Bits & Atoms II

DNS and Domains

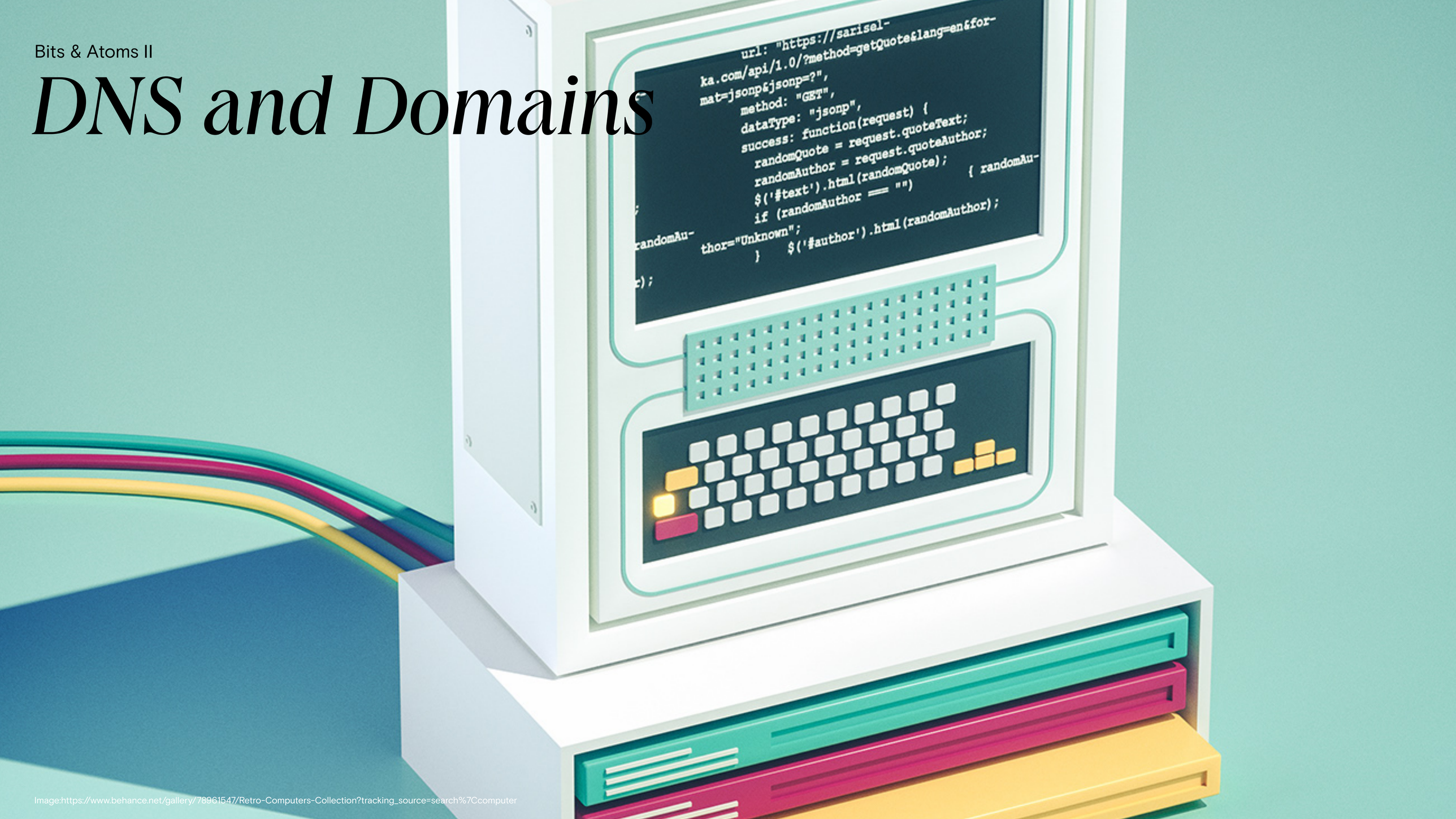


Image:https://www.behance.net/gallery/78961547/Retro-Computers-Collection?tracking_source=search%7Ccomputer

