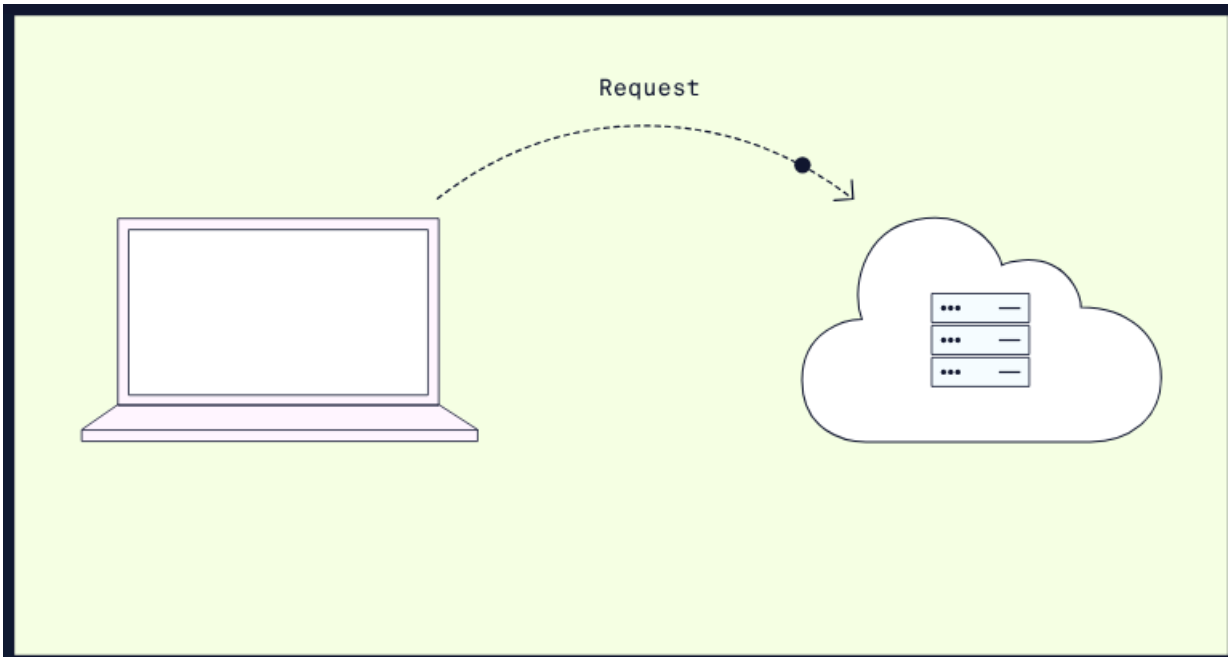
Introduction To Cloud Computing

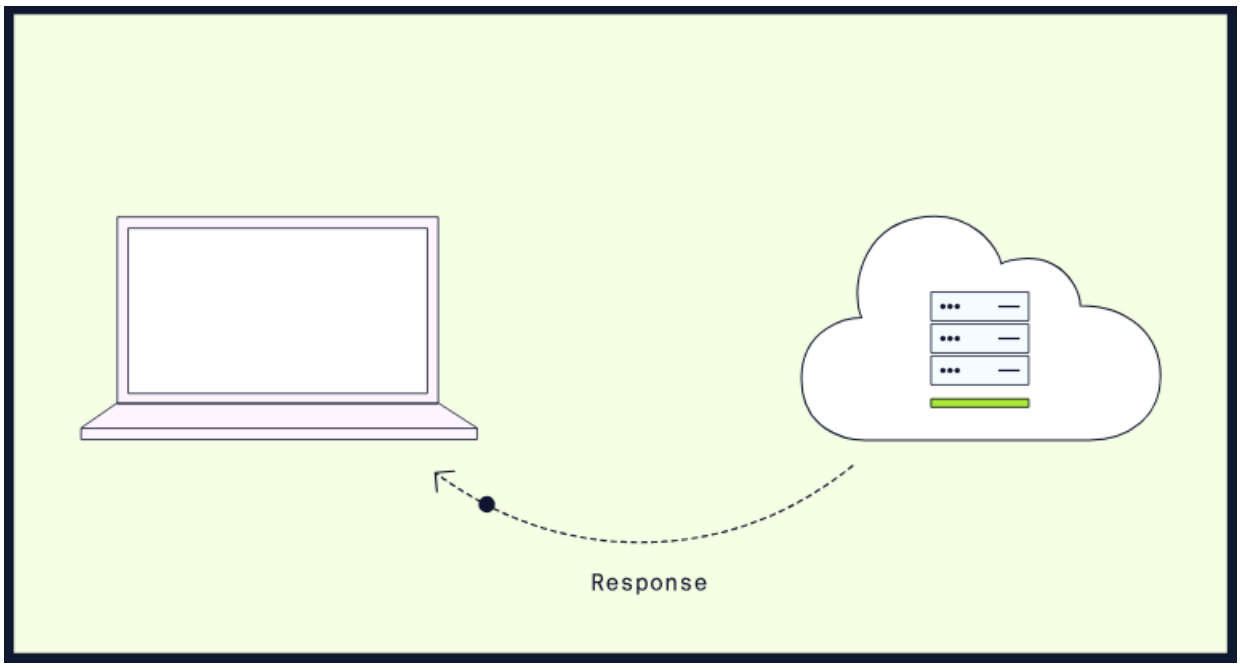
Explore key concepts of cloud computing

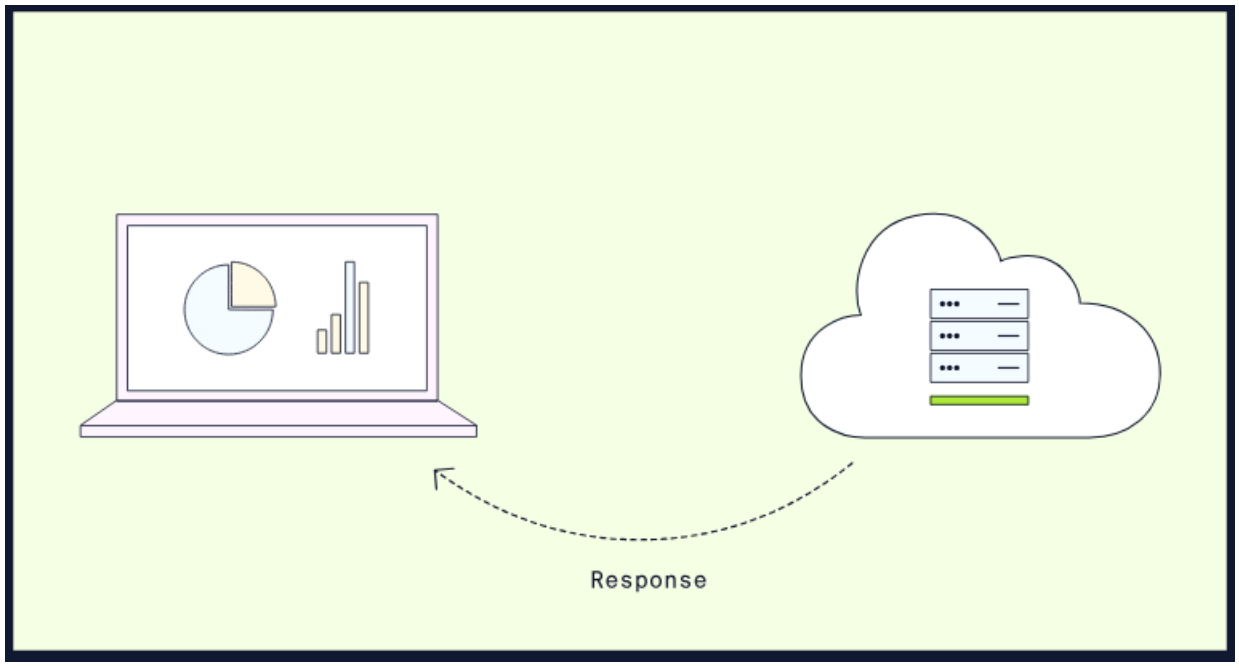
A request goes out from Sheila's laptop into the internet. The request reaches a data warehouse in a remote area of Europe. Inside, thousands of computer servers sit in racks, processing millions of similar incoming requests. Shelia's request goes to one of these servers. The server retrieves the necessary data.

