overview

This class is going to focus on __how__ the internet works, what are the protocols that define it, what are the people that have designed it and what are the organizations that maintain it. In a second part, we will focus on an introduction to HTML, CSS and JavaScript.

summary

housekeeping

readings

internet history

internet protocol

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internet languages

break

practice

homework

housekeeping

digital culture - structure

welcome!

plan for today

history of the internet

protocols of the internet

governance of the internet

html and css

fonio

groups

for next week: send me the main question you intend to ask

in two weeks: exploration writeup

readings

All watched over by machines of love and grace, a BBC documentary about the ideals which underpin the computer revolution: https://en.wikipedia.org/wiki/All_Watched_Over_by_Machines_of_Loving_

The Internet's Own Boy, a documentary about Aaron Swartz, the creator of Reddit and RSS, and about how he committed suicide over an IP lawsuit: https://www.youtube.com/watch?v=9vz06QO3UkQ

https://www.eff.org/

dreams of networks

do you feel free when you're online?

Free from what? from whom? Freedom can be associated either to immediate restraints, or to subsequent consequences. The "spontaneous" and "worldwide" development (or so it seemed) of the internet made the early users feel that there was some ineluctability to the spread of communication, knowledge and information, as illustrated by the motto "information wants to be free".

The other component is anonymity. At some point, it was impossible to know who was saying what, and instead of a terrifying nightmare of potential terrorist activity that this would be seen as in the 21st century, this was considered an opportunity to erase all inequalities: race, gender, income, etc. Whenever you're online, the only thing that matters is what you know, and what you say.

electronic frontier foundation

can a cyberspace be independent?

The first appearance of the term cyberspace is in William Gibson's sci-fi novel Neuromancer, which had a huge impact on pop culture then, and now (e.g. The Matrix was heavily

influenced by the style and world of Neuromancer). In this novel, groups of self-organized individuals, hackers, travel in a digital (yet, three-dimensional) world in order to fight against the oppression of corporations. Cyberspace, then, is first and foremost a fantasy. But this fantasy has roots in deeper, broader dreams: the New Frontier, the communes of the 1960s and early libertarian thinking.

ThIndependent from what? For Barlow, it's obviously being independent from nation-states, but as we have seen last week, there are different forces at play when it comes to the development of technology: governments are one of them, along with the military and commerce, but there are also two others: academica, and us. This class is going to specifically address the influence of academia on the development of the internet.

east vs. west codes

how does code act as a law?

The west coast code acts as law insofar as it is always either allowing or denying a particular state or behaviour. Without code, in the cyberspace, there is nothing; no jurisprudence, only decrees.

The question, then, is not whether or not we can be independent from external forces in cyberspace, but rather how do we actually hold accountable the forces that do.

internet history

first mention of the word internet: https://tools.ietf.org/html/rfc675

man-computer symbiosis, dreams of augmenting our intellect: http://worrydream.com/refs/Licklider%20-%20Man-Computer%20Symbiosis.pdf

written by some of its inventors: https://www.internetsociety.org/internet/history-internet/brief-history-internet/

Add the Cernettes

history of the internet

what's the difference between the internet and the web?

The development of the Internet precedes that of the Web by about 20 years. The internet therefore provides the infrastructure to enable the Web, and a lot of other applications (email, file transfer, torrenting, etc.). While the Internet was explicitly funded by the U.S. military, the Web was funded by the CERN, a nuclear research agency in Switzerland.

between academia and the miliary

"A network of such centers, connected to one another by wide-band communication lines [...] the functions of present-day libraries together with anticipated advances in information storage and retrieval and symbiotic functions suggested earlier in this paper " - J.C.R. Licklider

a decentralized network can withstand nuclear threats

arpanet + tcp/ip = internet

arpanet.jpg

The Internet was first and foremost the product of research in the field of machine communications: if phone lines weren't good enough for multiplexing (aka many-to-many communication), they needed to find something else. That something else became packet-switching, a technique which enables messages to take multiple, independent routes.