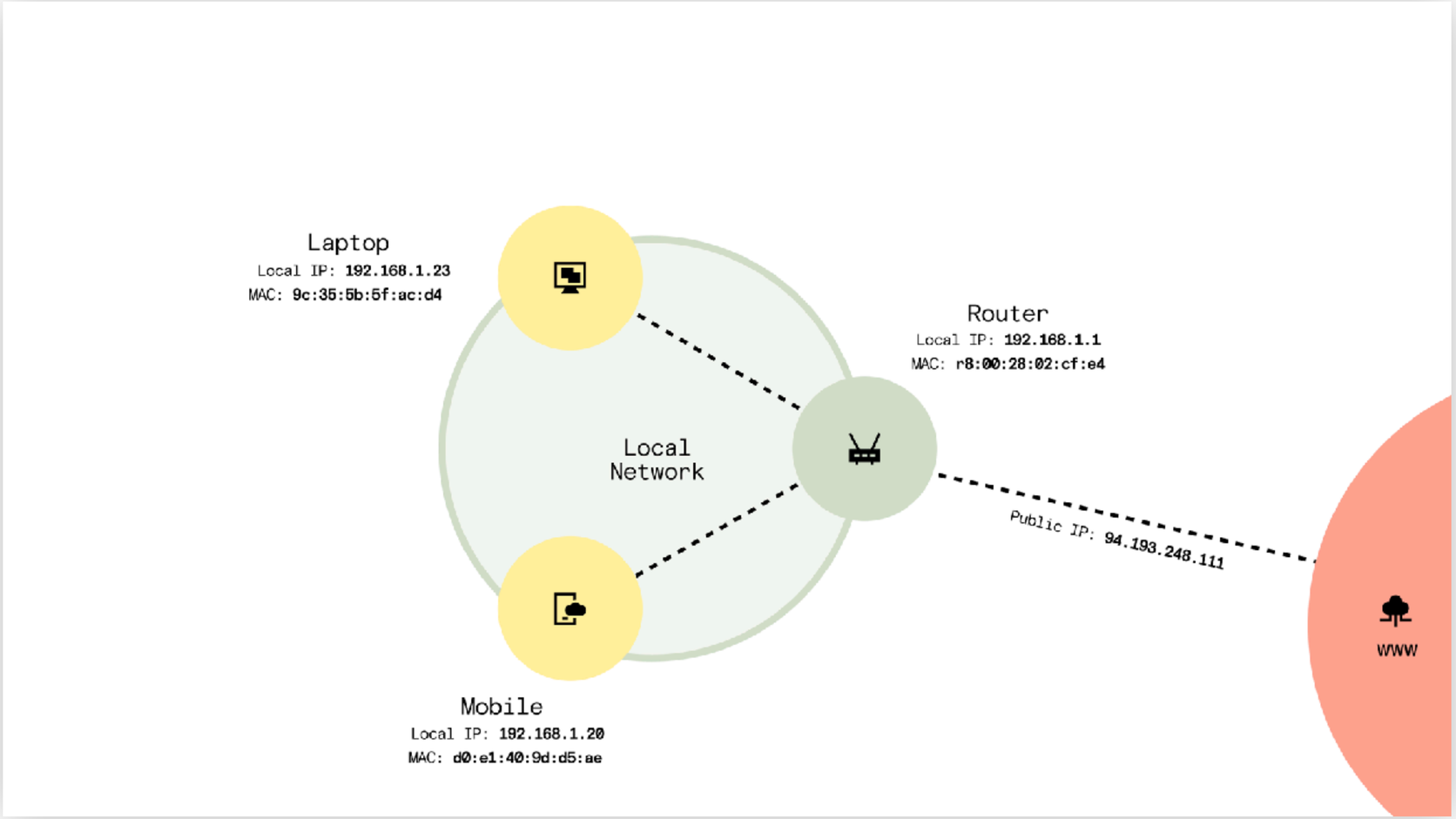
VPN vs. (Encrypted) Proxy

- Proxy only “protects” one app at a time (e.g. browser or BitTorrent client)
- VPN “protects” all your traffic

Internet Censorship

- States censor certain pages
  - Iran, China, etc.
- Different content depending on state
  - SRF, Netflix, etc.

NAT (Network Address Translation)



Encryption vs. Quantum Computers

- Every passphrase which would take thousands or millions of years to bruteforce *(trying out every possible combination)* today, could be easily found by using quantum computers

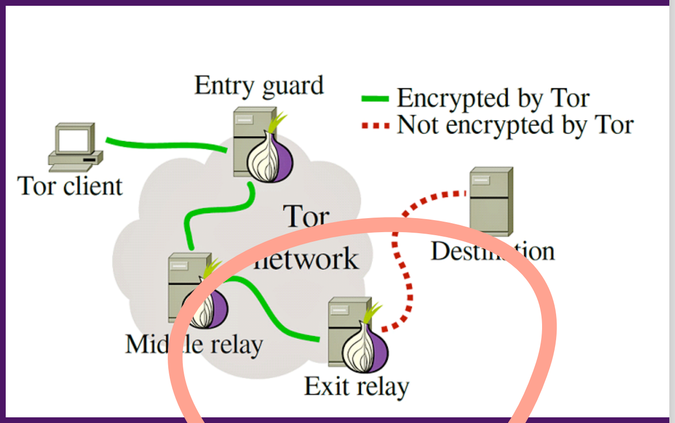
Spying on Exit Node (Tor)

- Because there is no exit node, you cannot spy on it...

Bits & Atoms II

Tor Browser (The Onion Router)

- Each relay (= Tor node) decrypts the next “onion



Bits & Atoms II

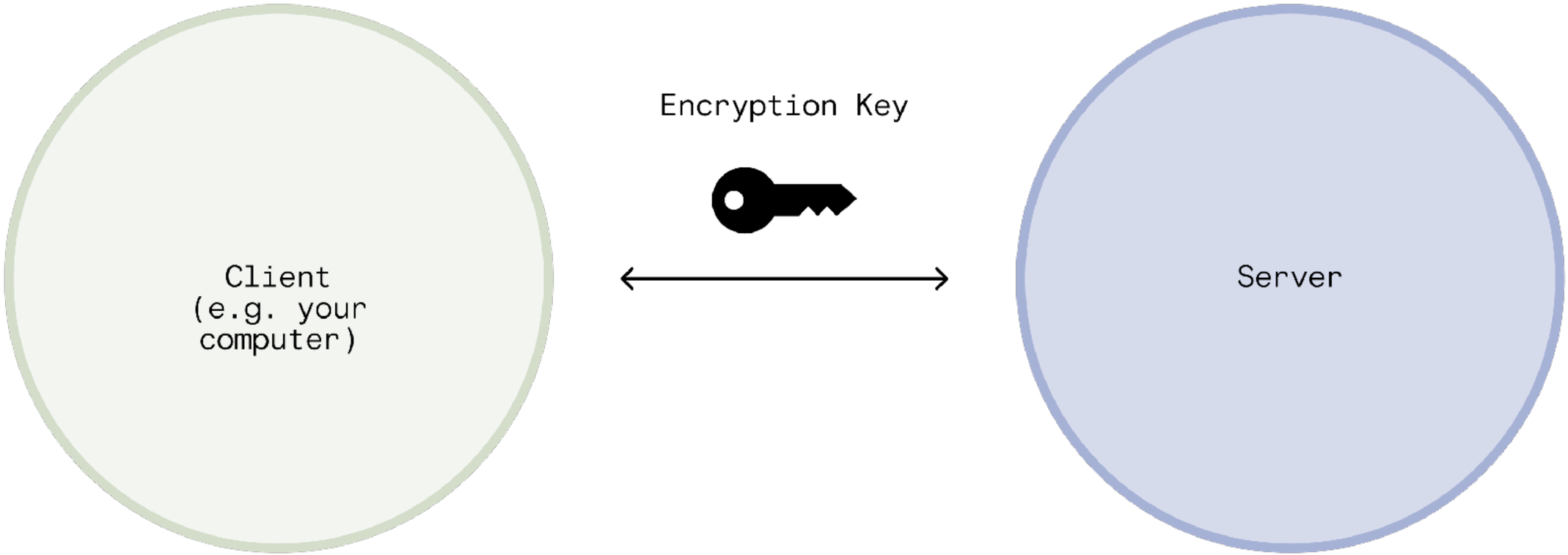
.onion

- 56 mostly random letters and numbers characters
- e.g. DuckDuckGo hidden service: https://duckduckgogg42xjoc72x3sjasowoarfbgcmvfimaftt6twagswzczad.onion/
- Only server in Tor network (only accessible with Tor-browser)
- No spying possible on Tor exit node, because it is inside the Tor network

