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موضوع البحث:

“ cloud computing ”

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Cloud computing

definition:

Simply put, cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale. You typically pay only for cloud services you use, helping you lower your operating costs, run your infrastructure more efficiently, and scale as your business needs change.

History:

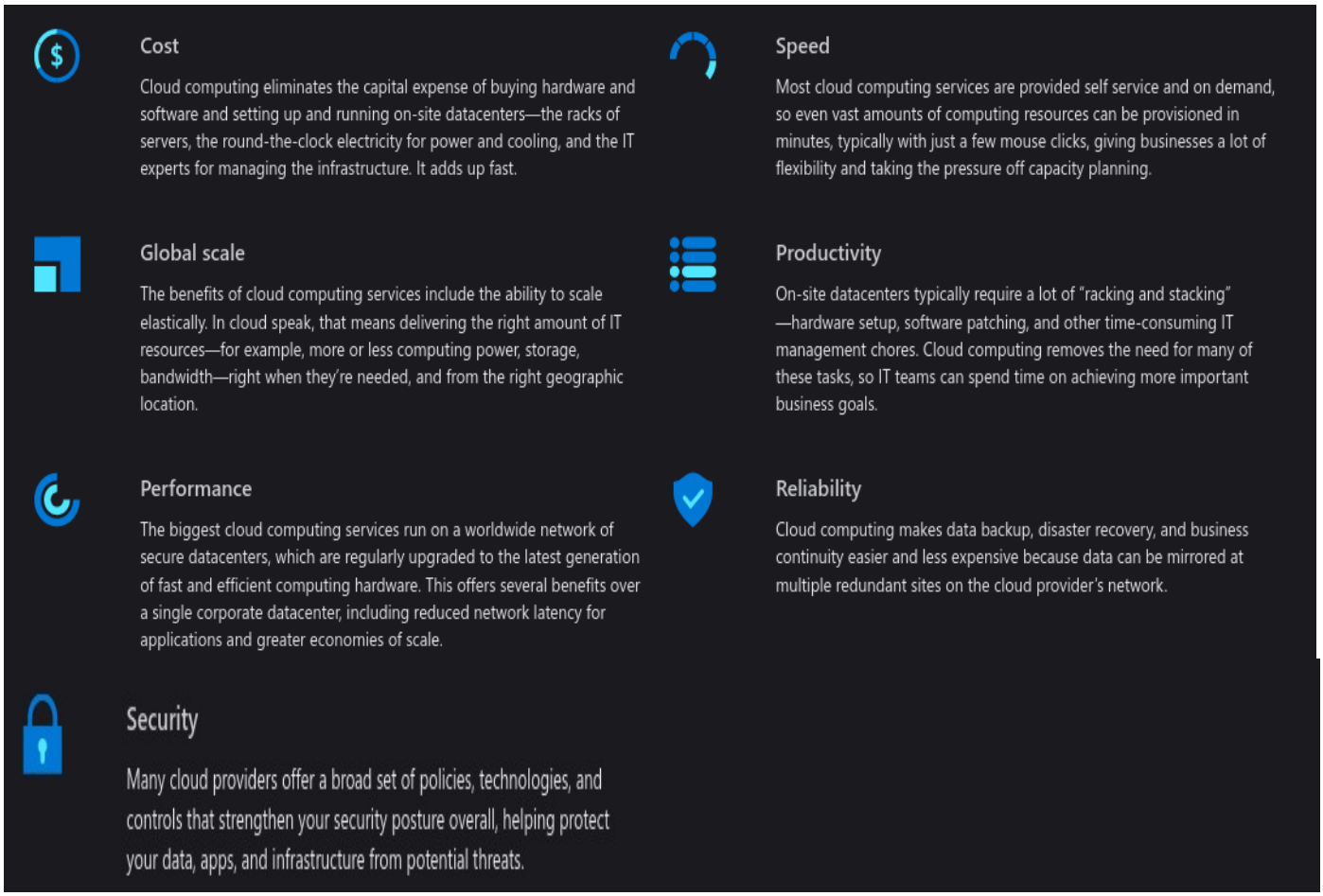
* References to the phrase "cloud computing" appeared as early as 1996, with the first known mention in a Compaq internal document.
* The cloud symbol was used to represent networks of computing equipment in the original ARPANET by as early as 1977,and the CSNET by 1981.
* During the 1960s, the initial concepts of time-sharing became popularized via RJE (Remote Job Entry);this terminology was mostly associated with large vendors such as IBM and DEC. Full-time-sharing solutions were available by the early 1970s on such platforms as Multics (on GE hardware), Cambridge CTSS, and the earliest UNIX ports (on DEC hardware). Yet, the "data center" model where users submitted jobs to operators to run on IBM's mainframes was overwhelmingly predominant.
* In the 1990s, telecommunications companies, who previously offered primarily dedicated point-to-point data circuits, began offering virtual private network (VPN) services with comparable quality of service, but at a lower cost.
* In July 2002, Amazon created subsidiary Amazon Web Services.
* In April 2008, Google released the beta version of Google App Engine.
* In early 2008, NASA's Nebula,enhanced in the RESERVOIR European Commission-funded project, became the first open-source software for deploying private and hybrid clouds, and for the federation of clouds.
* In 2008, the U.S. National Science Foundation began the Cluster Exploratory program to fund academic research using Google-IBM cluster technology to analyze massive amounts of data.
* In February 2010, Microsoft released Microsoft Azure, which was announced in October 2008.
* In July 2010, Rackspace Hosting and NASA jointly launched an open-source cloud-software initiative known as OpenStack.
* On March 1, 2011, IBM announced the IBM SmartCloud framework to support Smarter Planet.
* In May 2012, Google Compute Engine was released in preview, before being rolled out into General Availability in December 2013.
* In 2019, Linux was the most common OS used on Microsoft Azure.In December 2019, Amazon announced AWS Outposts, which is a fully managed service that extends AWS infrastructure, AWS services, APIs, and tools to virtually any customer datacenter, co-location space, or on-premises facility for a truly consistent hybrid experience.

