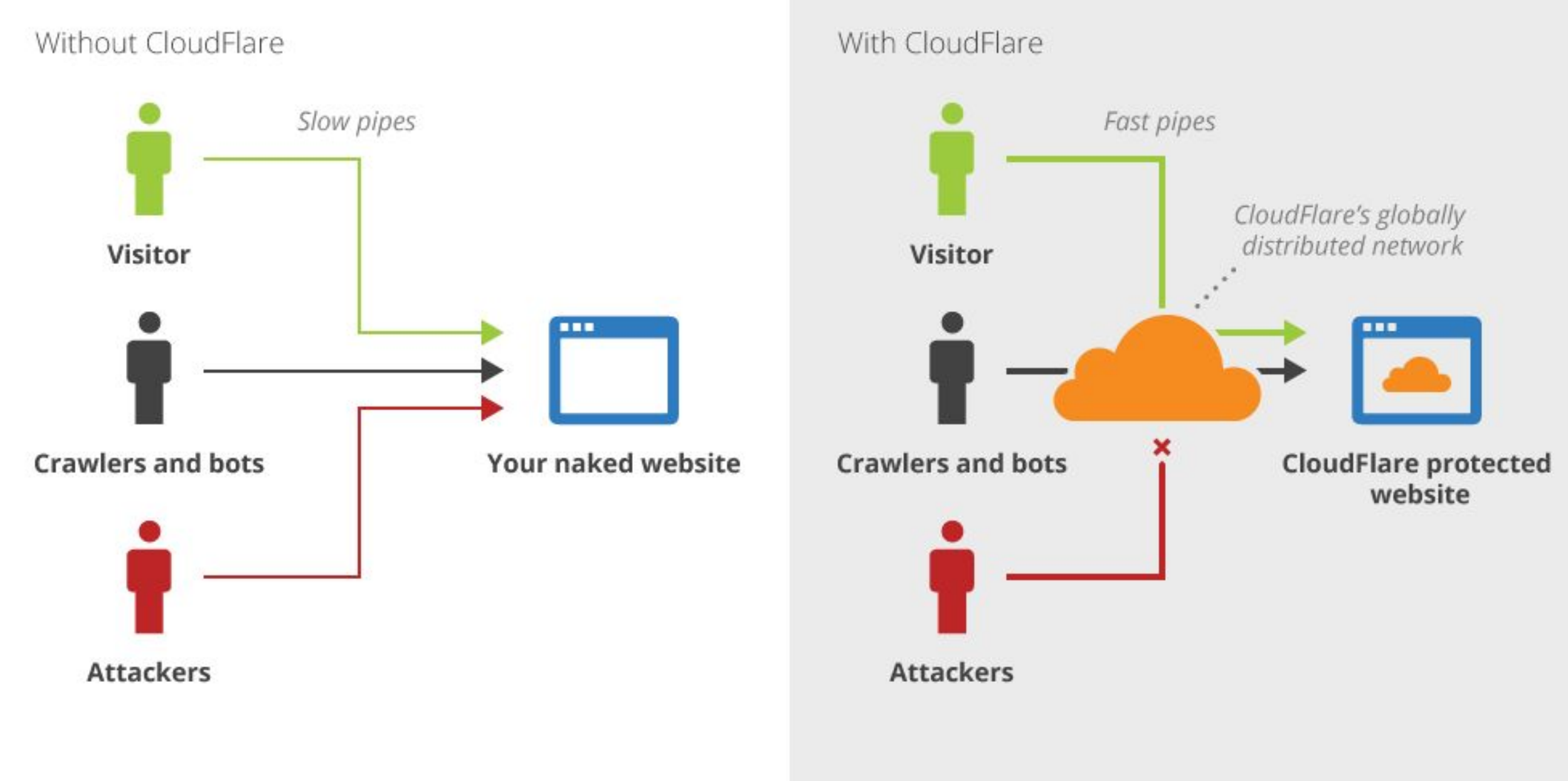


## Abstract

In this presentation we provide an introduction to cloud computing, an economically important way of abstracting computing resources from an economic technical and mathematical perspective. In some ways, cloud computing is simply a logical extension of the much older concept of time-sharing which had become a popular model by the 1960s. Cloud computing also refers to various Platform and Software as a Service (PaaS and SaaS respectively) offerings such as Amazon Web Services (AWS) Simple Storage Service (S3) and database offerings from various vendors. The simplest form of cloud computing, infrastructure as a Service (IaaS), is the short-term rental of servers located in a central data center. Traditionally companies would each own their own computers. This was inefficient due to, among other things, the bursty nature of computing needs. This sum-of-distributions efficiency is particularly interesting mathematically. This presentation covers multiple eras of cloud computing including both its history and current trends.



<https://servebolt.com/help/feature/cloudflare-support/>

## Description of Problem

When it comes to cloud computing certain security issues are possible to arise. If there aren't enough resources allocated to the business, the performance might lag behind when compared to a centralized server (1). When there is a loss of data, the third party company is in charge of the clients information recovery, competence may vary (2). The organization creates encrypted copies of the files and is likely to send them or an offsite backup destination (3). Privacy is a potential issue as well, the user data could be accessed by the host company with or without permission. (6)

Although there would be less maintenance cost when upgrading necessary resources, maintaining cloud quick and stable connections to hundreds of computers rack up bandwidth costs the most. The actualization of cloud computing is still being adapted and developed such that there is a lack of skilled experts within the market. Given the demand from organizations that want to organize their workplace around Cloud Computing resources, providers are struggling to keep up with demands.

