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**AMAZON WEB SERVICES(AWS)**

Amazon Web Services offers a broad set of global cloud-based products including compute, storage, databases, analytics, networking, mobile, developer tools, management tools, IoT, security, and enterprise applications: on-demand, available in seconds, with pay-as-you-go pricing. From data warehousing to deployment tools, directories to content delivery, over 200 AWS services are available. New services can be provisioned quickly, without the upfront fixed expense. This allows enterprises, start-ups, small and medium-sized businesses, and customers in the public sector to access the building blocks they need to respond quickly to changing business requirements. This whitepaper provides you with an overview of the benefits of the AWS Cloud and introduces you to the services that make up the platform. Introduction In 2006, Amazon Web Services (AWS) began offering IT infrastructure services to businesses as web services—now commonly known as cloud computing. One of the key benefits of cloud computing is the opportunity to replace upfront capital infrastructure expenses with low variable costs that scale with your business. With the cloud, businesses no longer need to plan for and procure servers and other IT infrastructure weeks or months in advance. Instead, they can instantly spin up hundreds or thousands of servers in minutes and deliver results faster. Today, AWS provides a highly reliable, scalable, low-cost infrastructure platform in the cloud that powers hundreds of thousands of businesses in 190 countries around the world. This video explores how millions of customers use AWS to take advantage of the efficiencies of cloud computing.

The AWS Cloud infrastructure is built around AWS Regions and Availability Zones. An AWS Region is a physical location in the world where we have multiple Availability Zones. Availability Zones consist of one or more discrete data centers, each with redundant power, networking, and connectivity, housed in separate facilities. These Availability Zones offer you the ability to operate production applications and databases that are more highly available, fault tolerant, and scalable than would be possible from a single data center.

As an AWS customer, you will benefit from a data center and network architecture built to meet the requirements of the most security-sensitive organizations. Security in the cloud is much like security in your on-premises data centers—only without the costs of maintaining facilities and hardware. In the cloud, you don’t have to manage physical servers or storage devices. Instead, you use software-based security tools to monitor and protect the flow of information into and out of your cloud resources. An advantage of the AWS Cloud is that it allows you to scale and innovate, while maintaining a secure environment and paying only for the services you use. This means that you can have the security you need at a lower cost than in an on-premises environment. As an AWS customer you inherit all the best practices of AWS policies, architecture, and operational processes built to satisfy the requirements of our most security-sensitive customers. Get the flexibility and agility you need in security controls. The AWS Cloud enables a shared responsibility model. While AWS manages security of the cloud, you are responsible for security in the cloud. This means that you retain control of the security you choose to implement to protect your own content, platform, applications, systems, and networks no differently than you would in an on-site data center. AWS provides you with guidance and expertise through online resources, personnel, and partners. AWS provides you with advisories for current issues, plus you have the opportunity to work with AWS when you encounter security issues. You get access to hundreds of tools and features to help you to meet your security objectives. AWS provides security-specific tools and features across network security, configuration management, access control, and data encryption.

**GOOGLE CLOUD PLATRFORM(GCP)**

**What is Google Cloud Platform (GCP)?**

[**GCP**](https://www.datacamp.com/courses/introduction-to-gcp)**is Google’s suite of**[**public cloud computing**](https://www.datacamp.com/blog/public-private-cloud-difference)**tools and services, including well-known data analytics services like Google BigQuery and Looker Studio.**

**Powered by Google’s global network of data centers, GCP runs on the same infrastructure as Gmail, Google Drive, and Google Docs.**

**Google originally opened its infrastructure to business users in 2008 via a public cloud. Since then, its tool suite of cloud services has been expanded rapidly, with Cloud AI being among the most recent additions. Other services include computing resources, networking, data storage, IoT, security, app deployment, and management tools.**

**GCP has an especially strong focus on data analytics, machine learning, and artificial intelligence, making it a crucial tool to learn for data analysts and consultants.**