Goal of cloud computing:

The goal of cloud computing is to allow users to take benefit from all of these technologies, without the need for deep knowledge about or expertise with each one of them. The cloud aims to cut costs and helps the users focus on their core business instead of being impeded by IT obstacles.

Top benefits of cloud computing

Cloud computing is a big shift from the traditional way businesses think about IT resources. Here

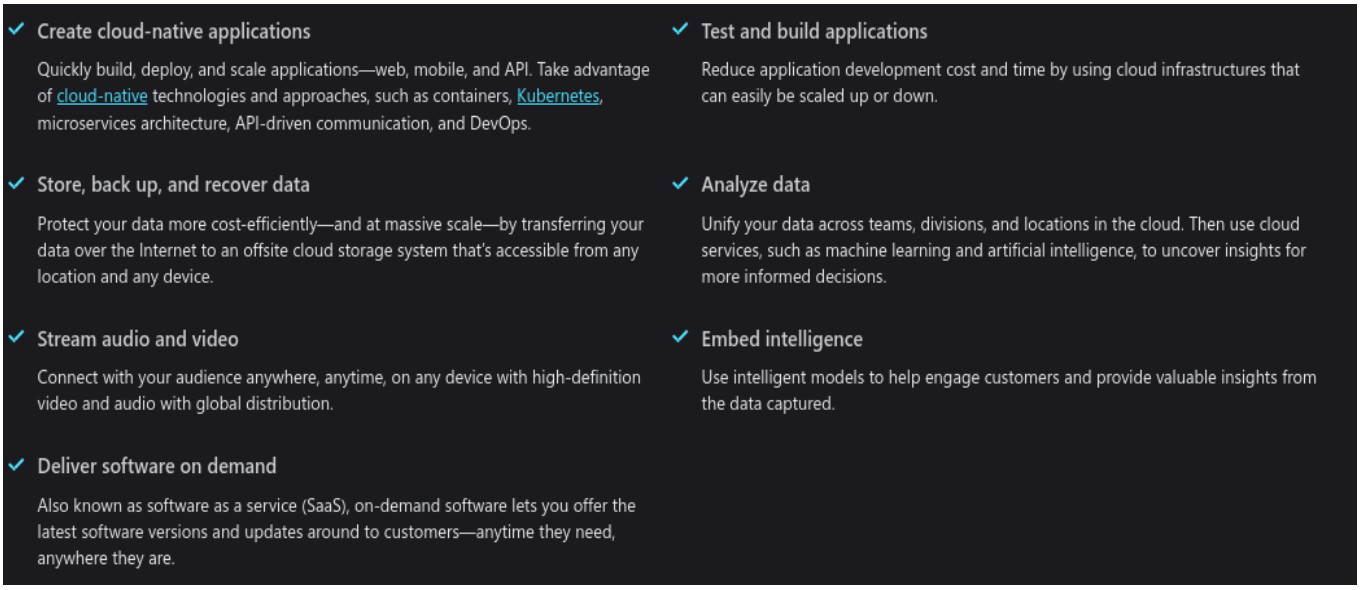


are seven common reasons organizations are turning to cloud computing services:

The main concept for cloud computing:

The main enabling technology for cloud computing is virtualization. Virtualization software separates a physical computing device into one or more "virtual" devices, each of which can be easily used and managed to perform computing tasks. With operating system–level virtualization essentially creating a scalable system of multiple independent computing devices, idle computing resources can be allocated and used more efficiently. Virtualization provides the agility required to speed up IT operations and reduces cost by increasing infrastructure utilization. Autonomic computing automates the process through which the user can provision resources on-demand. By minimizing user involvement, automation speeds up the process, reduces labor costs and reduces the possibility of human errors.