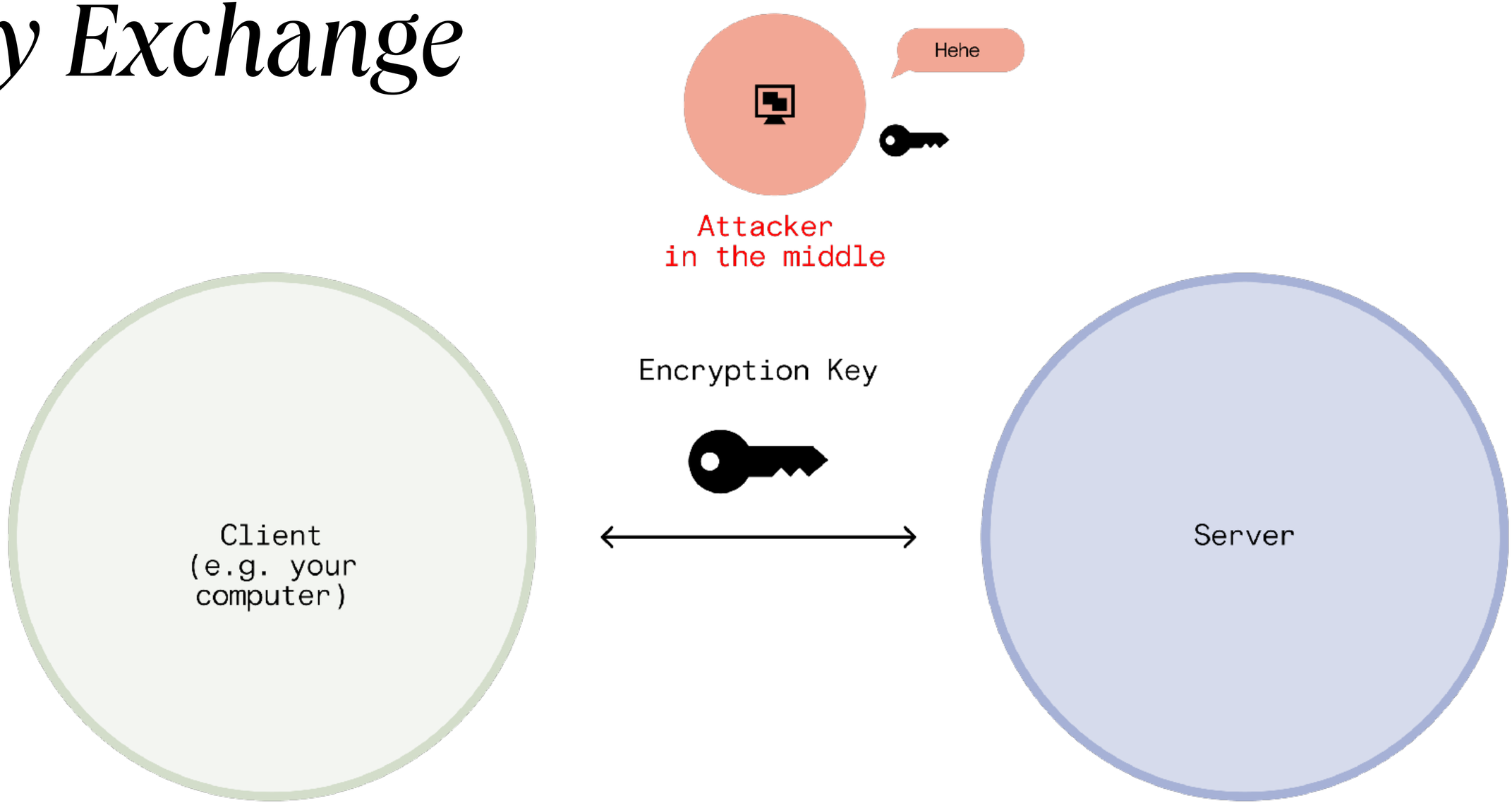
VPN and Evil Twin Discussion

- Problem of eavesdropping by attacker in the middle
- How to establish encryption in an unprotected environment?

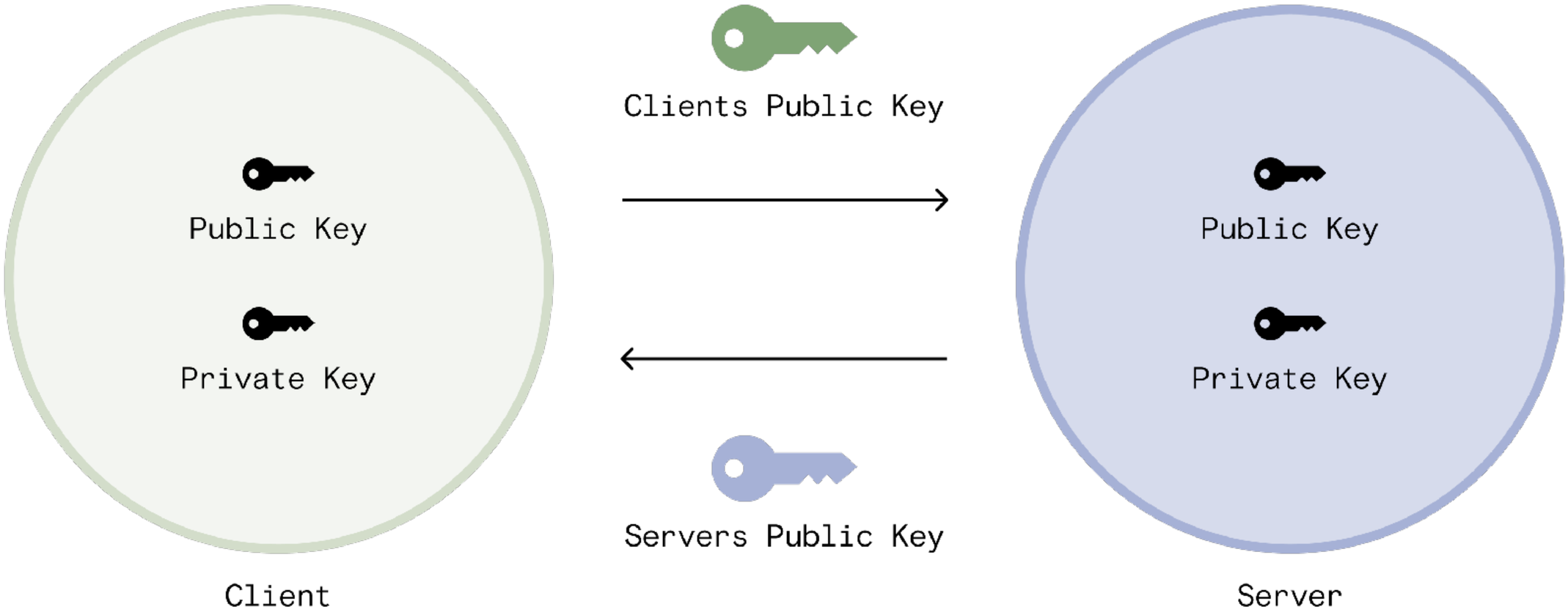
Encryption (Symmetric keys)



