

How the Internet Works

An Intro to Website Development Project

What is the Internet?

Stemming from a government project called ARPANET, the Internet is a nation-wide packet network. It is a system of networks that interconnects and allows for communication to other networks.

The Internet is made up of many parts. A lot of the work is being done behind the scenes that Internet users do not get to see. There are a number of mechanisms and processes that work to help the Internet continually. Click the links down below to learn more about how the Internet works!

Domain Names and ICANN
IP Addresses, Packets and Routing
DNS
HTTP and HTTPS Protocols
W3C, HTML and CSS

HTTP and HTTPS Protocols

Protocols exist for every aspect of the Internet. They are a universal set of rules and standards that are used to communicate between machines. The language used to communicate between web browsers and servers is known as Hyper Text Transfer Protocol, or **HTTP**. It is made up of "get" and "pull" requests that are made for computers used to ask for and send documents. A protocol also exists to ensure the safety of these requests, known as Hyper Text Transfer Protocol Secure, or **HTTPS**. The HTTPS guarantees that any HTTP requests are secure and protected.

Why do we need HTTPS Protocol?

The HTTP request can hold private and personal information of users, and since the Internet is completely open, the request are more likely to be hacked. HTTPS contains secure sockets and transport layers to be layers of security around any communication to protect it.



HTTPS acts like a lock on a door to guarantee that all information is secure on a website.

ABOUT

Learn about both the project and the creator!

The objective of this assignment is to get you familiarized with how the Internet works. You need to work individually for this assignment. You need to create a website (like one in the History of the Internet assignment) and explain some of the following topics:

- Domain names and ICANN
- IP Addresses, Packets and Routing
- DNS
- HTTP and HTTPS protocols
- W3C and HTML and CSS

Assignment Requirements:

1. Create an index page with a nice introduction to these topics along with the links to all the other pages.
2. Create an ABOUT page, discussing about this assignment, along with few lines about yourself.
3. Create one page for each of the topics.
4. Make sure to use Bootstrap (Links to an external site.) for your website. Your website should have a navigation bar (Links to an external site.) containing the links to different pages.
5. Host this website on Github Pages or AFS.
6. The README file of the Github repository for this assignment should clearly mention the URL of the website.
7. Each topic should be introduced with the concept/definition, followed by some examples and a section explaining why we use them.
8. Add at least 1 image for each topic and explain them.
9. You should have at least 10 feature commits.

Video and Reading Materials:

- How the Internet Works
- What is the Internet Part 1
- The Internet- Wires, Cables, Wifi Part 2
- The Internet- IP Addresses and DNS Part 3
- The Internet- Packets, Routing and Reliability Part 4
- The Internet- HTTP and HTML Part 5
- The Internet- Encryption Public Keys Part 6
- Bootstrap Grid System
- Bootstrap Tutorial

Submission

Put a link of the website hosted on Github Pages or AFS in the Readme file of the project repository and submit the link to this Github repository in Canvas.

About the creator:

[My GitHub Profile](#)

Julia-Marie Guinto

Hello, I am Julia-Marie Guinto, a sophomore at NJIT studying Human-Computer Interaction (HCI). As I was previously a Chemical Engineering major, I am brand new to the field, but learning along the way.

Domain Names and ICANN

One of the most important and recognizable parts of a website is its domain name. A **domain name** is the address that a users types in that will direct them to any website. Some recognizable examples of domain names are google.com or amazon.com. A domain name can be any combination of letters and numbers followed by any extension, like .com, .net, and more.

Why are domain names important?

Without the domain name, IP addresses are the only other thing associated with websites. Because the IP addresses are a series of numbers, Internet users will have a hard time remembering these numbers. Domain names make it easier to identify things on the Internet instead of IP addresses.

What is the ICANN?

ICANN is an abbreviation for the organization Internet Corporation for Assigned Names and Numbers. **ICANN** is an organized non-profit corporation that handles the upkeep and many procedures of dataspace, both name and number, on the Internet. They do not control the Internet; their focus is so simple maintain the Internet Protocol and the DNS.

Why is the ICANN important?

Through everything they do, the ICANN provides Internet users a safe and secure connection to the network. They continually make sure that the network is stable and operational.



Data is travels through webs of light creating connections over the Internet.

IP Addresses, Packets and Routing

Just like any phone and house has its designated number and address, respectively, any computer or computer network has there own version of this. This is known as an Internet Protocol address or **IP address** . An IP address is unique combination of numbers, which are separated into a hierarchy. The standard version of IP addresses is IPv4, where each address is 32 bits long, but with the growing Internet, there is a new standard IPv6, which will make them 128 bits long and allow for over 360 undecillion unique IP addresses.

