

What is cloud computing?



On-demand
self-service

No human
intervention
needed to
get
resources



Broad
network
access

Access from
anywhere



Resource
pooling

Provider
shares
resources to
customers



Rapid
elasticity

Get more
resources
quickly as
needed

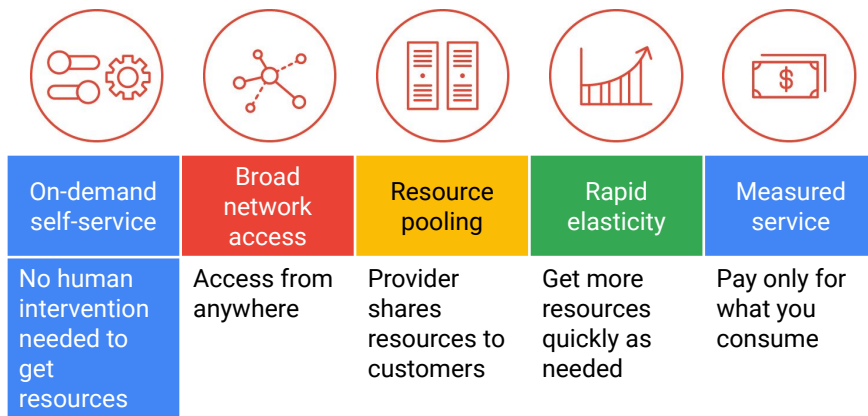


Measured
service

Pay only for
what you
consume

Cloud computing has five fundamental attributes, according to the [definition of cloud computing](#) proposed by the United States National Institute of Standards and Technology.

What is cloud computing?



First, customers get computing resources on-demand and self-service. Cloud-computing customers use an automated interface and get the processing power, storage, and network they need, with no need for human intervention.

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Second, they can access these resources over the network.

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Third, the provider of those resources has a big pool of them, and allocates them to customers out of the pool. That allows the provider to get economies of scale by buying in bulk. Customers don't have to know or care about the exact physical location of those resources.

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Fourth, the resources are elastic. Customers who need more resources can get more rapidly. When they need less, they can scale back.

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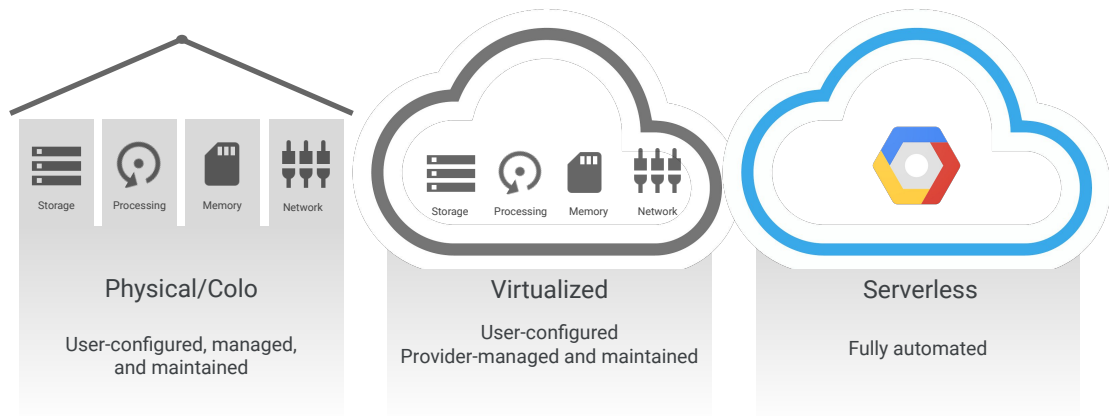


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And last, the customers pay only for what they use or reserve, as they go. If they stop using resources, they stop paying.

How did we get here? Where are we going?




The first wave of the trend towards cloud computing was colocation. Colocation gave users the financial efficiency of renting physical space, instead of investing in data center real estate.

Virtualized data centers of today, the second wave, share similarities with the private data centers and colocation facilities of decades past. The components of virtualized data centers match the physical building blocks of hosted computing—servers, CPUs, disks, load balancers, and so on—but now they are virtual devices. Virtualization does provide a number of benefits: your development teams can move faster, and you can turn capital expenses into operating expenses. With virtualization you still maintain the infrastructure; it is still a user-controlled/user-configured environment.

About 10 years ago, Google realized that its business couldn't move fast enough within the confines of the virtualization model. So Google switched to a container-based architecture—a fully automated, elastic third-wave cloud that consists of a combination of automated services and scalable data. Services automatically provision and configure the infrastructure used to run applications.

Today Google Cloud makes this third-wave cloud available to Google customers.

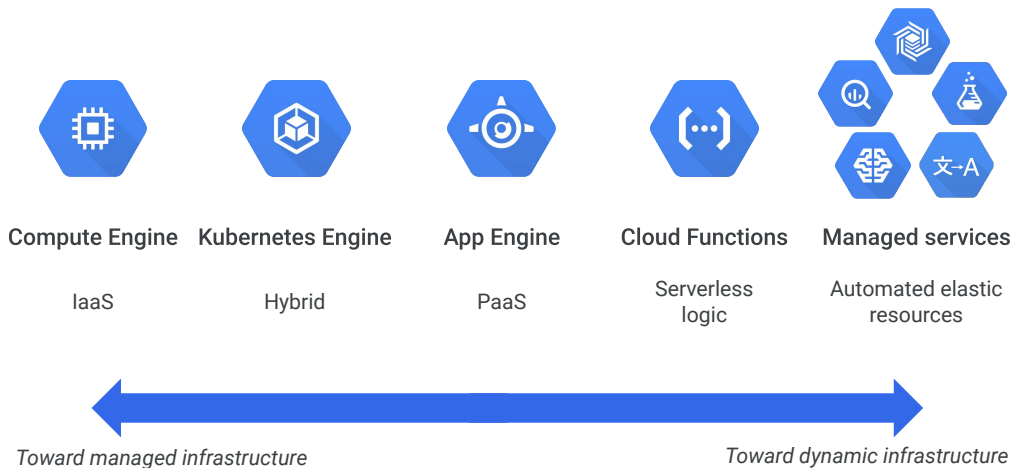


Every company is a data company

Google believes that, in the future, every company—regardless of size or industry—will differentiate itself from its competitors through technology. Largely, that technology will be in the form of software. Great software is centered on data. Thus, every company is or will become a data company.

Google Cloud provides a wide variety of services for managing and getting value from data at scale.

Google Cloud computing architectures meet you where you are



Virtualized data centers brought you infrastructure as a service (IaaS) and platform as a service (PaaS) offerings. IaaS offerings provide you with raw compute, storage, and network, organized in ways familiar to you from physical and virtualized data centers. PaaS offerings, on the other hand, bind your code to libraries that provide access to the infrastructure your application needs, thus allow you to focus on your application logic.

In the IaaS model, you pay for what you allocate. In the PaaS model, you pay for what you use.

As cloud computing has evolved, the momentum has shifted toward managed infrastructure and managed services.