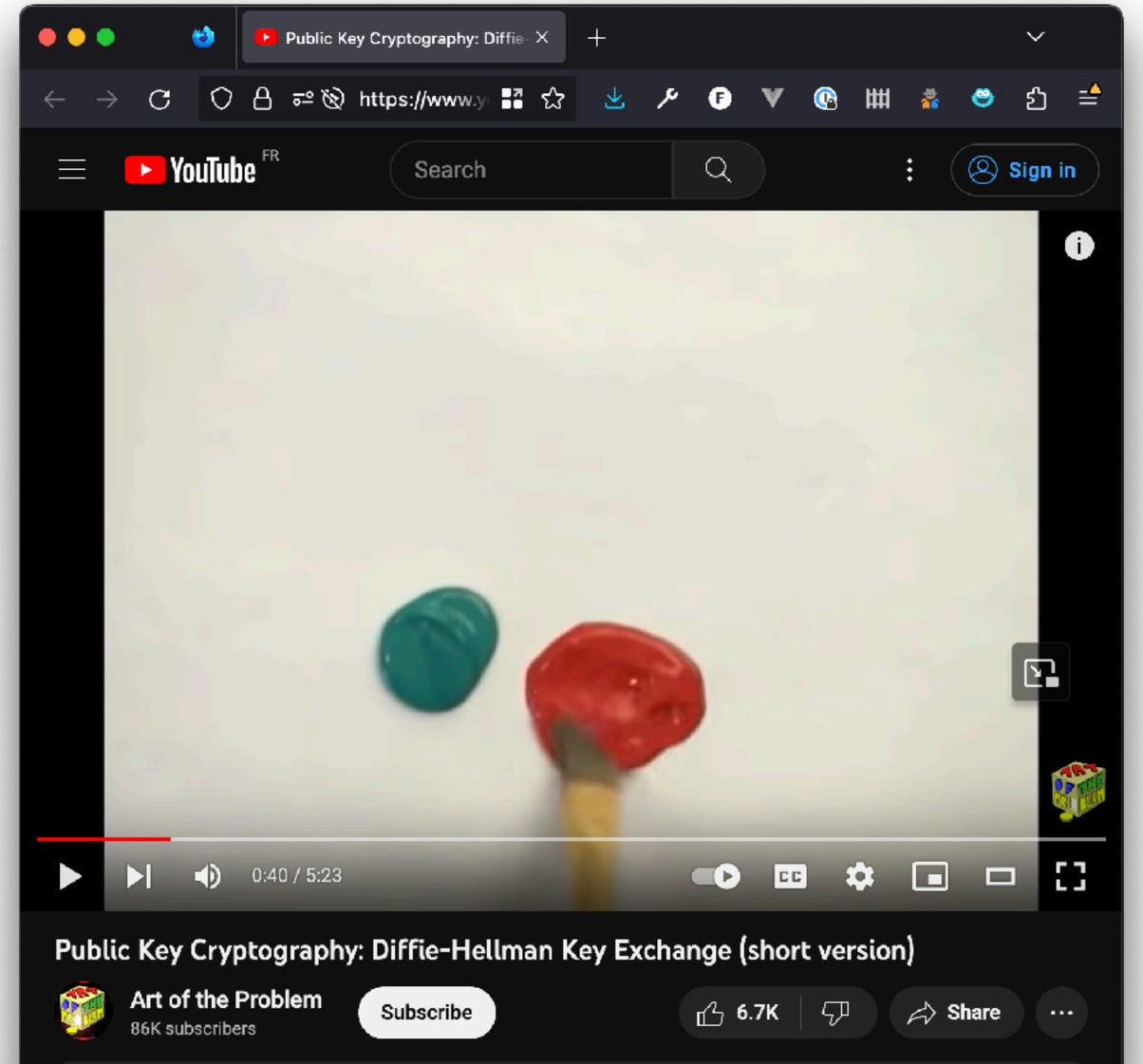
Key Exchange



Keypair (Public and Private Keys)

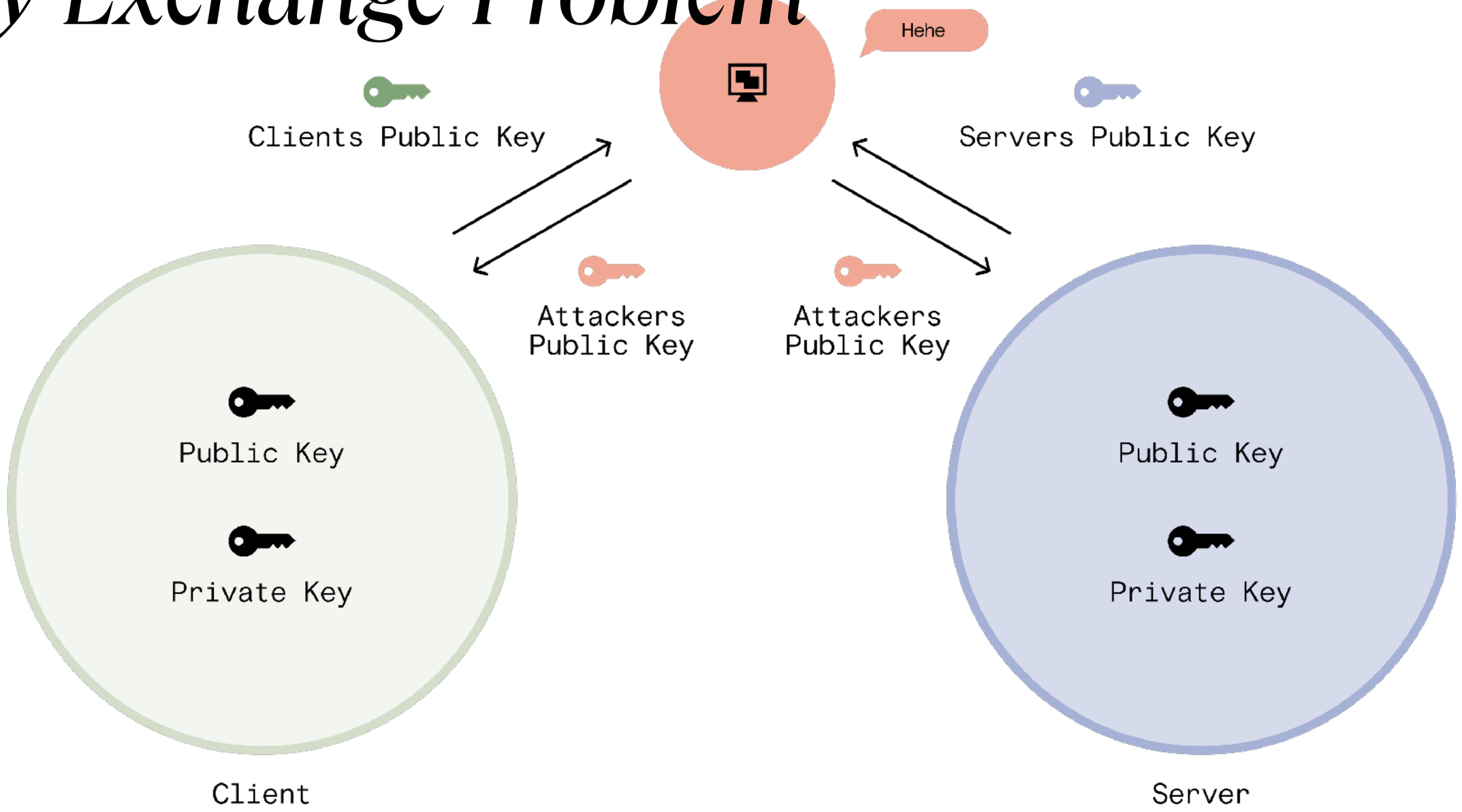


Keypair (Public and Private Keys)

