

How does the web work?

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10:57 PM

How does the internet work?

Internet is a way to connect computers all together and ensure that, whatever happens, they find each other.

A router is a computer that knows how to forward messages between networks.

A modem exists to connect our network to the telephone infrastructure.

- This modem turns the information from our network into information manageable by the telephone infrastructure.

Internet Service Provider (ISP): manages special routers that are all linked together (Bell, Rogers, etc.)

- ISPs can access other ISPs' routers

IP Address: the "name" of any computer linked to a network (ex 142.250.190.78)

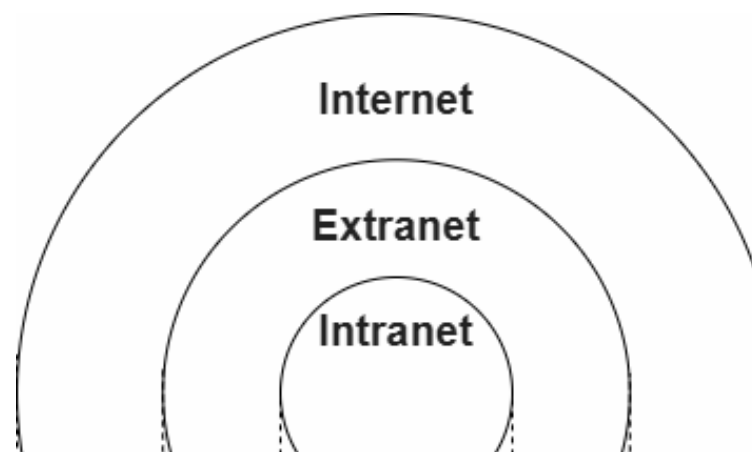
- Domain name is layered on top of the IP address

Internet \neq Web

- The Internet is an infrastructure, whereas the Web is a service built on top of the infrastructure.

Intranets are private networks that are restricted to members of a particular organization. They allow members to securely access shared resources, collaborate and communicate. *Extranets* are very similar to intranets but allow access to a private network to allow sharing and collaboration with other organizations.

- Both intranets and extranets run on the same kind of infrastructure as the Internet and use the same protocols to connect authorized members from different physical locations.



find a way to stay connected

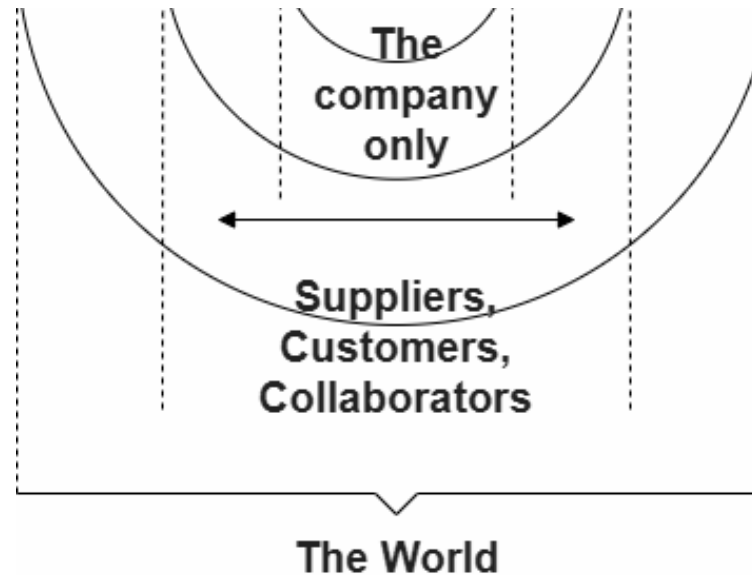
the telephone infrastructure

(e.g., etc)

structure

are commonly used to provide a portal for
similar to Intranets, except they open all or part of

use the same protocols. They can be accessed by



Internet is a wire!

Server: special computer connected directly to the internet

- Every server has a unique IP
- Web pages are stored on the servers' hard drives

Home computers are called clients, as they're connected indirectly to the internet (through an internet service provider).