Uses of cloud computing:



Main service models:

There are many service models based on what services are provided by cloud and user:

1) SaaS:

SaaS accounts for approximately 24% of all enterprise workloads (up from 14% in 2016) .

SaaS Characteristics:

SaaS platforms are:

- Available over the internet.
- Hosted on a remote server by a third-party provider.
- Scalable, with different tiers for small, medium, and enterprise-level businesses.
- Inclusive, offering security, compliance, and maintenance as part of the cost.

SaaS examples:

BigCommerce, Google Apps, Salesforce, Dropbox, MailChimp, ZenDesk, DocuSign, Slack, Hubspot.

2) IaaS:

IaaS is hovering around 12% (up from 6%).

IaaS Characteristics:

IaaS platforms are:

- Highly flexible and highly scalable.
- Accessible by multiple users.
- Cost-effective.

IaaS examples:

AWS EC2, Rackspace, Google Compute Engine (GCE), Digital Ocean, Magento 1 Enterprise Edition*.

3)PaaS:

PaaS is currently the most popular model, hovering around 32% and expected to grow in 2020.

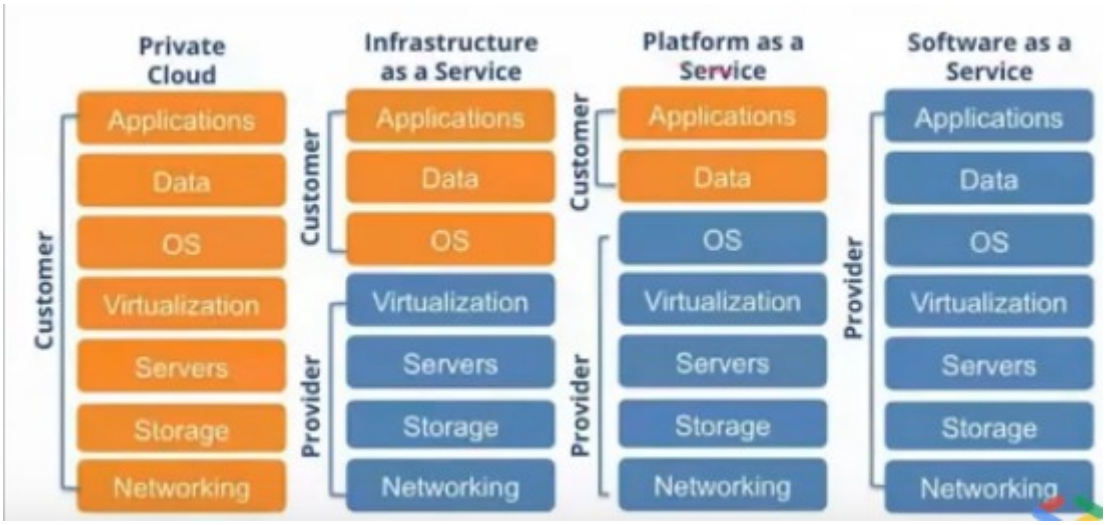
PaaS Characteristics:

PaaS platforms are:

- Accessible by multiple users.
- Scalable – you can choose from various tiers of resources to suit the size of your business.
- Built on virtualization technology.
- **Easy to run without extensive system administration knowledge.**

PaaS examples:

AWS Elastic Beanstalk, Heroku, Windows Azure (mostly used as PaaS), Force.com, OpenShift, Apache Stratos, Magento Commerce Cloud.



Main famous cloud platforms comparison (AWS vs. Azure vs. Google Cloud):

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	• Late entrant to IaaS market

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

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

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: 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

pricing:

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.”

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.
- **Azure Availability Zones:**
  Brazile, Canada, Chile, Mexico, United States, Azure Government.
- **Google Availablity Zones:**

  Asia, Australia, Europe, North America, South America.

Resources:

1) https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/#cloud-computing-models
2) https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/
3) https://www.datamation.com/cloud/aws-vs-azure-vs-google-cloud/
4) https://en.wikipedia.org/wiki/Cloud_computing