**Google Cloud Platform (GCP) vs. Google Cloud**

**People sometimes mix up GCP and Google Cloud by using the terms interchangeably, but really, GCP is a part of Google Cloud.**

**Google Cloud refers to all of Google’s cloud services. These also include Google Workspace (formerly known as G-Suite or Google Apps) and enterprise versions of Android and Chrome OS. Google Cloud also encompasses Google apps like Gmail and Google Docs.**

**GCP, on the other hand, only refers to cloud services covered by the GCP pricing models, such as App Engine, Google BigQuery, and Cloud Console, which we will explore below.**

**Pros and Cons of GCP**

**Like all services, GCP has some advantages and disadvantages for its users. Let’s first look at the advantages.**

**GCP Advantages**

**Wide range of cloud computing services**

**GCP offers an especially wide range of cloud computing services for businesses and end users. These include computing power, networking, data storage, data analytics, machine learning, artificial intelligence, and even app deployment and API integration. All this makes GCP a good solution for businesses with diverse or rapidly changing cloud requirements.**

**Global reach of network infrastructure**

**Businesses that use GCP have access to Google’s robust and globally distributed network infrastructure. This allows the implementation of multi-region redundancy or using especially cheap locations for hosting the main workload.**

**Robust security**

**Google Cloud Platform provides robust security options, including**[**IAM**](https://cloud.google.com/security/products/iam)**(Identity and Access Management),**[**KMS**](https://cloud.google.com/security/products/security-key-management?hl=en)**(Key Management Service), and the**[**SCC**](https://cloud.google.com/security/products/security-command-center?hl=en)**(Security Command Center). This grants businesses great cybersecurity measures while hosting their data remotely.**

**Strong focus on innovation**

**Google is known for its strong pioneering spirit and focus on implementing technological advancements fast within its product suite. GCP customers are therefore likely to enjoy new technologies like artificial intelligence integration for analyzing their data.**

**GCP Disadvantages**

**Complex pricing model**

**Contrary to other cloud providers, GCP has relatively complex pricing models. This can make it difficult for businesses to forecast and manage their expenses for cloud computing.**

**Limited support**

**GCP also provides a relatively limited and hard-to-access support team that might not respond immediately to requests. This can negatively impact productivity and data availability if there is an ongoing issue with the cloud infrastructure.**

**Proprietary platform**

**It’s also important to note that GCP is a proprietary platform. This can make it harder to migrate data and deploy applications if a business wants to leave Google’s services. Furthermore, GCP can be more expensive than open-source solutions or cloud services from smaller providers.**

**Use Cases of GCP**

**Due to its diverse suite of cloud services and tools, GCP has many use cases for businesses of all sizes. Here are some common ways a business might utilize GCP:**

* **Data storage: With Google BigQuery, businesses can use an enterprise-level data warehouse in GCP. In addition, Cloud SQL provides a database-as-a-service model for MySQL, PostgreSQL and Microsoft SQL Server databases. Cloud BigTable can be used for NoSQL databases and Cloud Storage offers options for unstructured data and large files like images.**
* **Business intelligence: GCP’s integrated BI tool Looker Studio offers swift data visualization and reporting directly on the platform. This lets data analysts and consultants gain quick insights and create shareable visuals for presentations and consulting calls.**
* **Machine learning: GCP also offers services to deploy machine learning models like Cloud AutoML and Cloud Machine Learning Engine. Businesses can use these tools to train, validate and deploy their models directly in the cloud, automating and improving their business intelligence processes.**
* **IoT management: GCP is ideal for managing a company-wide IoT (Internet of Things) network. Services for IoT device connection and management like Cloud IoT Core make it easy to set up and supervise various IoT devices.**
* **App deployment: GCP can also be used to deploy applications developed with the Java, Python, Go, Ruby, PHP or C# programming languages by utilizing the service App Engine. This makes it easy for businesses to host their applications without upfront infrastructure setup and allows them to iterate swiftly during the development process.**
* **API development: GCP’s integrated tools Apigee API Platform and Developer Portal make it possible to use GCP as a base for developing and hosting APIs.**