Even though Cloud Computing has faults, it's still being used by most major corporations like Google, Ebay, Netflix (8), Apple (4), General Electric (5) etc. The price they pay for the Cloud Computing services is dependent on how many resources they need. This is an issue because given the complexity of companies data usage, it is difficult to estimate the proper budget they might need for the service (1).

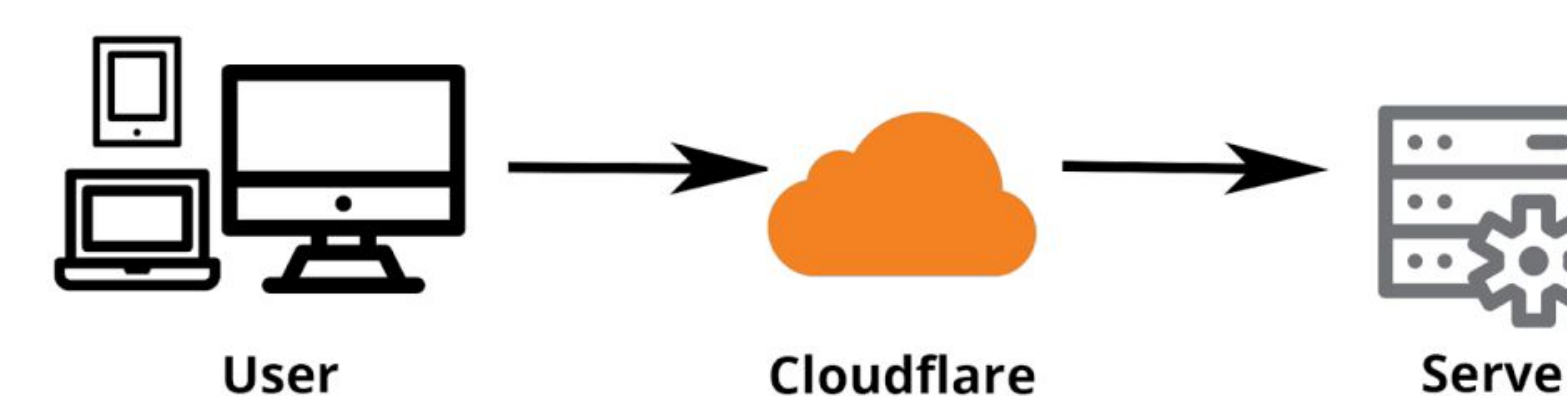
## History

Time-sharing systems significantly predate cloud computing. In fact they were described as far back as the 1950s (14). While time-sharing is not the same thing as cloud computing, the two are intellectual related.

Cloud computing has become increasingly important to national infrastructure, where "cloud providers run a significant amount of mission-critical business software for companies that no longer operate their own data-centers." In fact, cloud service providers have become "important for national economies like banks, financial institutions, electricity suppliers, public transport systems" (12).

Cloud computing is divided into three well-accepted service categories: (10) (12)

1. Infrastructure as a Service (IaaS)
  - a. Computer resources that can be accessed through a public connection
  - b. Provides maximum flexibility for arbitrary consumer-created software but hides almost no operation complexity of the application (just of the infrastructure).
2. Platform as a Service (PaaS)
  - a. Users can access a cloud environment to develop applications through the internet
  - b. Allows consumer-created software to be accessed but the cost of the resource efficient application architectures might cause some degree of lock-in situations resulting from the platform.
3. Software as a Service (SaaS)
  - a. Customers are provided with applications hosted on a cloud service, without requiring a server for the application.
  - b. Hides operation complexity almost entirely but is too limited in many use cases that involve consumer-created software.



(<https://laptrinhx.com/how-cloudflare-can-amp-up-your-seo-efforts-114607680/>)

## Solutions and Examples

Thankfully, there are also benefits to having a Cloud Computing service in place. There isn't a need to put money into upgrading infrastructure for localized servers, or investing unnecessarily into upgrading/getting rid of hardware later down the line. Another benefit is the ability to access the company's files from anywhere which makes remote work more efficient (7).

### Ex. 1

The process of learning higher mathematics and engineering is arduous, for this reason creating an optimized scheduling system with the use of Cloud Computing was important. The model used in "Higher mathematics teaching resource scheduling system based on cloud computing" by Tiejun Chen takes higher mathematics teaching resources globally and fuses it with an allocation and resource scheduling model to create an optimized higher mathematics scheduling model. Basing this method on Cloud Computing balanced the scheduling and distribution of higher mathematics teaching resources. It also provided an adequate teaching system with high processing efficiency (13).

### Ex. 2

With the emergence of Cloud computing, certain companies like CloudFlare developed to secure internet privacy. Cloudflare's design model allows industries to build their applications directly in their network securely. Its application service helps accelerate personal apps, APIs, and websites. Its security was proven in February of 2014 when it reduced the impact of the largest recorded DDoS attack. Most recently, it promises to enable an affordable Domain Name System Security Extension.

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