When information is sent across the internet (image, video, etc), computers break the info down into small packets.

- When the packets reach the destination (through different routes), they are reassembled.
- Routers direct your packets around the internet
- Candy wrapper analogy

Web Jargon

Web page

A document that can be displayed in a web [browser](#). These are also often called just "pages" and are written in the [HTML](#) language (which we look at in more detail later on).

Types of resources in a web page:

- Style information — controlling a page's look-and-feel.
- Scripts — which add interactivity to the page.
- Media — images, sounds, and videos.

Note: PDFs are not formally considered web pages since it's not in HTML.



(ISP)

own into pieces called "packets".
d to reform the info

ges". Such documents are written in

web pages have a unique location (URL or Uniform Resource Locator)

Website

A collection of web pages grouped together into a single resource, with links connecting

All web pages on a site share the same domain name.

Web server

A computer that hosts one or more websites on the Internet.

"Hosting" means that all the *web pages* and their associated files are available on that co

- Ex. If you hear someone say, "My website is not responding", it actually means that the v
the *website* is not available (and the collection of websites hosted on that server).

Web service

A software that responds to requests over the Internet to perform a function or provide
server, and may provide web pages for users to interact with.

Search engine

A web service that helps you find other web pages, such as Google, Bing, Yahoo, or Duck

Search engine \neq browser \rightarrow A browser is a piece of software that retrieves and displays
people find web pages from other websites.

- Don't confuse the *software* (the *browser*) with the *service* (the *search engine*).

Process behind you accessing the web:

1. The web browser requests the resource (ex. a web page, some data, or an image or video
stored on.
 - a. Such requests (and the resulting responses) are made using a technology called [HT](#)
language of verbs (such as **GET**) to describe what should happen.
2. If the request is successful, the web server sends an HTTP response back to the web brow
3. In some cases, the requested resource will then fire off more HTTP requests, which will r
 - a. When a website is loaded, initially the main index HTML file of the site's home page
 - b. When that file is received by the browser, it will start to parse it, and will probably
discussed above, these might be for files to embed such as images, style informatio
4. When all of the resources have been requested, the web browser parses and renders the
user.

them together. Often called a "site".

computer.
web server is not responding and therefore

data. A web service is typically backed by a web

DuckGo.

web pages; a search engine is a website that helps

o) you want to access from the web server it is

[HTTP](#) (Hypertext Transfer Protocol), which uses a

server containing the requested resource.

result in more responses. For example:

is requested.

find instructions to make more requests. As

on, scripts, and so on.

em as required, before displaying the result to the

Resources: MDN, Stack Overflow

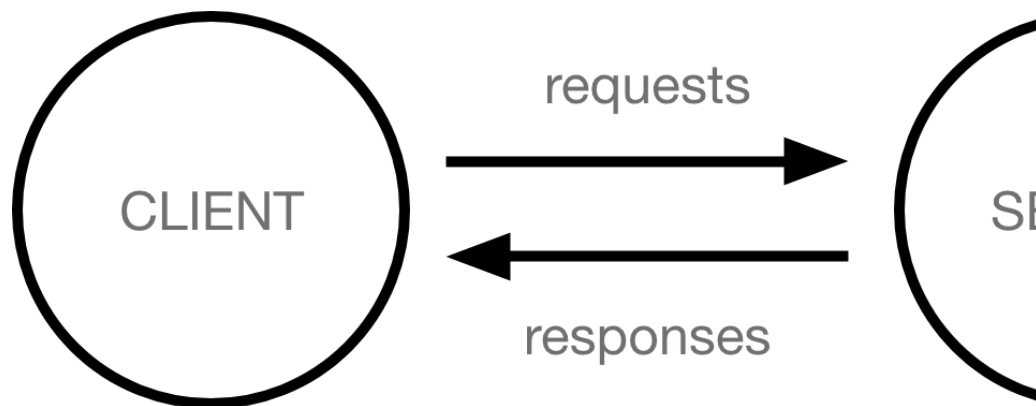
Most important program on computer: web browser

- Program on computer that allows you to visit websites, and displays them to you
- My current web browser: Chrome 134.