**MICROSOFT AZURE**

**Microsoft Azure, or just Azure ,**[**[5]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-5)[**[6]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-6)[**[7]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-7)**is the**[**cloud computing**](https://en.wikipedia.org/wiki/Cloud_computing)**platform developed by**[**Microsoft**](https://en.wikipedia.org/wiki/Microsoft)**. It has management, access and development of applications and services to individuals, companies, and governments through its global infrastructure. It also provides capabilities that are usually not included within other cloud platforms, including**[**software as a service (SaaS)**](https://en.wikipedia.org/wiki/Software_as_a_service)**,**[**platform as a service (PaaS)**](https://en.wikipedia.org/wiki/Platform_as_a_service)**, and**[**infrastructure as a service (IaaS)**](https://en.wikipedia.org/wiki/Infrastructure_as_a_service)**. Microsoft Azure supports many**[**programming languages**](https://en.wikipedia.org/wiki/Programming_language)**, tools, and frameworks, including Microsoft-specific and third-party software and systems.**

**Azure was first introduced at the**[**Professional Developers Conference**](https://en.wikipedia.org/wiki/Professional_Developers_Conference)**(PDC) in October 2008 under the codename "Project Red Dog".**[**[8]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-:1-8)**It was officially launched as Windows Azure in February 2010 and later renamed to Microsoft Azure on March 25, 2014.**[**[9]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-anya-9)[**[10]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-renaming-10)

**Services**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=1)**]**

**Microsoft Azure uses large-scale**[**virtualization**](https://en.wikipedia.org/wiki/Virtualization)**at Microsoft data centers worldwide and offers more than 600 services.**[**[11]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-11)**Microsoft Azure offers a service level agreement (SLA) that guarantees 99.9% availability for applications and data hosted on its platform, subject to specific terms and conditions outlined in the SLA documentation.**[**[12]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-12)

**Computer services**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=2)**]**

* [**Virtual machines**](https://en.wikipedia.org/wiki/Virtual_machine)**,**[**infrastructure as a service**](https://en.wikipedia.org/wiki/Infrastructure_as_a_service)**(IaaS), allowing users to launch general-purpose**[**Microsoft Windows**](https://en.wikipedia.org/wiki/Microsoft_Windows)**and**[**Linux**](https://en.wikipedia.org/wiki/Linux)**virtual machines,**[**software as a service**](https://en.wikipedia.org/wiki/Software_as_a_service)**(SaaS), as well as preconfigured machine images for popular software packages.**[**[13]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-13)
  + **Starting in 2022, these virtual machines are now powered by**[**Ampere**](https://en.wikipedia.org/wiki/Ampere_Computing)**Cloud-native processors.**[**[14]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-14)
  + **Most users run Linux on Azure, some of the many**[**Linux distributions**](https://en.wikipedia.org/wiki/Linux_distribution)**offered, including Microsoft's own**[**Linux**](https://en.wikipedia.org/wiki/Linux_kernel)**-based**[**Azure Sphere**](https://en.wikipedia.org/wiki/Azure_Sphere)**.**[**[15]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-15)
* **App services,**[**platform as a service**](https://en.wikipedia.org/wiki/Platform_as_a_service)**(PaaS) environment, letting developers easily publish and manage websites.**
* [**Azure Web Sites**](https://en.wikipedia.org/wiki/Azure_Web_Apps)**allows developers to build sites using**[**ASP.NET**](https://en.wikipedia.org/wiki/ASP.NET)**,**[**PHP**](https://en.wikipedia.org/wiki/PHP)**,**[**Node.js**](https://en.wikipedia.org/wiki/Node.js)**,**[**Java**](https://en.wikipedia.org/wiki/Java_(programming_language))**, or**[**Python**](https://en.wikipedia.org/wiki/Python_(programming_language))**, which can be deployed using**[**FTP**](https://en.wikipedia.org/wiki/File_Transfer_Protocol)**,**[**Git**](https://en.wikipedia.org/wiki/Git)**,**[**Mercurial**](https://en.wikipedia.org/wiki/Mercurial)**,**[**Azure DevOps**](https://en.wikipedia.org/wiki/Azure_DevOps_Services)**, or uploaded through the user portal. This feature was announced in preview form in June 2012 at the Meet Microsoft Azure event.**[**[16]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-meetnew-16)**Customers can create websites in PHP, ASP.NET, Node.js, or Python, or select from several open-source applications from a gallery to deploy. This comprises one aspect of the**[**platform as a service**](https://en.wikipedia.org/wiki/Platform_as_a_service)**(PaaS) offerings for the Microsoft Azure Platform. It was renamed Web Apps in April 2015.**[**[10]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-renaming-10)[**[17]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-17)
* **Web Jobs are applications that can be deployed to an App Service environment to implement background processing that can be invoked on a schedule, on-demand, or run continuously. The Blob, Table, and Queue services can be used to communicate between Web Apps and Web Jobs and to provide state.**[**[8]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-:1-8)
* **Azure Kubernetes Service (AKS) provides the capability to deploy production-ready**[**Kubernetes**](https://en.wikipedia.org/wiki/Kubernetes)**clusters in Azure.**[**[18]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-18)
* **In July 2023,**[**watermarking**](https://en.wikipedia.org/wiki/Digital_watermarking)**support on**[**Azure Virtual Desktop**](https://en.wikipedia.org/wiki/Azure_Virtual_Desktop)**was announced as an optional feature of *Screen Capture* to provide additional security against**[**data leakage**](https://en.wikipedia.org/wiki/Data_leakage)**.**[**[19]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-19)

