How CDNs Work

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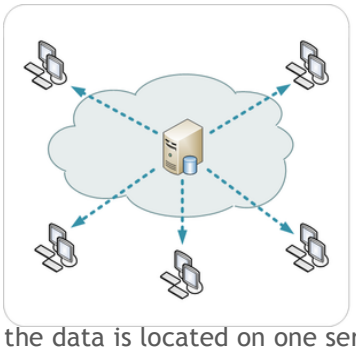
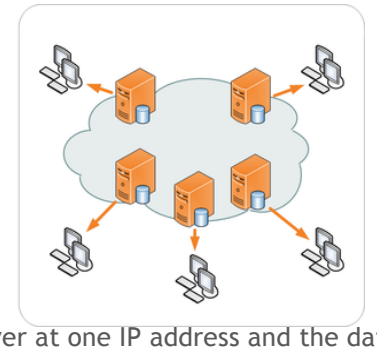
Content | Delivery | Network

An Overview of Content Delivery Networks (CDNs)

Content Delivery Networks or CDNs have become a very crucial component of loading a wide array of content on the modern Internet. A CDN is a collection of cloud servers hosted by a company that is located in different areas around the world. These servers have access to data such as images, videos, and even libraries of code that help run the Internet. Most large technology companies choose to host their content on CDNs as they provide a number of useful benefits for serving data. Companies such as Facebook host user images on these CDNs so that they have a variety of servers that are hosting their content in case one of their local servers goes down. It also provides Facebook users with quicker content delivery. This is because CDNs are located in various geographical locations across the globe to ensure faster delivery of content and safe transfer of user data.

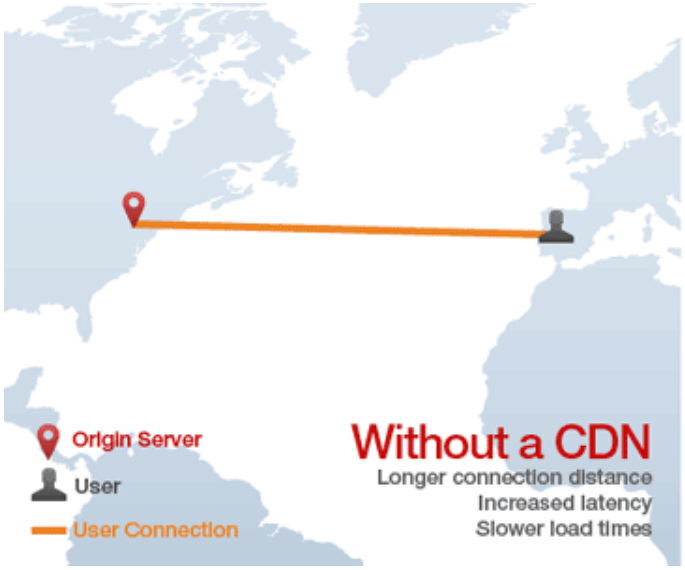


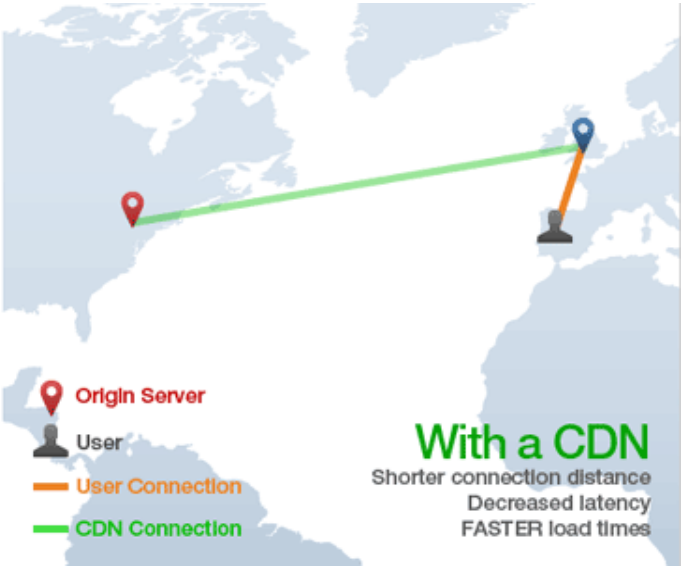


This graphic compares a normal network to a CDN network. The far-left image a non-CDN network. In this case, the data is located on one server at one IP address and the data is retrieved from this one location by all machines. The image on the right describes a CDN, where the desired data is on multiple servers that will send data to the requesting computers based on location.

Dangers of CDNs

Since serving content with CDNs is equivalent to hosting your data in a cloud, you no longer have direct control over the information, code, and data that the CDN's servers are using. This can be problematic when serving content to countries that block certain CDN providers such as China or North Korea. This can also be problematic when a CDN's servers are compromised, similar to the 2016 Dyn hack that brought down major ISP and CDN Hubs across the Eastern United States.





Geographic Perspective

Another way to explain CDNs is to look at it specifically from a geographical perspective. In order to understand how the networks in CDNs work, one must have a basic understanding of how the Internet itself works. The Internet is, in short, a series of wires that are connected across the globe. These wires span across cities, across lakes, and oceans. If one of these wires is damaged or cut, portions of the Internet that were connected near that area would experience either Internet outages or significant slow-downs when attempting to connect to websites. They user's computer must then find another path through this global network of wires to make connections from the machine to the servers that serve requested content.

CDNs have been created to try and combat problems like this. Their approach is to store local copies of a website's content at different Hubs throughout the in different countries and regions throughout the world. If part of the cable that connects the United States and Europe were damaged, for example, slowdowns would be expected all across Europe when users attempted to load a webpage being served by a US server in New York. If Europe had a CDN Hub in the UK, however, this would prevent this problem, as the UK Hub would have an identical copy of the content that is located in New York and therefore, the content can be served to users across Europe without depending on the cable connecting the United States to Europe.

Even if the Internet cable that connects the United States and Europe was not severed, there are still advantages to using a CDN versus only storing data on one server. Since data can be transferred at constant speeds (theoretically at the speed of light) it follows that the closer a user is to where the data is being served, the faster a user will receive the information.

This holds true in many cases such as people in the Eastern United States accessing content on East Coast servers rather than West Coast servers or the above image, which reflects a user in Spain who has a much shorter connection distance if they are trying retrieve content from a UK server as compared to a server in the United States.

In reality, a CDN is not a magical device that allows for faster load times, rather, a networking tool that

Summary & Further Reading

provides backup plans if network lines are cut and allows users to get content from servers geographically close to them. CDNs are an impressive step in making the Internet's infrastructure a more distributed network.

If you care to learn more about CDNs or would like to set one up yourself to host content, please check out the JSDelivr CDN project (http://www.jsdelivr.com). JSDelivr is an excellent CDN with over 1000 projects and libraries that can help fit your website or product's needs. JSDelivr is also approved by the Chinese government and will work in China. Follow the guide and the CDN will be serving your content in no time!