How the web works

Computers connected to the internet are called **clients** and **servers**.

- Client: typical web user's connected device
- Servers: computers that store webpages, sites, or apps. When a client wants to access a webpage, the browser sends a request to the server, which then downloads the webpage from the server onto the client machine to be rendered by the browser and displayed to the user.



Other parts of the toolbox -> for data to get back and forth, we need the following:

- **Your internet connection:** Allows you to send and receive data on the internet. It's basically the road to the shop.
- **TCP/IP: Transmission Control Protocol and Internet Protocol (TCP/IP)** are communication protocols that allow data to be sent across the internet.
- **DNS:** The **Domain Name System (DNS)** is like an address book for websites. When you type a website address into your browser, the browser looks at the DNS to find the website's IP address — the actual address the server is located at. The browser needs to find out which server the website lives on, so it can send HTTP messages to the server. It's like looking up the address of the shop before you visit it.
- **HTTP: Hypertext Transfer Protocol (HTTP)** is an application protocol that defines a language for the transfer of information over the internet. This is like the language you use to order your goods.
- **Files:** A website is made up of many different files, which are like the different goods you can buy. There are different types of files:
 - **Code:** Websites are built primarily from HTML, CSS, and JavaScript — the different languages used to create websites.

webpage, a copy of the webpage code is displayed to the user.



ally like the street between your house and the

n protocols that define how data should travel

pe a web address in your browser, the browser
ed at — before it can retrieve the website. The
es to the right place (see below). This is like looking

age for clients and servers to speak to each other.

buy from the shop. These files come in two main

programming languages websites are written in.

which the browser interprets and assembles into a web page to display to a user.

- **Assets:** This is a collective term for all the other items that appear on a website — s
PDFs — that aren't code that the browser interprets.

What happens? When you type a web address (which is technically part of a URL) into your bro

1. The browser goes to the DNS server and finds the real address of the server that the web
2. The browser sends an HTTP request message to the server, asking it to send a copy of the
(your goods). This message, and all other data sent between the client and the server, is s
3. If the server approves the client's request, the server sends the client a "200 OK" messag
website! Here it is", and then starts sending the website's files to the browser as a series
4. The browser assembles the small chunks into a complete web page and displays it to you

Domain Name System (DNS)**

This system uses special servers that match up a web address you type into your browser (like

- Kind of like a lookup table
- Real web addresses (URLs) aren't nice- they're IP addresses (numbers)

How does a DNS request work?

As we already saw, when you want to display a webpage in your browser it's easier to type a d
the process:

1. Type mozilla.org in your browser's location bar.
2. Your browser asks your computer if it already recognizes the IP address identified by this
the name is translated to the IP address and the browser negotiates contents with the w
3. If your computer does not know which IP is behind the mozilla.org name, it goes on to as
computer which IP address matches each registered domain name.
4. Now that the computer knows the requested IP address, your browser can negotiate con

Recall: cache is usually a record of information in memory that was most recently accessed by y

- **Local DNS cache** is a temporary storage system, maintained by an operating system or br
resolved domain names and their corresponding IP addresses, speeding up future lookup
- Similar structure to the standard L1 cache (ECE222)

TL;DR - Websites can be reached directly via their IP addresses. You can use a DNS lookup tool

such as images, music, video, Word documents, and

browser address bar, the following steps occur:
1. The website lives on (you look up the address of the shop).
2. The website is sent to the client (you go to the shop and order).
3. The data is sent across your internet connection using TCP/IP.
4. The data is received, which means "Of course you can look at that".
5. The data is sent in small chunks called [data packets](#).

For example, "mozilla.org") to the website's real (IP) address.