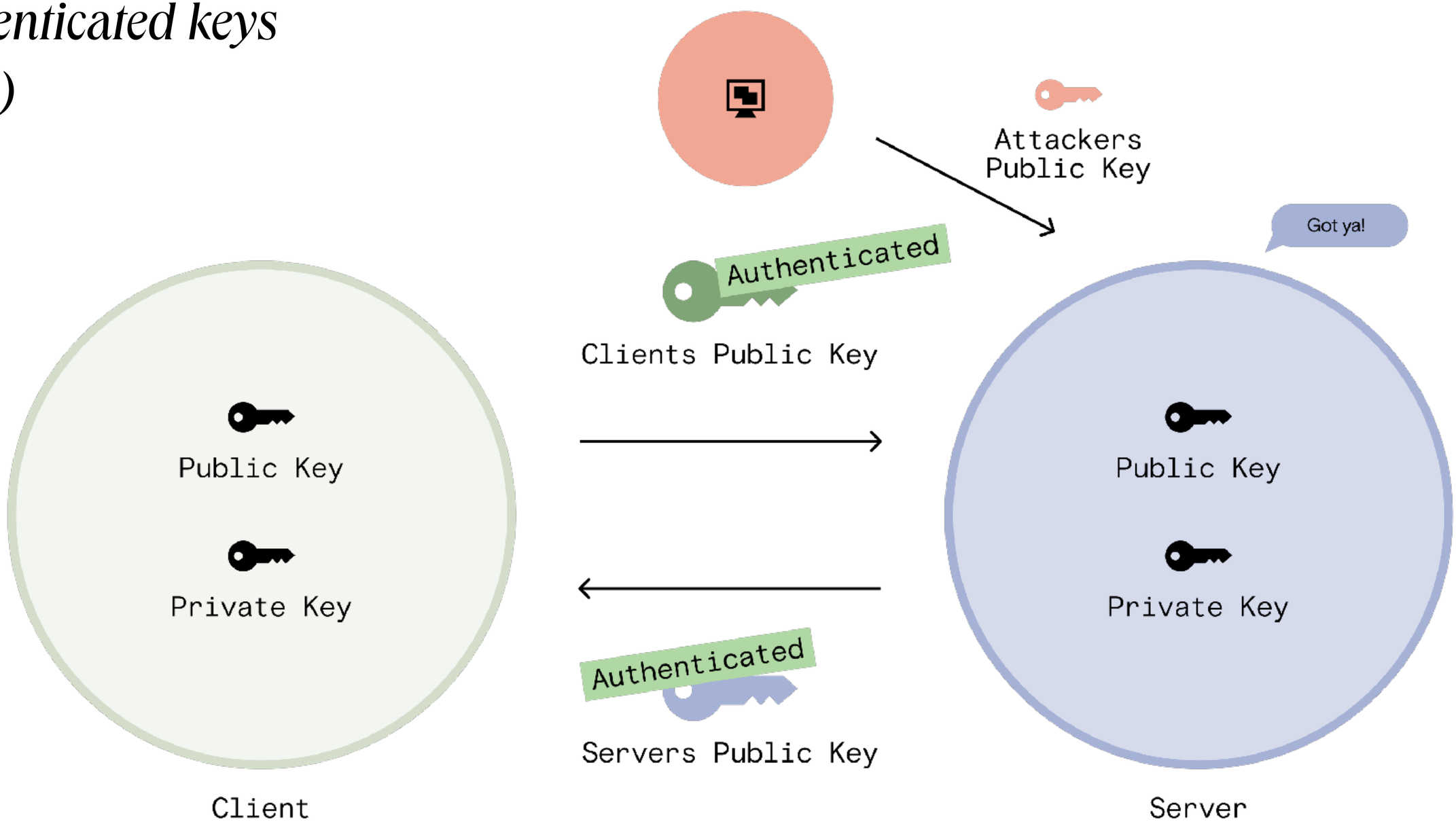


https://www.youtube.com/watch?v=3QnD2c4Xovk&ab_channel=ArtoftheProblem

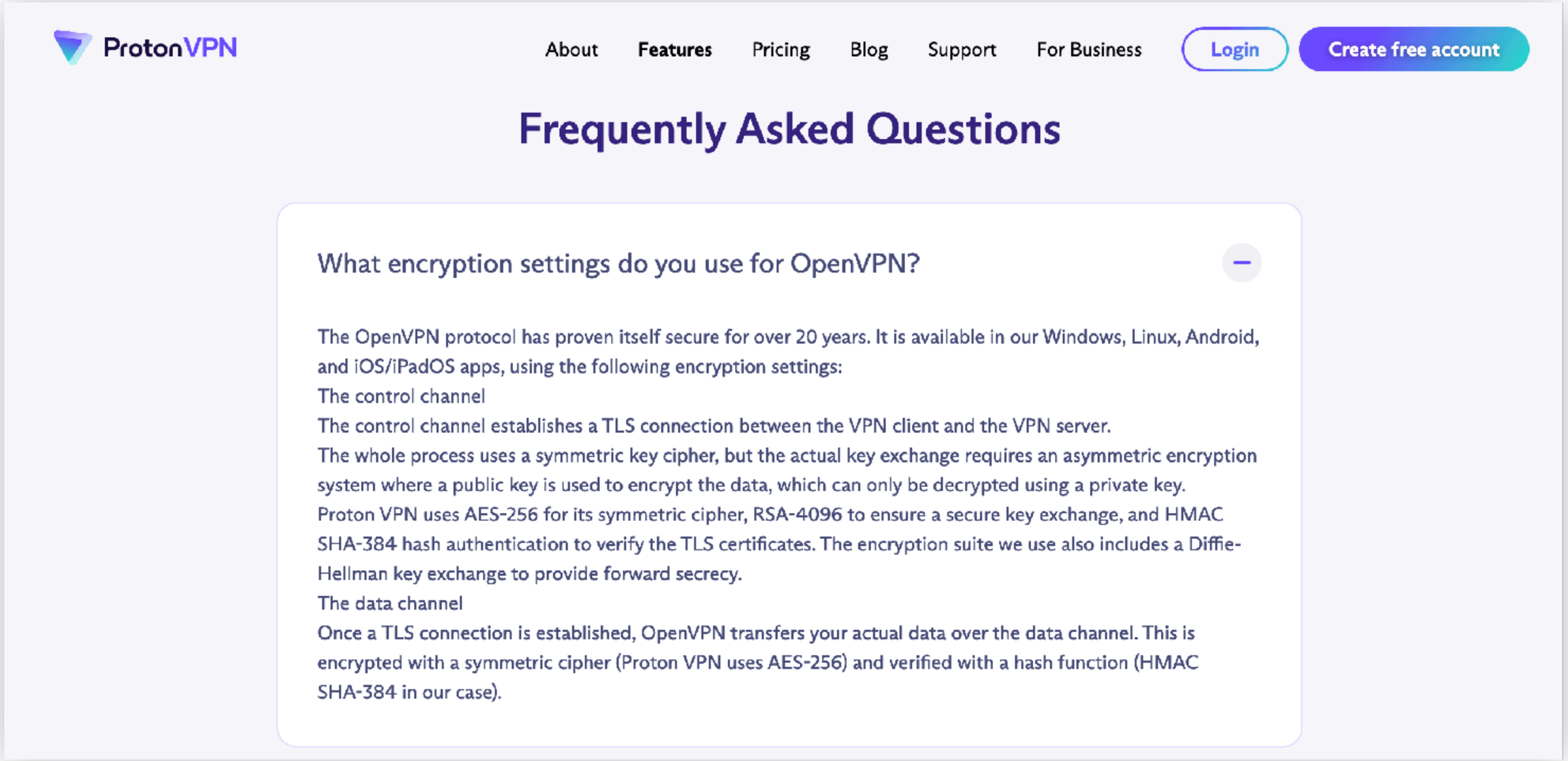
Key Exchange Problem



Authenticated keys (RSA)



VPN and Evil Twin Discussion



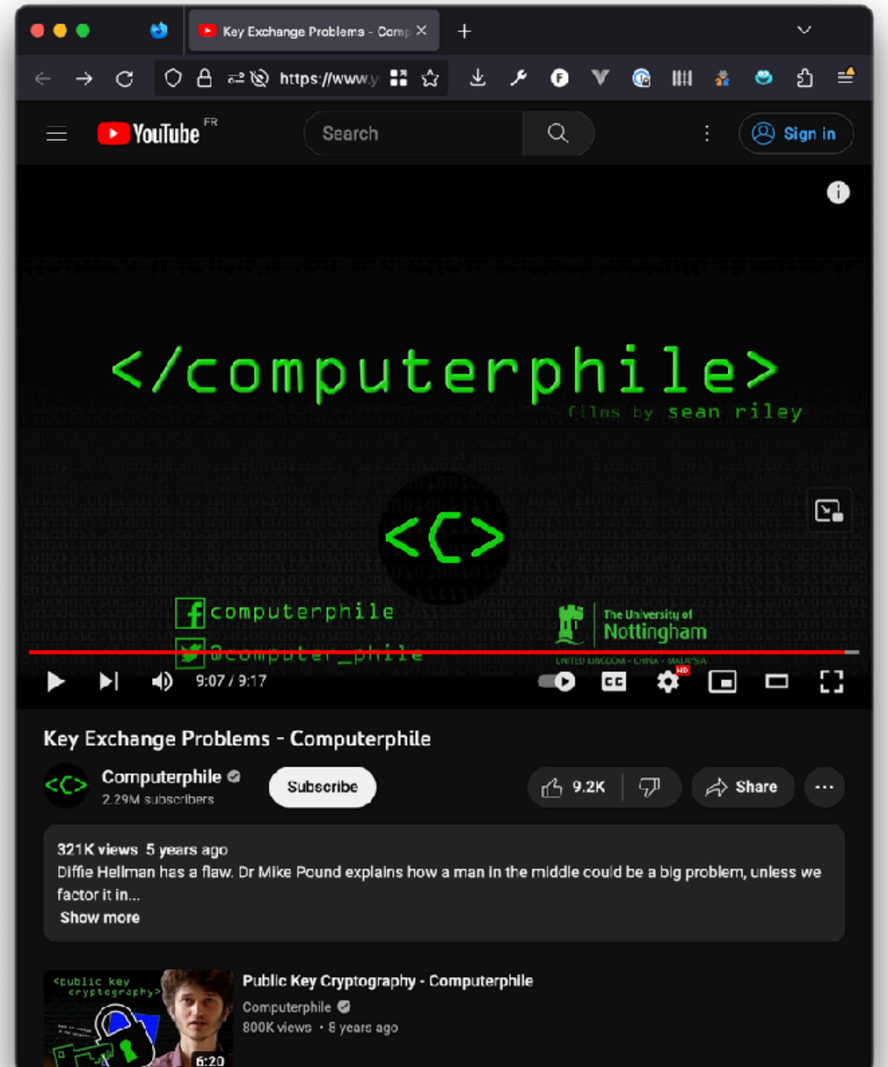
https://protonvpn.com/secure-vpn/strong-protocols

Further Reading

- https://en.wikipedia.org/wiki/RSA_(cryptosystem)