The data is sent to a processing server somewhere else in the building. A response comes back to her. A visualization of Shelia's company's performance last quarter renders on her computer. All of the storage and the processing happened somewhere far away, but Sheila received the results on her device.

This is cloud computing, and it is everywhere.







In this article, we will introduce some of the major concepts of cloud computing:

- What is cloud computing?
- Where did cloud computing come from?
- What can we do with cloud computing?
- Why use cloud computing?
- What are the risks?

Let's get started with an overview of what this cloud computing thing is.

What Is Cloud Computing?

Cloud computing can be a definition that is hard to pin down. For this course, we will define *cloud computing* as delivering computing services over the internet by a cloud provider. These services range from databases to networking to data storage.

YouTube is an example of a cloud computing-based product. Our phone or laptop cannot store every video that we can watch on YouTube in its memory. But YouTube has the resources to store all those videos for us. Our devices request the cloud storage services of YouTube, which streams its data back to our device.

The cloud is not one computer in any particular location. Any set of servers dedicated to providing services to other computers is its own cloud. When we say "the cloud," we refer to many different clouds owned by many different companies. Companies like Google, Amazon, and Microsoft provide large *public clouds* accessible to anyone. Thousands of small businesses also host small *private clouds* accessible only to their employees.

Now we know what a cloud is, but how did the clouds get there?

Where Did Cloud Computing Come from?

In the early 2000s, large websites needed the ability to handle billions of requests per day. Handling this kind of traffic required the creation of data centers. *Data centers* are buildings that are made specifically to house computer systems. A data center is often capable of supporting thousands of servers within one building. These data centers allowed for the creation of the first cloud-based products. These products included Amazon shopping, Google's search engine, and Gmail.

Amazon engineers proposed that separating infrastructure from architecture would achieve more flexibility. Having applications able to load in and out of different servers would allow for more scaling and redundancy. The engineers also believed that offering this separation would be attractive to external companies as well. This idea was the beginning of Amazon Web Services (AWS).

Today, cloud computing has become a market worth hundreds of billions of dollars. Let's take a brief look at some of the ways that companies use cloud computing.

What Is Cloud Computing Used for?

More and more companies are moving aspects of their business into the cloud. Let's take a look at some of the critical areas where this is happening.

Storage

Today's businesses collect a lot of data, which needs a massive amount of disk space. The days in which a company could hold all its data in file cabinets are long gone. The

cloud offers storage capacity far beyond what most companies can create. The scale of the data centers allows for cheap backups and storage of vast amounts of data.

Analytics
The raw data that a business collects can be a jumbled mess to read directly. The data often needs to be processed to make any sense to a person.

Companies can use cloud provider data centers to process large amounts of data.

Infrastructure
The massive data centers of cloud providers contain enough servers to support millions of businesses. Owning the servers necessary to host applications needs a lot of time, money, and work for a business. Businesses are now often turning this responsibility over to cloud providers. Cloud providers have so much computing power available that they can provide infrastructure at a fraction of the cost of a business hosting their servers.

Now we know what these companies are doing on the cloud, but why they are moving there?

Free response

You hear about a new company called Porage launching a new public cloud storage service. Describe what this business might be offering.

Your response

This business may be offering its potential costumers, the capabillity of storage the data and information of their companies.

Our answer

As a storage service, Porage is going to allow customers to store their data. Because it's a public cloud, this service will be available to anyone over the internet. Porage is likely to resemble services offered by Dropbox, OneDrive, and Google Drive.

Why This Answer?