When visiting a website, a computer asks another computer for intformation. That computer sends a message to another computer's IP address along with its own for responses, like putting a return address on mail. Sometimes the message that is returned is too much and must be sent using packets. **Packets** are smaller pieces of messages or information that travel from one place to another on the Internet. They can send information by taking different routes and amount of times, but will be assembled in order at the destination. Packets are able to move throughout with the help of routing. **Routing** is the process that manages packets to keep them moving through the network smoothly. Every router keeps track of multiple paths for send packets and chooses the *cheapest* available path for each piece of data, cheapest in terms of time, politics, or network relationships. This process is all due to TCP, or transmission control protocol, which overlooks the sending and receiving of data as packets, like guaranteed mail services.



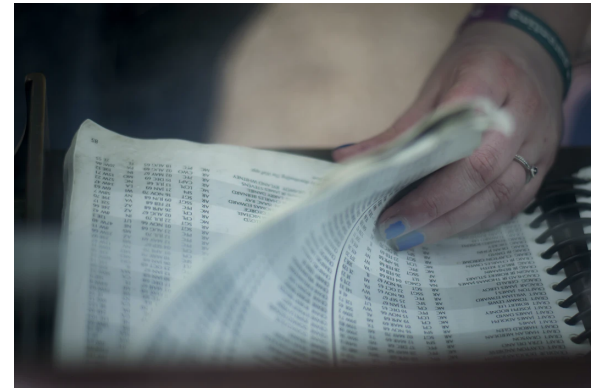
Packets are sent in digital packages similiar to how cardboard boxes are used to deliver actual packages

DNS Domain Name System

The DNS or also known as **Domain Name System** is responsible for associating names like `www.google.com` with their corresponding IP addresses. The computer uses the DNS to look up domain names and get the IP address, which is then used to connect it to its destination on the internet. One main DNS server is not enough, so they are connected in a distributed hierarchy divided into zones. The zones are split up and overlook major domains like `.com`, `.org`, and `.net`. Since the DNS was originally made to be an open public communication protocol, it is prone to cyber attacks, like spoofing.

Why do we use the Domain Name System?

Google.com. Yahoo.com. Youtube.com. These are just a few of the well known websites, which have their own IP addresses that most Internet users never notice or disregard. Luckily, the DNS connects the domain names with the address. Without the DNS, users would have to memorize each unique IP addresses for each domain.



Like a phonebook, the DNS associates a domain with an IP address

W3C, HTML and CSS

These World Wide Web standards and protocols do not just appear out of nowhere; there has to be people that are responsible and work on them. The group that maintains the standards is called the World Wide Web Consortium, or **W3C**, who are a group that works to develop web standards. This group consists of people all over the world, like organizations, the W3c staff, and the public. The W3C leads by their principle *Web for all and on everything*.

What is HTML and CSS?

Behind every website, there is all different kinds of code, each website always has HTML. **HTML** or Hyper Text Markup Language is the standard language for documents to be displayed on a web browser. It is responsible for letting the web browser know how to look. With HTML, anyone can make a website. HTML is being used right now to display the text you are reading!

You can write code to display the text like this, using the Headings of HTML:

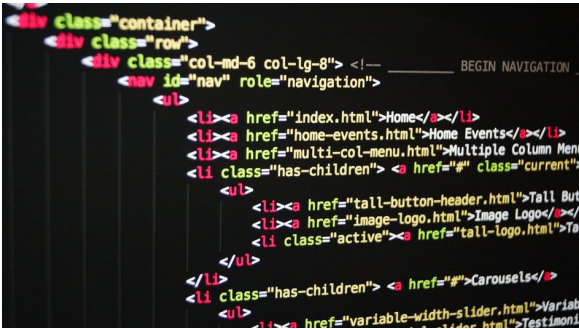
Hello! My name is Bob.

Not only does HTML work to make the look of the website, it has the help of other mechanisms, like a common one, CSS. Cascading Style Sheets or **CSS** is a mechanism that adds style, like fonts, colors, and spacing, to the HTML documents. It can be used to make a website look more appealing to its users. In order for the websites to be uniform throughout, the creators would add a CSS styling sheet for each page.

Example of CSS:

You can add **style="color:Tomato;"** to the previous code to display the text like:

Hello! My name is Bob.



This is an example of HTML and CSS code that is much more complicated.