**Identity**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=3)**]**

* **Entra ID connect is used to**[**synchronize**](https://en.wikipedia.org/wiki/Data_synchronization)**on-premises directories and enable**[**SSO**](https://en.wikipedia.org/wiki/Single_sign-on)**(Single Sign On).**[**[20]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-20)
* **Entra ID B2C allows the use of consumer identity and access management in the cloud.**
* **Entra Domain Services is used to join Azure virtual machines to a**[**domain**](https://en.wikipedia.org/wiki/Windows_domain)**without**[**domain controllers**](https://en.wikipedia.org/wiki/Domain_controller_(Windows))**.**
* **Azure information protection can be used to protect**[**sensitive information**](https://en.wikipedia.org/wiki/Information_sensitivity)**.**
* **Entra ID External Identities is a set of capabilities that allow organizations to collaborate with external users, including customers and partners.**[**[21]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-21)
* **On July 11, 2023, Microsoft announced the renaming of Azure AD to**[***Microsoft Entra ID***](https://en.wikipedia.org/wiki/Microsoft_Entra_ID)**.**[**[22]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-22)**The name change took place four days later.**

**Mobile services**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=4)**]**

* **Mobile Engagement collects real-time analytics that highlight users’ behavior. It also provides push notifications to mobile devices.**[**[23]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-23)
* [**HockeyApp**](https://en.wikipedia.org/wiki/HockeyApp)**can be used to develop, distribute, and beta-test mobile apps.**[**[24]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-24)