The prompt says Porage is "launching a new public cloud storage service." A public cloud makes its services available to anyone on the internet. A storage service would allow customers to store data within the data centers of Porage. This idea resembles the business model of Dropbox, OneDrive, and Google Drive.

Why Use Cloud Computing?

Owning our infrastructure requires us to purchase, configure, and maintain the servers that run our services. Managing infrastructure requires a lot of work and expense. More companies than ever need servers and infrastructure. New customers can flood a company's product, creating a need for massive amounts of infrastructure. When these customers leave, the company can be left with much more infrastructure than needed. Cloud computing solves many of these issues.

Cloud computing slashes the time, cost, and effort required to maintain computing services. Cloud providers offer computing power at prices far below what it would cost to keep our servers. We can configure servers in milliseconds. The number of servers can scale with the needs of the business almost instantly.

Cloud providers have data centers and host locations all over the world. Using a cloud provider allows a company to provide high-speed connections to customers in diverse geographical locations.

Cloud computing allows us to have a highly available and fault-tolerant infrastructure. A *highly available* infrastructure aims to be usable by customers as close to 100% of the time as possible. Cloud providers grant companies the ability to reproduce infrastructure in multiple data centers cheaply. This redundancy makes our systems more *fault-tolerant*, meaning that issues can occur, and our systems will keep going. By duplicating infrastructure across data centers, if one fails, another takes its place.

Cloud computing provides many benefits to a company, but it's not perfect.

What Are the Risks of Using Cloud Computing?

Owning our infrastructure provides complete control over it. Our data stays within our business. We can approve each expense of maintaining the data centers. When a part of the infrastructure breaks, we can send a team member to fix it.

Using cloud computing, we lose much of that control. Our data becomes stored on the cloud provider's servers. The cloud provider determines the cost we pay. We are trusting the provider to be reliable and not have data center outages. We also have to learn the provider's way of working with their infrastructure because we no longer have direct access. The training to learn to manipulate cloud services can take time and money.

Because numerous companies store their data within a few cloud providers, the providers have access to massive amounts of data. Companies should take care to preserve the privacy of sensitive customer data. Cloud providers having access to all of this data could set up the industry for enormous data breaches at scales never seen before.

Free response

It's been ten years since their last hardware upgrades, and Zenith Inc's servers are starting to slow down. The company needs to replace them. The executives are debating whether to move to the cloud or purchase a new set of server racks. You must summarize the critical points for and against cloud adoption. What might you present to the executives?

Your response

Cloud Adoption Advantages:

. The company will save the money destined for purchasing the servers and the server racks that are very expensive.

. The company will have support of well known companies such as Google, Amazon, or Microsoft.

. The company will save the physical space destined to allocate the data center infrastructure.

Cloud Adoption Disadvantages:

. The data of the company will be stored in external servers.

. The company will lose total control over the information.

Our answer

These servers need to be replaced by something. Today's question is whether we want to replace the servers with our infrastructure or move to the cloud.

If we purchase new server racks, we are responsible for all of the parts, we need to configure them, and we are locking into the use of the server room for the foreseeable future. However, our staff is familiar with the in-house infrastructure and probably won't need much additional training.

Moving to the cloud will likely cost much less than purchasing and continuing to maintain our infrastructure. It becomes the cloud provider's responsibility to upgrade the hardware over time, so we won't have to worry about this problem anymore. The data centers will be much more reliable than our server room, so we will probably have fewer outages.

However, the cloud is a new way of working. Our staff may need to train on using the cloud properly, and we may need to bring some new people in. Furthermore, I don't know how comfortable our company is with storing our data within another company.

I recommend considering these factors before coming to a decision.

Why This Answer?

This answer considers the company's situation and presents the consequences of moving to the cloud as well.

Review

In this article, we described a high-level overview of cloud computing, introducing its uses, benefits, and consequences. Cloud computing is the delivery of computing services over a network. The cloud allows companies to gain access to the storage and computing infrastructure of tech giants. We can give responsibility for our infrastructure to someone else. Yet, using the cloud comes with a reduction in the amount of control we have.