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DEPARTMENT OF COMPUTER SCIENCE

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CSC 402 ASSIGNMENT 2

1. FTP stands for File Transfer Protocol. A protocol is a system of rules that networked computers use to communicate with one another. FTP is a client-server protocol that may be used to transfer files between computers on the internet. The client asks for the files and the server provides them.

You can work with FTP using a simple command-line interface, such as the DOS console in Windows and Terminal in Linux and macOS. If you don’t want to use those, though, there are graphical user interface solutions, such as [Filezilla](https://filezilla-project.org/download.php?type=client) or [WS FTP Pro](https://www.ipswitch.com/ftp-client). Browsers also allow you to download files via FTP (check out our recommendations for the [most secure browsers](https://www.cloudwards.net/most-secure-web-browser/)).

You can exchange any kind of file, including music, videos and documents. If it’s a single file, you might even [get it faster](https://daniel.haxx.se/docs/ftp-vs-http.html) than you would with HTTP, unless the server is far away. If tuned properly, FTP [may be better](https://www.isi.edu/lsam/publications/http-perf/) for large files, too (read our guide on [sharing large files](https://www.cloudwards.net/send-large-files/) if it doesn’t work, though).

You can also create directories, remove them and list files with FTP, but you may need to authenticate with a username and password first. Anonymous FTP servers don’t require keys and are usually used for open source software that is freely distributed.

To access public servers, navigate to the directory called “pub,” which usually holds files, then download what you want via FTP. Here’s [one](ftp://ftp.belnet.be/) with some Linux distributions on it operated by Belnet, a Belgian education and research network.

Many transfers are handled by HTTP, but FTP is still commonly used to transfer files behind the scenes for applications, such as banking, and website builders, such as Wix (read our [Wix review](https://www.cloudwards.net/wix-review/)).

FTP is far older than HTTP. It even preceded the TCP/IP protocol, the standard network protocol that powers the internet, so you could use it to transfer files between computers long before the internet was in its initial stages of development.

1. SMTP is part of the application layer of the TCP/IP protocol. Using a process called "store and forward," SMTP moves your email on and across networks. It works closely with something called the Mail Transfer Agent (MTA) to send your communication to the right computer and email inbox.

SMTP spells out and directs how your email moves from your computer's MTA to an MTA on another computer, and even several computers. Using that "store and forward" feature mentioned before, the message can move in steps from your computer to its destination. At each step, Simple Mail Transfer Protocol is doing its job. Lucky for us, this all takes place behind the scenes, and we don't need to understand or operate SMTP.

SMTP provides a set of codes that simplify the communication of email messages between email servers (the network computer that handles email coming to you and going out). It's a kind of shorthand that allows a server to break up different parts of a message into categories the other server can understand. When you send a message out, it's turned into strings of text that are separated by the code words (or numbers) that identify the purpose of each section.

SMTP provides those codes, and email server software is designed to understand what they mean. As each message travels towards its destination, it sometimes passes through a number of computers as well as their individual MTAs. As it does, it's briefly stored before it moves on to the next computer in the path. Think of it as a letter going through different hands as it winds its way to the right mailbox.

SMTP is able to transfer only text—it isn't able to handle fonts, graphics, attachments, etc.—maybe that's why it's called simple. Fortunately, Multipurpose Internet Mail Extensions were created to lend a hand. MIME encodes all the non-text content into plain text. In that transformed format, SMTP is coaxed into transferring the data.

1. The Internet Protocol (IP) is a protocol, or set of rules, for routing and addressing packets of data so that they can travel across networks and arrive at the correct destination. Data traversing the Internet is divided into smaller pieces, called packets. IP information is attached to each packet, and this information helps routers to send packets to the right place. Every device or [domain](https://www.cloudflare.com/learning/dns/glossary/what-is-a-domain-name/) that connects to the Internet is assigned an [IP address](https://www.cloudflare.com/learning/dns/glossary/what-is-my-ip-address/), and as packets are directed to the IP address attached to them, data arrives where it is needed.

Once the packets arrive at their destination, they are handled differently depending on which transport protocol is used in combination with IP. The most common transport protocols are TCP and UDP.

1. UDP is a communication protocol used across the Internet for especially time-sensitive transmissions such as video playback or [DNS](https://www.cloudflare.com/learning/dns/what-is-dns/) lookups. It speeds up communications by not requiring what’s known as a “handshake”, allowing data to be transferred before the receiving party agrees to the communication. This allows the protocol to operate very quickly, and also creates an opening for exploitation.

UDP is commonly used in time-sensitive communications where occasionally dropping packets is better than waiting. Voice and video traffic are sent using this protocol because they are both time-sensitive and designed to handle some level of loss. For example VOIP (voice over IP), which is used by many internet-based telephone services, operates over UDP. This is because a staticy phone conversation is preferable to one that is crystal clear but heavily delayed. This also makes UDP the ideal protocol for online gaming. Similarly, because DNS and NTP servers both need to be fast and efficient, they operate though UDP. Volumetric [DDoS attacks](https://www.cloudflare.com/learning/ddos/what-is-a-ddos-attack/) including [DNS amplification](https://www.cloudflare.com/learning/ddos/dns-amplification-ddos-attack/) and [NTP amplification](https://www.cloudflare.com/learning/ddos/ntp-amplification-ddos-attack/) make use of vulnerable instances of these servers with the aim of flooding a target with UDP traffic.