

## Introduction

Cloud computing — ubiquitous access to digital resources over a network — has been revolutionizing business since its mainstream debut in the late 1990s.

Providers satisfy a range of needs, allowing companies to apply cloud technology to their industry. The cloud can handle immense storage requirements, be accessed and controlled remotely, and sustain security. However, despite the popular awareness of the “the cloud,” it’s important to understand cloud service differentiations. The following white paper will discuss the three types of cloud products, their relative merits or drawbacks and the incredible potential of cloud-driven data harnessing.

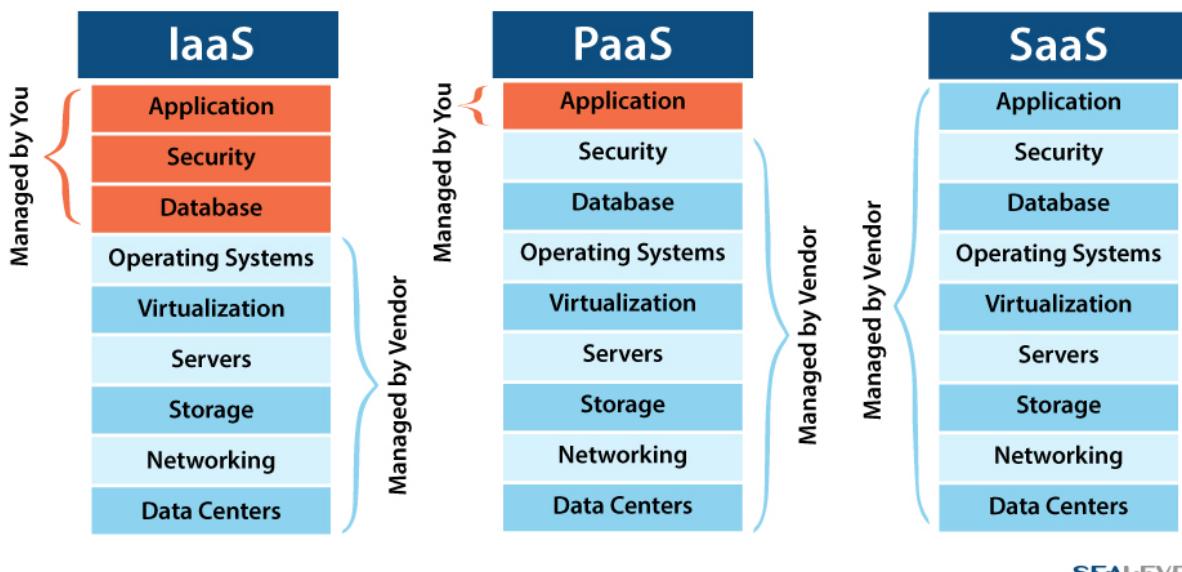
### History of Cloud Computing

As with many discoveries, cloud computing owes its inception to an academic-military partnership — in this case, MIT and the Defense Advanced Research Projects Agency (DARPA). The request for “two or more people to use and access a computer simultaneously” in 1963 eventually led to “virtualization”, a virtual computer machine complete with a functional operating system. This process was aided by the creation of ARPANET in the 1970s, which became known as “The Internet”.

Since its creation, cloud computing has barreled forward in development. In the 1990s, it moved beyond defense and academic applications. Businesses used it for software storage and downloading. In the early 2000s, tech giants began designing cloud services such as web-hosting and remote document storage. In the past 10 years, computing companies have diversified — increasing cloud service opportunities and introducing scalability — and started integrating with objects to create smart networks.

## Three Types of Cloud Computing: Explained

As previously mentioned, cloud computing is a form of virtualization. It mimics the properties of a physical computing machine without actually using a computer body. Those operational qualities include data storage and processing. A cloud has a “digital body,” remotely created by servers that communicate and function through networks, producing digital space. Companies like Amazon and Google maintain huge server sites, from which they create and sell space. There are three models of cloud computing services that tech companies may offer. These three types are called “Infrastructure as a Service” (IaaS), “Platform as a Service” (PaaS) and “Software as a Service” (SaaS).



### Infrastructure as a Service

The most basic service provision, IaaS is the foundation on which one builds a platform or software. Generally, other tech companies want this option because they need computing power but didn't want hardware maintenance or implementation. IaaS allows a company to access resources on consumption-based payment — much like a monthly utility bill. The hosting company maintains everything except the applications, security and database.

In terms of security, IaaS offers the greatest potential for personalized, maximum protection. However, it takes the greatest effort to secure because owners, as opposed to server hosts, are liable for the data's safety or breaches.

### Platform as a Service

PaaS has an infrastructure that can be customized with applications made with coding languages like Python or Ruby on Rails. Everything else, including security and databases, is managed by the provider. Generally, PaaS products carry applications designed and engineered by the user for the user. For example, businesses with an insufficient pre-existing cloud service may develop a PaaS to interface with extra programs. PaaS makes up the smallest portion of the cloud market, but it is a growing industry.

Unlike IaaS, the server host is liable and responsible for security. However, the range of protection is wide. It is up to the consumer to communicate what kind of security is needed. These platforms tend to have small user pools, which makes them less susceptible.

### Software as a Service

The largest cloud market, SaaS delivers "turn-key" clouds, complete with applications and software. Users have unique logins but share the service with other clients. All technical and infrastructure issues are managed by the developer or host. Examples of this type of cloud computing include iCloud, Google Drive, Netflix and SalesForce. New products include remote monitoring, like the Sealevel SeaCloud SaaS. These innovative projects are tied in with IoT and IIoT technology, employing relay commands and smart home networks.

The most attractive cloud computing model for most individuals and non-technical projects, SaaS offers a hands-off, low-maintenance subscription. However, with these programs' popularity, they can be vulnerable to security breaches. A properly secured SaaS maintains few access points, end-to-end encryption and authorization for access as baseline measures to ensure protection. However, it remains up to the user to confirm how data is stored and protected. If there is a breach, terms of service will lay out the user's path of recourse.

## Cloud Computing in Action

Cloud computing has been called a revolution for a myriad of reasons: it created a multi-billion dollar information technology market; it has been leveraged across political and socio-economic spectrums; and it continues to grow and advance.

The industry has moved beyond just data storage and hosting. Cloud computing has played a key role in the Internet of Things (IoT) and expansion to the Industrial Internet of Things (IIoT). Entire companies have configured multiple factories for improved asset management: the cloud enables reliability data collection, ensures equipment effectiveness, and delivers predictive usage statistics while automating and monitoring machines. Individual homes can be secured and made more efficient via applications available on their phones, thanks to the cloud.

Cloud computing and smart networks have been especially useful in agro-innovation and the oil and gas industry. Farmers have leveraged sensor technology and remote monitoring, combined with relay commands, to increase crop yield and decrease waste. Energy efficiency can be accomplished through data harnessing in real time with the cloud. Consumers can increase their personal awareness of their energy footprint by seeing tailored and delivered reports through energy-saving focused SaaS applications.

## Conclusion

The accessibility and scalability of the cloud makes it a linchpin of innovation. It holds immense potential for operational efficiency and improved ease of life, whether business or personal. Tech companies offer a range of cloud computing services at three levels: Infrastructure as a Service, Platform as a Service, and Software as a Service. They cater to a wide range of needs and have progressive levels of security available. In conjunction with other technology, such as sensors, these services can optimize an operation.