The diagram above is the earliest Internet known, and indicates who (universities: UC Los Angeles, UC Santa Barbara, Stanford Research Institute and University of Utah) is running what kind of computers).

the world wide web

the web was built on top of the internet

follows a long tradition of organizing information (hypertext)

internet + hypertext = web

the first website

internet protocol

an excellent book on how protocol makes control survive the move towards decentralization (aka HTTP meets Foucault):
https://github.com/periode/politics-of-code/blob/master/assets/readings/05-government/ProtocolIntroduction.pdf

A visualization of packet-switching, the technique underlying the web:
https://en.wikipedia.org/wiki/Packet_switching#/media/File:Packet_Switc

https://en.wikipedia.org/wiki/Project_Xanadu

Project Mundaneum, the first virtual library:
http://www.virtualknowledgestudio.nl/staff/charles-van-den-heuvel/vdheuvel-mundaneum.pdf
https://www.nytimes.com/2008/06/17/health/17iht-17mund.13760031.html

the "talk"

thetalk.png

So, this was a broad historical overview, let us now dive deeper into the practicalities of it. It might seem a stretch, but the picture above illustrates quite clearly the influence of knowledge on power and agency.

The same way that lack of information about reproductive health maintains a system of control on those who cannot understand and act upon their own bodies, a lack of knowledge about technical systems makes us more vulnerable to its pitfalls.

a stack of protocols

tcp/ip -> addresses (machine version)

dns -> addresses (human version)

http/smtp/ftp/irc -> itinerary

html -> display instructions

The global network has multiple layers. The first one, not mentioned above, is the link layer. The link layer is the set of physical infrastructures which underpin everything else. Aka cables. Those cables are particulary vulnerable to two things: sharks and the NSA.

Then comes IP (where do I go), then TCP (do I still make sense when I'm there), then everything else (what is it that i was trying to say in the first place).

This layer scheme is quite recurrent in digital technology, which often consists on layers of abstractions relying on top of each other.

tcp/ip

transmission control protocol

how do we make sure that whatever we're sending gets there in one piece?

internet protocol

how do i know where i'm going, and how to get there?

birthplaque.jpg

IP (Internet Protocol) is the set of behaviours which allows to know where a computer is on a network. It is essentially an address system along with a network of roads. In an example of going from A to B, it first defines what it means to be A, and to be B (i.e. it assigns addresses, of the type 127.234.231.9), and then it establishes multiple paths between A and B, by breaking up a given message from A to B and having different parts of that message go through different paths to get to their destination.

The job of TCP, then, is to make sure that, once those packets have gotten to B, none of them are missing, and they can be reliably re-assembled in order to make sense of that message. It does so by structuring the data in a very particular way (see resources for a detailed explanation).

Those two protocols were designed by Vint Cerf and Bob Kahn at UCLA in 1967, and the first

packet sent according to these protocols was sent on October 29, 1969. Their message actually crashed the whole network. In contrast, the first message ever sent via the telegram was "What Hath God Wrought?" -quite visionary for the time.

dns

domain name system

how the hell am i supposed to remember all these numbers?

Because IP addresses are just numbers, the DNS protocol convert these numbers in human-memorable means: words, separated by dots. It starts with a TLD (top level domain), such as __com__, then goes down one level, such as __google__, then another level, such as __mail__, for a complete Domain Name of __mail.google.com__

http

hypertext transfer protocol

how do i know the correct way to interpret a message?

(other protocols on the application layer: simple mail transfer protocol, file transfer protocol, etc.)

HTTP is the protocol in which "clients" and "servers" first appear. It functions as a request, and a response, in order to fetch some information through some automated way from a remote machine.

html

hypertext markup language

how do i know the correct way to display the message's contents?

This is where we technically leave the realm of the internet and get into "userland", the realm of humans, and what we see on our screens. However, HTML is not separable from the development of HTTP, since HTTP was designed to retrieve HTML documents.

HTML documents, ML meaning Markup Language, is a way to organize information in a

consistent way so that it can be retrieved reliably. Previous inspirations include Ted Nelson's Xanadu project, and Vanevar Bush's Memex (see resources)

typical circuit

a "client" asks for a webpage to a "server".

first, they type the URL, and DNS translates it into an IP address

second, your computer sends a HTTP request to that IP address

third, the "server" sends back a HTTP response (with an HTML document)

last, your computer interprets the document according to the HTML rules

example

pierre runs a web server on his computer

The webserver is a very simple application written using Python and Flask: https://palletsprojects.com/p/flask/

