October 29, 2021

**Web Theory**

**Overview**

**Goals**

* Be able to explain how the internet works
* Focus on front-end web
* Learn about the purpose of the “semantic web”

**How the Web Works**

**The Big Question**

“What happens when I visit https://google.com?”

**Request is sent**

Text

Description automatically generated

**Server receives request**

![A baseball player catching a ball

Description automatically generated with medium confidence]()

**Server produces HTML in response**

Icon

Description automatically generated with low confidence

**Response (HTML) arrives**

![Diagram

Description automatically generated]()

**Browser renders HTML**

Graphical user interface, text, application

Description automatically generated

**Requests and Responses**

**Types of Requests**

* GET: most basic request, ask for data
* POST: **change the world** in some way, some database is likely to be updated
* PUT: create a new resource at the specified place
* DELETE: remove the specified resource
* …and more

**Idempotency**

* Stateless - each request is **independent** of the next
* If you make the **same request** multiple times, the server is left in the exact same state as if you made it only once
* The request contains everything the server/browser need to know
* Don’t need to know what came before to do the proper thing
* GET, PUT, and DELETE are idempotent
* POST is not

**Types of Responses**

* HTML: most common, contains “markup” to be rendered
* JS: Javascript code to be executed in the browsser
* CSS: styling modifications to apply on top of HTML structure
* PNG or JPEG: images! separate response for each.
* JSON: key-value data, usually from a database, to be used within Javascript code
* XML: key-value data, less common nowadays, also usually used within Javascript code
* …and more!

**HTTP Theory**

**URLs**

**URL stands for Uniform Resource Locator**

http://google.com/search?input=cats&filter=False

**Parts of a URL**

http://google.com/search?input=cats&filter=False

* Protocol http://
* Hostname google.com
* Resource /search
* Query arguments ?input=cats&filter=False

**DNS**

* Hostnames are just for humans
  + The real address of a web server is called the **IP Address**
* Before any request is sent, the hostname is converted into an IP address
* google.com becomes something like 52.53.158.216
* The process of converting a hostname to an IP address is called **Domain Name System**, or DNS

**HTTP, a Protocol**

* HTTP stands for **Hyper Text Transfer Protocol**
* Request/response pattern
* Structure of requests/responses is simple and straightforward
* Established way for browsers and computers to communicate
* Originally invented to allow groups of scientific researchers to share information

**HTTPS vs. HTTP**

* HTTPS is just HTTP + Secure
* It is 99% the same as HTTP, but with a layer of encryption around all requests
* Browser must **encrypt** request (no longer human readable) in a way that allows the server to **decrypt** it
  + And vice-versa
* HTTPS is the expectation nowadays
  + HTTP on its own is highly insecure and vulnerable to crypto-attacks

**Browsers & Accessibility**

**What can browsers do?**

* Read and render HTML
* Send web requests
* Receive web responses
* Run Javascript code
* And so much more!

**Multiple Responses**

* A single response can contain both HTML AND Javascript code
* Multiple responses can be assembled together to create a single page
* A single page usually involves > 5 request/responses, for HTML, CSS, Javascript, Images, and any other data

**Semantic Web**

* Also known as “Web 3.0”
* Generally refers to the use of common data formats and exchange protocols that have meaning across applications, communities, and enterprises
* For coders, the use of **Semantic HTML elements** is encouraged
  + Use <article> or <nav> instead of just <div>

**Accessibility**

* Many users of the web use assistive technologies, such as **screen readers**
* Allow someone to navigate the contents of a webpage via keyboard and audio or braille output
* Assistive technologies only work if the proper HTML elements and attributes are used
  + Machine cannot derive meaning if data is not properly labelled

**The End**

© 2021 Devmountain