- https://en.wikipedia.org/wiki/Diffie%E2%80%93Hellman_key_exchange

Recommended Youtube Channel

- Computerphile Youtube Channel
  - TLS Handshake Explained
  - Key Exchange Problems
  - Diffi-Hellman Key Exchange



Domains

- duckduckgo.com
- zhdk.ch
- wired.com
- hallointer.net
- ...

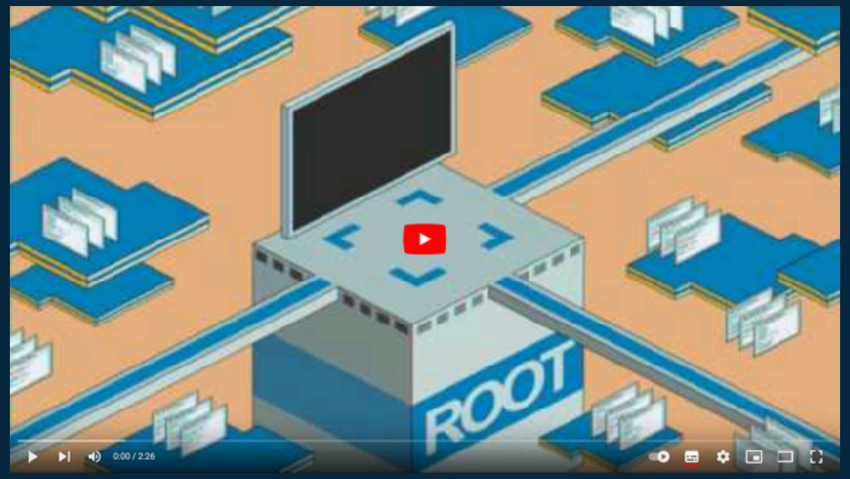
Domain Name System (DNS)

- duckduckgo.com → 40.114.177.156
- zhdk.ch → 195.176.247.145
- wired.com → 151.101.2.194