**Storage services**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=5)**]**

* **Storage Services provides**[**REST**](https://en.wikipedia.org/wiki/REST)**and**[**SDK**](https://en.wikipedia.org/wiki/Software_development_kit)[**APIs**](https://en.wikipedia.org/wiki/API)**for storing and accessing data on the cloud.**
* **Table Service lets programs store structured text in**[**partitioned**](https://en.wikipedia.org/wiki/Partition_(database))**collections of entities that are accessed by the partition key and**[**primary key**](https://en.wikipedia.org/wiki/Primary_key)**. Azure Table Service is a**[**NoSQL**](https://en.wikipedia.org/wiki/NoSQL)**non-relational database.**
* **Blob Service allows programs to store unstructured text and binary data as**[**object storage**](https://en.wikipedia.org/wiki/Object_storage)**blobs that can be accessed by an HTTP(S) path. Blob service also provides security mechanisms to control access to data.**
* **Queue Service lets programs communicate asynchronously by message using**[**queues**](https://en.wikipedia.org/wiki/Message_queuing_service)**.**
* **File Service allows storing and access of data on the cloud using the REST APIs or the**[**SMB protocol**](https://en.wikipedia.org/wiki/SMB_protocol)**.**[**[25]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-25)

**Communication services**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=6)**]**

* **Azure Communication Services offers an**[**SDK**](https://en.wikipedia.org/wiki/Software_development_kit)**for creating web and mobile communications applications that include**[**SMS**](https://en.wikipedia.org/wiki/SMS)**, video calling,**[**VOIP**](https://en.wikipedia.org/wiki/VOIP)**and**[**PSTN**](https://en.wikipedia.org/wiki/PSTN)**calling, and web-based chat.**

**Data management**

**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Microsoft_Azure&action=edit&section=7)**]**

* [**Azure Data Explorer**](https://en.wikipedia.org/wiki/Azure_Data_Explorer)**provides**[**big data**](https://en.wikipedia.org/wiki/Big_data)**analytics and**[**data-exploration**](https://en.wikipedia.org/wiki/Data_exploration)**capabilities.**
* [**Azure Search**](https://en.wikipedia.org/wiki/Azure_Search)**provides text search and a subset of**[**OData**](https://en.wikipedia.org/wiki/OData)**'s structured filters using REST or SDK APIs.**
* [**Cosmos DB**](https://en.wikipedia.org/wiki/Cosmos_DB)**is a**[**NoSQL**](https://en.wikipedia.org/wiki/NoSQL)**database service that implements a subset of the**[**SQL SELECT**](https://en.wikipedia.org/wiki/Select_(SQL))**statement on**[**JSON**](https://en.wikipedia.org/wiki/JSON)**documents.**
* **Azure Cache for Redis is a managed implementation of**[**Redis**](https://en.wikipedia.org/wiki/Redis)**.**
* [**StorSimple**](https://en.wikipedia.org/wiki/StorSimple)**manages storage tasks between on-premises devices and cloud storage.**[**[26]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-26)
* [**Azure SQL Database**](https://en.wikipedia.org/wiki/Microsoft_Azure_SQL_Database)**works to create, scale, and extend applications into the cloud using**[**Microsoft SQL Server**](https://en.wikipedia.org/wiki/Microsoft_SQL_Server)**technology. It also integrates with**[**Active Directory**](https://en.wikipedia.org/wiki/Active_Directory)**,**[**Microsoft System Center**](https://en.wikipedia.org/wiki/Microsoft_System_Center)**, and**[**Hadoop**](https://en.wikipedia.org/wiki/Apache_Hadoop)**.**[**[27]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-27)
* **Azure Synapse Analytics is a fully managed cloud**[**data warehouse**](https://en.wikipedia.org/wiki/Data_warehouse)**.**[**[28]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-28)[**[29]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-29)
* **Azure Data Factory is a**[**data integration**](https://en.wikipedia.org/wiki/Data_integration)**service that allows creation of data-driven workflows in the cloud for orchestrating and automating data movement and data transformation.**[**[30]**](https://en.wikipedia.org/wiki/Microsoft_Azure#cite_note-adfdoc-30)
* [**Azure Data Lake**](https://en.wikipedia.org/wiki/Azure_Data_Lake)**is a scalable data storage and analytic service for**[**big data**](https://en.wikipedia.org/wiki/Big_data)**analytics workloads that require developers to run**[**massively parallel**](https://en.wikipedia.org/wiki/Massively_parallel)**queries.**

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