

Module 2: Exploring the BitTorrent Application Layer Protocol

Describe the process of file sharing in the BitTorrent protocol. How does it differ from downloading files via HTTP?

When using HTTP, files are obtained from a single server directly, and the server handles getting the file to the user. BitTorrent uses a system known as peer-to-peer which allows the file being distributed to be shared between multiple servers. These servers will download and upload different parts of the file to other servers in this network. The reason this is done is to improve download speeds. By having parts of a file downloaded from multiple servers, they can all be downloaded at the same time.

What is a BitTorrent 'swarm'? How does this concept contribute to BitTorrent's efficiency compared to traditional HTTP file transfers?

A BitTorrent swarm is where the group of servers in the peer-to-peer network all share a torrent. As I stated in the previous question, this allows multiple servers to download and upload parts of the file, increasing overall download speed. The user is able to download parts of the file from multiple servers at the same time. HTTP file transfers use a single server, making the time it takes to download longer than a BitTorrent swarm.

How does BitTorrent manage to reduce the load on the source server, and how does this compare with HTTP?

By giving multiple servers the ability to download and upload parts of the file, the source server is able to reduce the amount of load it is bearing. In HTTP, the server handles all of the load in regards to distributing the file to the user. BitTorrent is able to circumvent this issue by decentralizing the network and doing a BitTorrent swarm to distribute the file. The source server has roles other than getting the entire file to the user, unlike in HTTP.

Compare BitTorrent with the distributed nature of DNS. How are they similar? How are they different?

BitTorrent and DNS are similar in that they both rely on distributing files among a network of servers. BitTorrent has multiple servers to get parts of a file and DNS has multiple servers to get IP addresses. Both systems are also able to scale very well, as having multiple servers allows them to tackle increased server load. By giving multiple servers work to do, it reduces the overall strain on both systems overall. In terms of differences, BitTorrent is a file sharing system whereas DNS gets domain names and finds their IP addresses. BitTorrent and DNS also differ in that BitTorrent servers download and upload files whereas DNS servers just send a request to a

server and receive an IP address in response. The actual operation they perform is different overall.

Consider the security aspects of HTTP, DNS, and BitTorrent. How do these protocols handle data privacy and security?

HTTP doesn't encrypt their data which means the data can be accessed and modified by people who shouldn't have access to the data. Because of this, HTTP has a system known as HTTPS or HTTP Secure which actually encrypts the data it is accessing. For DNS, the server can be affected by DDoS attacks to access the DNS requests and responses. To prevent this, DNS has a system called DNSSEC to allow for verification of the DNS responses. This also prevents the DNS data from being messed with. BitTorrent has a unique system of downloading and uploading from servers directly. Because of this, there is a chance you could download viruses or bad files. To combat this issue, you have to verify the source you are downloading from manually, as BitTorrent will not be able to tell you if a source is malicious. You can use a VPN with BitTorrent to prevent servers from seeing your IP addresses, however there is still a chance the data you download could be bad if the source is not verified.