Domain name than an IP address. Let's take a look at

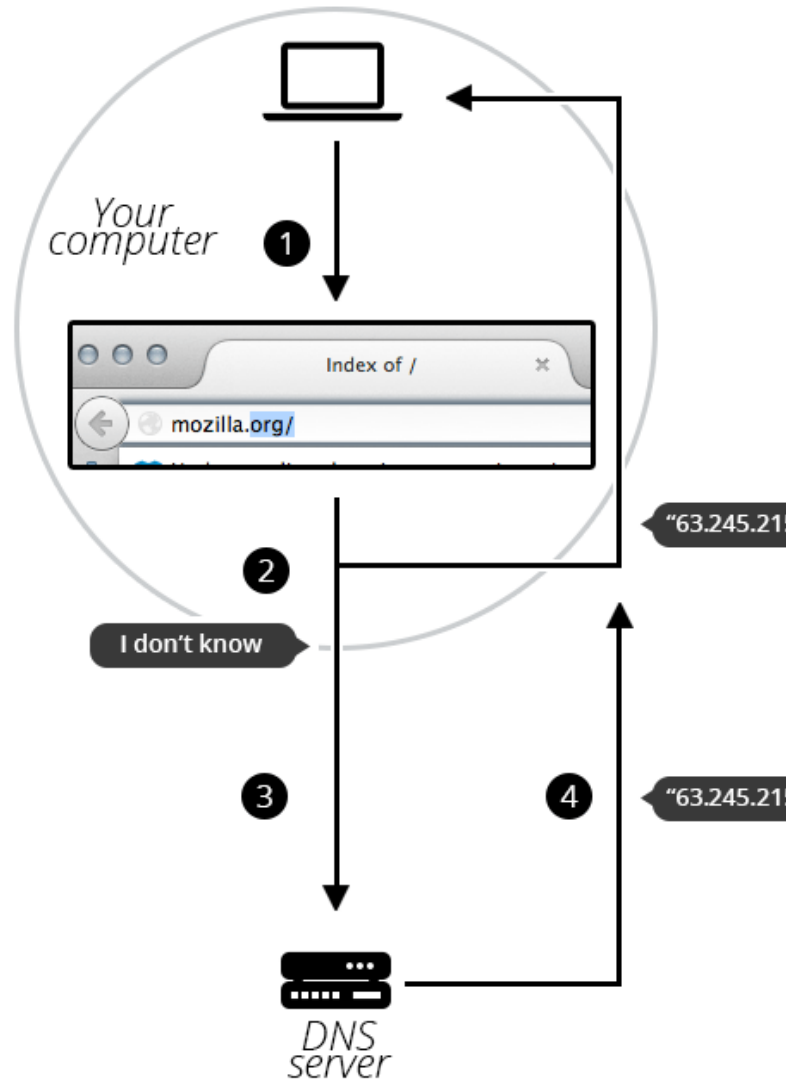
1. The domain name (using a local DNS cache). If it does,
2. The web server. End of story.

3. Ask a DNS server, whose job is precisely to tell your

4. The contents with the web server.

5. Your computer's
6. Browser, that stores information about previously
7. OS

8. To find the IP address of a website.



Components of a URL

Web addresses that you type into the browser address bar form part of Uniform Resource Locators (URLs). The first part of a URL is the [https](https://)

The protocol being used to send the request. In this case, we are using [HTTPS](https://), which is a secure protocol that encrypts your data while it is being transported. On the modern web, pretty much every site uses HTTPS, so the browser assumes that is what you are using and adds it for you.

developer.mozilla.org

The [domain name](https://developer.mozilla.org) of the URL, which represents the top-level location of the server you are visiting. The domain name typed in is equal to the domain name, but this is not always the case — you could choose a subdomain.

Note that the developer part is a subdomain (distinct content area) of Mozilla's mozilla.org domain.

5.20"

5.20"

ators (URLs)

secure version of HTTP that stops bad people from
server uses HTTPS, so if you don't include it explicitly,

re connecting to. In this case, the web address you
e to type in a more complicated web address.

rg domain.