You can find the code in the folder 2_structure/ of the class website: http://github.com/periode/digital-culture-2019/tree/master/2_structure

internet governance

https://internetsociety.org

https://w3.org/Consortium

https://ietf.org

https://icann.org

internet governance

IS - Internet Society

IETF - Internet Engineering Task Force

W3C - World Wide Web Consortium

ICANN - Internet Corporation for Assigned Names and Numbers

stakeholders

private companies

research universities

professionals' associations

members of the W3C

internet languages

the thing to keep in mind when it comes to learning things about the internet, or about computers in general, is that the best place to find a documentation about any digital system is online. for HTML and CSS, there are two essential resources:

the W3Schools website, very good for beginners and entry level.

https://w3schools.com

the MDN (mozilla developer network) website, a little more elaborate.

https://developer.mozilla.org

html

hyper text markup language

a markup language is a language which describes __what__ the content is

<tagname attribute="value"> innerText </tagname>

 Lorem ipsum dolores sit amet...

HTML is essentially a set of tags, which the browser uses to render the document appropriately. For example, a tag describes a paragraph, so the browser will add a bit of white space at the bottom of that block. Because tags denote blocks, they need to be __opened__ and __closed__. Closing a tag is as simple as including a forward slash (/) before the tag:

* lorem *

An <a> tag describes an anchor, i.e. a web link, and needs an __attribute__ to function properly. Attributes are specific features of tags, which can vary from tag to tag. We might want all the tags on a page to behave the same, but probably not all the <a> tags to send us to the same link. For that, we give a __value__ to the __attribute__ of the tag. The name is the attribute which takes care of where the <a> will link to is called href:

click here to go to wikipedia

A last attribute which we will introduce is the __class__ attribute. This attribute allows us to connect the HTML to the CSS. In other words, it allows us to connect WHAT things are (a paragraph, a link, a title), with HOW they should look (bold, big, justified, etc.).

css

cascading style sheets

a style sheet is a document which indicates __how__ things should look

selector { attribute: value }

p { color: green }

CSS is a set of instructions which comes with an HTML file. We can integrate CSS in multiple ways to the HTML document, either through inline CSS (adding a __style=""__ attribute directly inside the tag), having its own <style> tag in the HTML file, or having it all in a separate file, and telling the HTML document where to find that file.

But in the end, CSS always does the same thing: it states how a particular HTML tag should look like. This can include fonts, colors, animations, positioning, etc.

It does that by having a __selector__, which is followed by curly brackets, within which each __attribute__ is given a __value__. After each value, you must tell the browser that you're done by adding a semi-colon (;).

For example, making a title red and underlined would look like this:

```
h1 {
color: red;
text-decoration: underline;
}
```

developer tools

let's look at a real webpage with the developer tools of your browser

the developer tools allow you to manipulate the source code of any webpage on your browser

Tools > Developer Tools...

safari: If you don’t see the Develop menu in the menu bar, choose Safari > Preferences, click Advanced, then “Show Develop menu in menu bar.”
firefox: CTRL+ SHIFT + I
chrome: CTRL + SHIFT + J
internet explorer: F12 or Tools > Developer Tools

structure of a webpage

every webpage has an <html>, a <head> and a <body>

<head> is what your browser needs to know

<body> is what you want to see

add a file example here

This structure is called the DOM (Document Object Model), and it is by manipulating the DOM that most of interactivity happens on the web.

Inside the <head> tag comes all of the "meta" information, such as where to find the CSS files, what kind of language encoding are you using (US, Arabic, Polish, etc.), the default zoom level for each device, etc.

Inside the <body> tag comes everything else. That is, everything that we've seen above (<p>, <a>, etc.)

break

10'

practice

exercise

write a simple, styled HTML page about your exploration with at least:

- a header

- a paragraph

- a link

- an image

fonio

fonio is a platform developed by the sciencespo medialab, and is where you will be publishing your final project

fonio.medialab.sciences-po.fr/cirses/

This URL is specific to the class. You can create a story (i.e. your publication) and start working on it as easily as with a blog publisher like WordPress (fun fact: did you know that at least 25% of all websites on the internet are published by WordPress?).

No worries, I won't be spying on your progress. But then again I could. But then again you wouldn't know. Welcome to the Internet in 2019 <3

homework

watch - s1e3, s3e1, s3e2, s4e3, s4e4, s6e6

read - restricting digital sites of dissent: commercial social media and free expression

install - audacity

install - open shot