- Cloud Run for Anthos

Read more: Top Hybrid Cloud Trends 2021

AWS Vs. Azure Vs. Google: High-Profile Customers

AWS and Azure have boasted the lion's share of high-profile enterprise customers for many years, but Google is quickly picking up more renowned enterprises and federal government branches.

AWS Customers

- Netflix
- CapitalOne
- Coca Cola
- McDonald's
- Stanford University
- Volkswagen
- General Electric
- Petco
- Philips
- LG

Azure Customers

- National Basketball Association
- Snowflake
- AT&T
- AccuWeather
- EY
- Papa John's
- FedEx
- GNC
- L'Oreal
- Nationwide

Google Customers

- Twitter
- Deutsche Bank
- PayPal
- P&G
- Home Depot
- UPS
- Etsy
- Equifax
- Target
- 20th Century Fox

AWS Vs. Azure Vs. Google: Pricing

Also see: an in-depth look at AWS vs. Azure vs. Google pricing for cloud services.

Understanding pricing among these three cloud leaders is challenging – and pricing changes; it can also change based on the specific arrangement that a customer wrangles from their service rep. Look below for typical pricing engagements with each provider:

AWS Pricing

Amazon's pricing is particularly inscrutable. While it does offer a cost calculator, the many variables involved make it difficult to get accurate estimates. Gartner advised, "[Amazon's] granular pricing structure is complex; use of third-party cost management tools is highly recommended."

Azure Pricing

Microsoft Azure doesn't make things any simpler. Because of Microsoft's complicated software licensing options and use of situation-based discounts, its pricing structure can be difficult to understand without outside help and/or considerable experience.

Google Pricing

By contrast, Google uses its pricing as a point of differentiation. It aims to offer "customer-friendly" prices that beat the list prices of the other providers. Gartner noted, "Google uses deep discounts and exceptionally flexible contracts to try to win projects from customers that are currently spending significant sums of money with cloud competitors."

Key tip: Organizations that are basing their cloud vendor decisions primarily on price will need to analyze each project on a case-by-case basis to get the best deal. And because the vendors drop their prices regularly, they may need to revisit those calculations frequently.

AWS Vs. Azure Vs. Google: Availability Zones

Depending on where your international operations are located and what localized regulations you need to follow, one of these top clouds may be optimal for your business model:

- **AWS Availability Zones:** North America, South America, Europe, Middle East, Africa, Asia Pacific. Learn more here.
- **Azure Availability Zones:** Brazile, Canada, Chile, Mexico, United States, Azure Government. Learn more here.
- **Google Availablity Zones:** Asia, Australia, Europe, North America, South America. Learn more here.

AWS Vs. Azure Vs. Google: What's Best For You?

As noted at the beginning of this article, the best public cloud vendor for you is going to depend on your needs and your workloads. In fact, the best vendor for some of your projects might not be the best vendor for your other projects. Many experts believe that the majority of enterprises will invest heavily in multicloud. Indeed, pursuing a multicloud strategy may help lessen vendor lock-in or match workloads with the best available service.

The AWS Choice

You can't go wrong with AWS, due to its rich collection of tools and services and massive scale. The only reason not to choose Amazon is if you want a more personal relationship, something a small boutique shop can offer. At its size, it's hard for Amazon to have a close relationship with every customer, but there are managed services providers that can offer that type of attentive focus.

The Azure Choice

Microsoft's greatest appeal is, of course, its Microsoft shops. All of your existing .Net code will work on Azure, your server environment will connect to Azure, and you will find it easy to migrate on-premises apps. Futhermore, Azure's deep focus on the hybrid cloud will help you bridge the legacy data center environment with the rapidly scalable (and feature-rich) Microsoft cloud.

The Google Choice

Google is growing quickly but is a work in progress. Naturally, the search giant doesn't have a legacy background in dealing with businesses. But it is fully committed and has plowed billions into its cloud efforts. And it is partnered with Cisco, which does know the enterprise. The people who should look at Google now are the ones who looked a year ago and didn't like what they saw. They might be surprised. Google has built its cloud on its strength, which is scale and machine learning. it's clearly worth a look.

Bottom line: Certain types of companies will be more attracted to certain cloud vendors. So again, if your firm runs Windows and a lot of Microsoft software, you'll probably want to investigate Azure. If you are a small, web-based startup looking to scale quickly, you might want to take a good look at Google Cloud Platform. And if you are looking for the provider with the broadest catalog of services and worldwide reach, AWS will probably be right for you.

AWS Vs. Azure Vs. Google: Vendor Pages

Look below for links to the AWS, Azure, and Google vendor pages about a variety of tools, from compute to storage to advanced cloud tools:

See Full Table

	Amazon Web Services	Microsoft Azure	Google Cloud Platform
Regions	Global Infrastructure	Regions	Regions and Zones
Pricing	Cloud Services Pricing	Pricing	Pricing
Basic Compute	EC2	Virtual Machines	Compute Engine
Containers	ECS EKS	AKS Container Instances	Kubernetes Engine
Serverless	Lambda	Functions	Cloud Functions
App Hosting	Elastic Beanstalk	App Service Service Fabric Cloud Services	App Engine
Batch Processing	Batch	Batch	N/A
Object Storage	S3	Blob Storage	Cloud Storage
Block Storage	EBS		Persistent Disk
File Storage	EFS	File Storage	N/A
Hybrid Storage	Storage	StorSimple	N/A

	Gateway		
Offline Data Transfer	Snowball Snowball Edge Snowmobile	N/A	Transfer Appliance
Relational/SQL Database	RDS Aurora	SQL Database Database for MySQL Database for PostgreSQL	Cloud SQL Cloud Spanner
NoSQL Database	DynamoDB	Cosmos DB Table Storage	Cloud Bigtable Cloud Datastore
In-Memory Database	Elasticache	Redis Cache	N/A
Archive/Backup	Glacier	Backup	N/A
Disaster Recovery	N/A	Site Recovery	N/A
Machine Learning	SageMaker AML Apache MXNet on AWS TensorFlow on AWS	Machine Learning	Cloud Machine Learning Engine
Cognitive Services	Comprehend Lex Polly Rekognition Translate Transcribe	Cognitive Services	Cloud Natural Language Cloud Speech API Cloud Translation API Cloud Video Intelligence
IoT	IoT Core	IoT Hub IoT Edge	Cloud IoT Core
Networking	Direct Connect	Virtual Network	Cloud Interconnect Network Service Tiers
Content Delivery	CloudFront	CDN	Cloud CDN
Big Data Analytics	Athena EMR Kinesis	HDInsight Stream Analytics Data Lake Analytics Analysis Services	Cloud Dataflow Cloud Dataproc
Authentication and Access Management	IAM Directory Service Organizations Single Sign-On	Active Directory Multi-Factor Authentication	Cloud IAM Cloud IAP
Security	GuardDuty Macie Shield WAF	Security Center	Cloud DLP Cloud Security Scanner
Application Lifecycle Management	CodeStar CodePipeline	Visual Studio Team Services Visual Studio App Center	N/A
Cloud Monitoring	CloudWatch CloudTrail	Monitor Log Analytics	Stackdriver
Cloud Management	Systems Manager Management Console	Portal Policy Cost Management	Stackdriver
AR & VR	Sumerian	N/A	N/A
Virtual Private Cloud	VPC	N/A	Virtual Private Cloud
Training	Training and Certification	Training	Training Programs
Support	Support	Support	Support
3rd Party Software and Services	Marketplace	Marketplace	Cloud Launcher Partner Directory