

# Cloud Computing

In this section we will discuss what cloud computing is, how it came to be, and the varying methods in which we take advantage of it.

## Cloud Computing: A Brief History

Computers have become an integral part of businesses environments around the world, and different businesses have resorted to different methods of acquiring computers and computer resources. However, computers are a relatively recent invention and their current ubiquity was obviously not always the case.

In the beginning, computing was seen mostly as a tool for large governments and universities, with private companies adopting computing technology mostly as a novelty, something that could aid their worker's productivity and give them a potential competitive advantage against less "modern" competitors.

Over time though, as the adoption of computers became more widespread, technology became not only a competitive advantage against other companies but a competitive necessity, an essential resource without which companies could simply not be as productive as the rest of the economy.

Thus, as organizations became more reliant on computer-based workflows, they built larger and larger computers often with very specialized networking, security, computing, software and hardware resources: the very first **data centers**.

These data centers were often located either near or exactly on the premises of corporations offices, occupying expensive land and were managed by an in-house team of IT technicians and electricians, both of which did not come cheap. And that is not to mention the cost of electricity accrued by the operation of the computers and the cooling required to maintain them.

Referred to as an **on-premises cloud environment**, data centers like the one mentioned above were brilliantly secure and performant, but were a huge drain on the business's financials and a pain to manage. While many businesses were willing to front the costs associated with these private clouds, there were many that sought other options: enter **Cloud Computing**.

## **Cloud Computing: What it is, Tradeoffs and Characteristics**

In 1961, MIT Professor John McCarthy said in a now-famous speech that someday "Computing can be sold as a utility, like water and electricity", an idea that was realized with the advent of cloud computing platforms, platforms that allow us to lease IT infrastructure and software solutions from third-party providers, usually over the internet.

These platforms often utilize pay-as-you-go pricing models, enabling flexible and cost-effective access to computing resources and organizations that had so far been maintaining extensive arsenals of hardware and software resources gave those arsenals up for the convenience and cheapness of renting their infrastructure from companies like AWS, Azure, Salesforce and Google.

Though this period of mass transition from on-premises environments to cloud computing is seen mostly as a net-positive, there were some trade-offs to the cloud. Firstly, the ability of organizations to take advantage of the cloud was dependent on the internet, and therefore necessitated organizations to adopt and invest in high speed internet connections.

And secondly, since organizations went from owning to simply renting resources under cloud computing, they had to relinquish a great deal of the control over the underlying infrastructure and software in the process, especially when compared to the degree of control offered by on-prem cloud environments.



Variations of this Simpsons meme is extremely popular among Cloud engineers online

That second point actually was and continues to be a point of particular frustration for cloud engineers, who often have to obey illogical rules and protocols within AWS and other cloud platforms simply because that is the way the parent company has decided things should work.

Engineers and businesses like the comparatively greater control that on-prem environments offer, but the price tag associated with them is often enough to make them unattractive. Well, this has led to many organizations adopting a sort of third way, a middle-ground between the two: **Hybrid Cloud Environments**.

Hybrid cloud environments combine a standard data center with an outsourced cloud computing platform. For many organizations, the hybrid cloud is the perfect migration to the cloud. In a hybrid architecture, the organization can run its applications and systems in its local data center and offload part of the computing to the cloud. This provides an opportunity for the organization to leverage its investment in more traditional data centers while simultaneously being able to take advantage of modern cloud solutions.

Now, depending on what exactly is being rented/leased from the platform, cloud computing services are typically categorized into three main types:

1. **Infrastructure as a Service (IaaS):** Provides virtualized hardware resources for the operation of digital applications/products, such as virtual machines, storage, and networks.
2. **Software as a Service (SaaS):** Delivers software applications, often related to extremely specific use-cases, and often on a subscription basis.

3. **Platform as a Service (PaaS):** Provides both hardware and software tools, typically make the hosting of application development and/or testing more convenient and simpler.

All three categories of cloud computing services, and their examples will be discussed in future sections of the book. The short descriptions above were written for the express purpose of making it clear to the reader that cloud computing and all of its constituent services amount to nothing more than renting agreements for hardware and/or software resources.

Cloud computing is therefore nothing complicated to understand, it is not quantum physics, it is not advanced mathematics and it is not rocket science, it is just **rent**. A fundamental practice that humanity has been performing for thousands upon thousands of years.