- localhost → 127.0.0.1

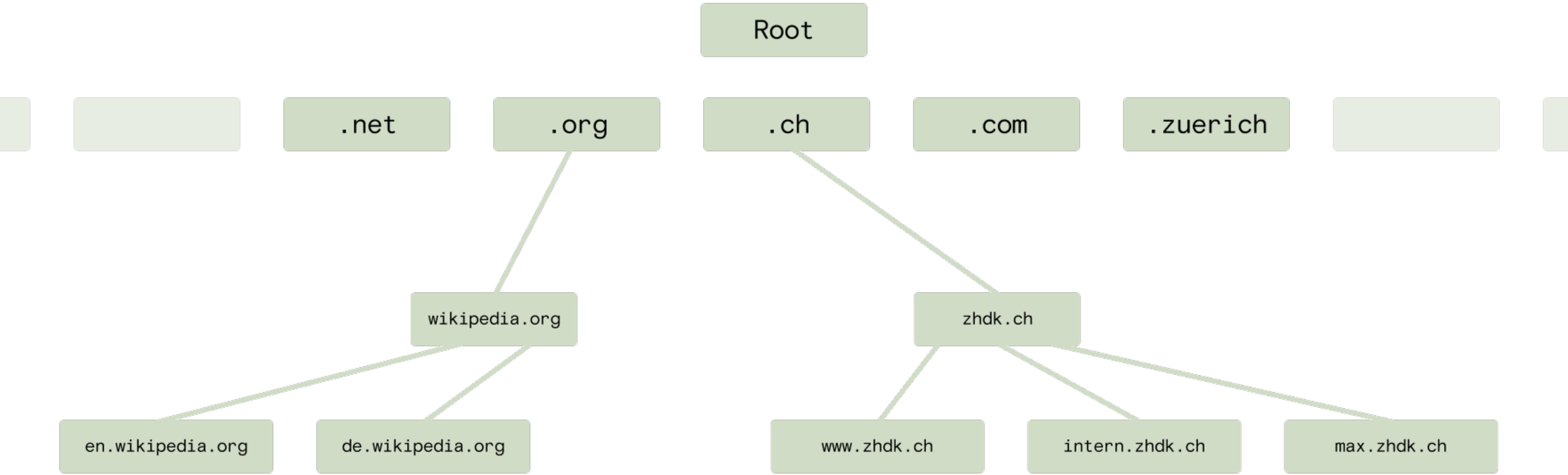
Bits & Atoms II

DNS

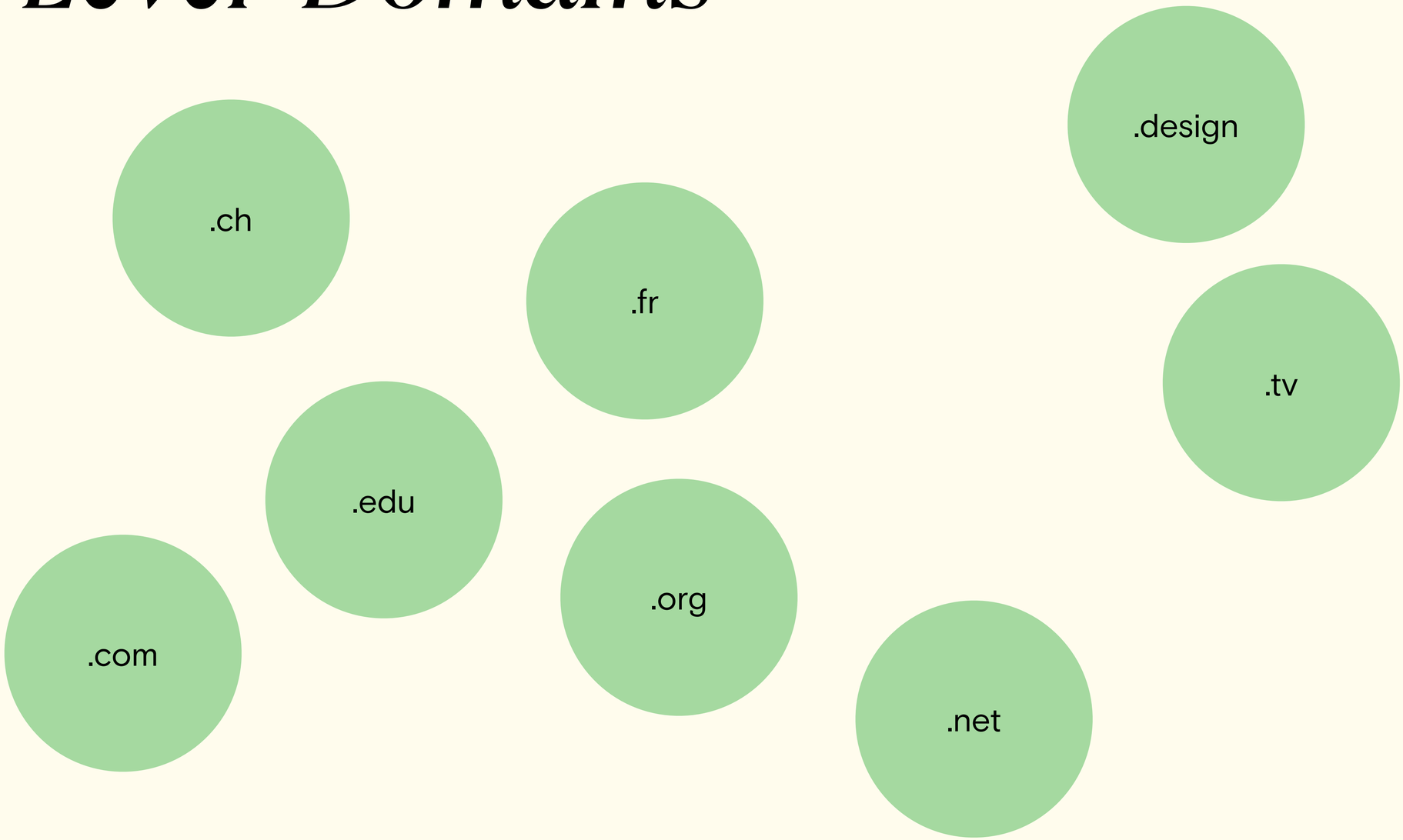


https://www.youtube.com/watch?v=2ZUxoi7YNgs&ab_channel=CIRANEWS

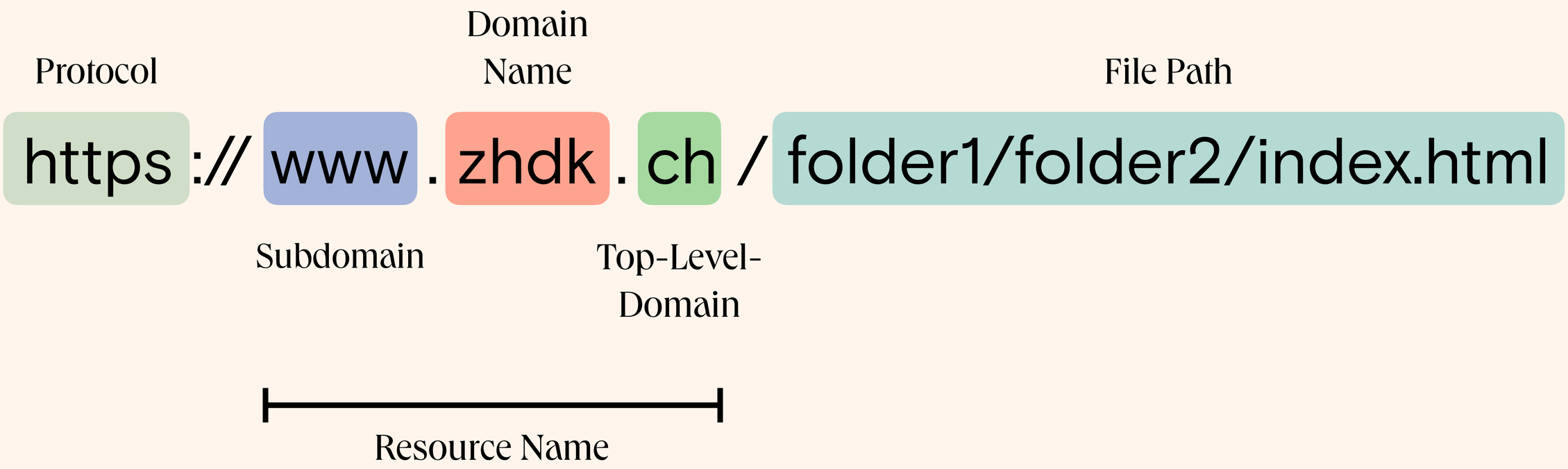
DNS Lookup Hierarchy



Top-Level-Domains



Uniform Resource Locator (URL)



Uniform Resource Locator (URL)

- http://my-domain.to/path/to/my/file.zip
- https://www.chess.com/puzzles/rated
- https://goo.gl/maps/niVtxgPvNzmxvbB56
- https://www.youtube.com/watch?v=2ZUxoi7YNgs&t=65

URL Query parameters

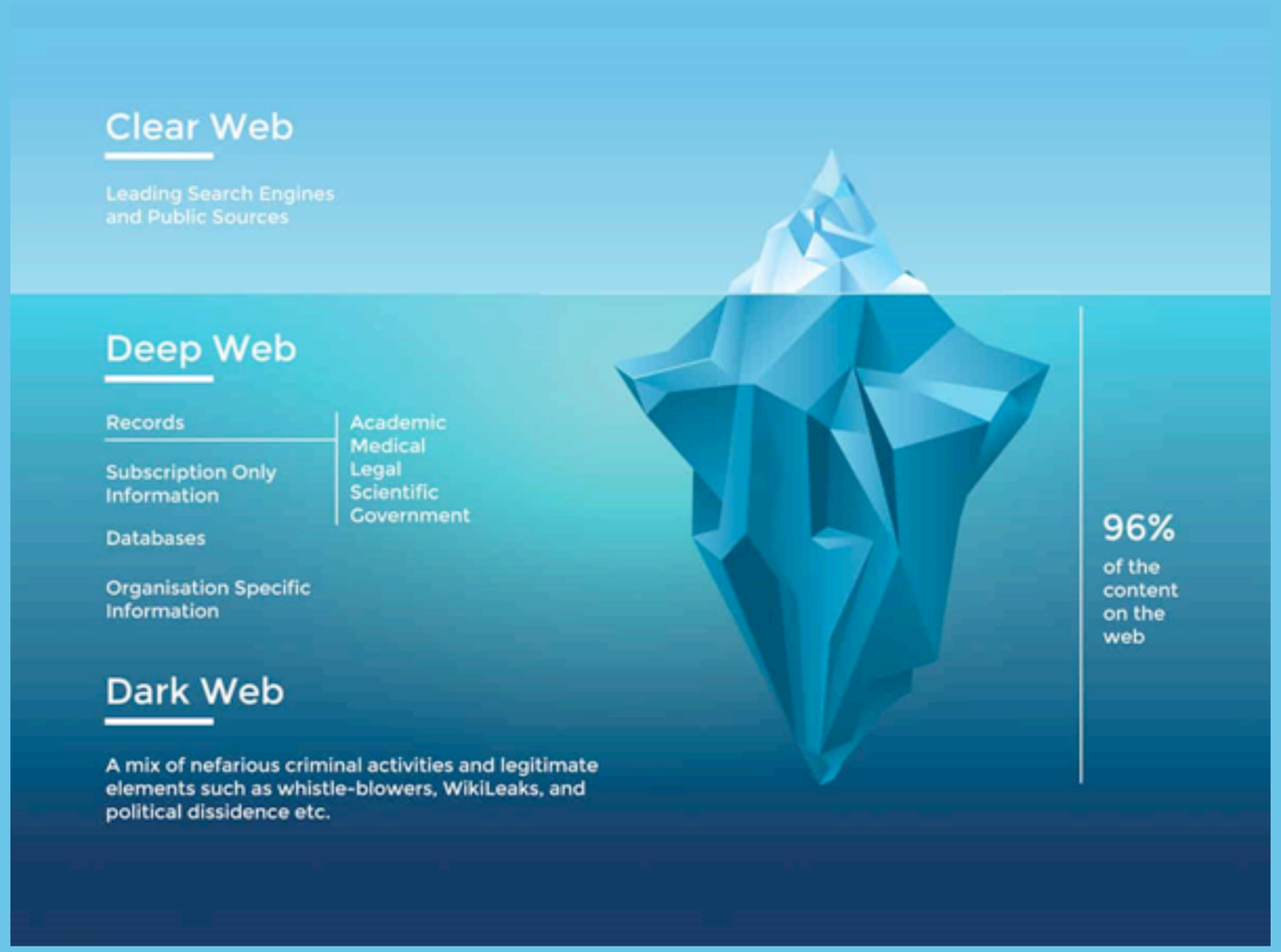
https://www.sudpol.ch/programm/?jahr=2022&monat=3&kategorie=installation&post=pro-senectute-tanznachmittag-4-11

URL Query parameters

https://www.sudpol.ch/programm/
?jahr=2022
&monat=3
&kategorie=installation
&post=pro-senectute-tanznachmittag-4-11

Bits & Atoms II

The Web



https://i2.wp.com/www.threatmonit.io/wp-content/uploads/2021/09/word-image-1.png?fit=600%2C448&ssl=1

Languages

- HTML 5
- CSS
- JavaScript
- PHP
- Go
- Xml
- ...

HTML (Hypertext Markup Language)

```html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Document</title>
</head>
<body>
  An HTML document.
</body>
</html>
```

Bits & Atoms II

CSS (Cascading Style Sheet)

```
1
2  html {
3    font-family: var(--sans-font);
4    scroll-behavior: smooth;
5  }
6
7  body {
8    color: var(--text);
9    background: var(--bg);
10   font-size: 1.15rem;
11   line-height: 1.5;
12   display: grid;
13   grid-template-columns:
14     1fr min(45rem, 90%) 1fr;
15   margin: 0;
16 }
17
18 body > * {
19   grid-column: 2;
20 }
21
22 body > header {
```

Bits & Atoms II

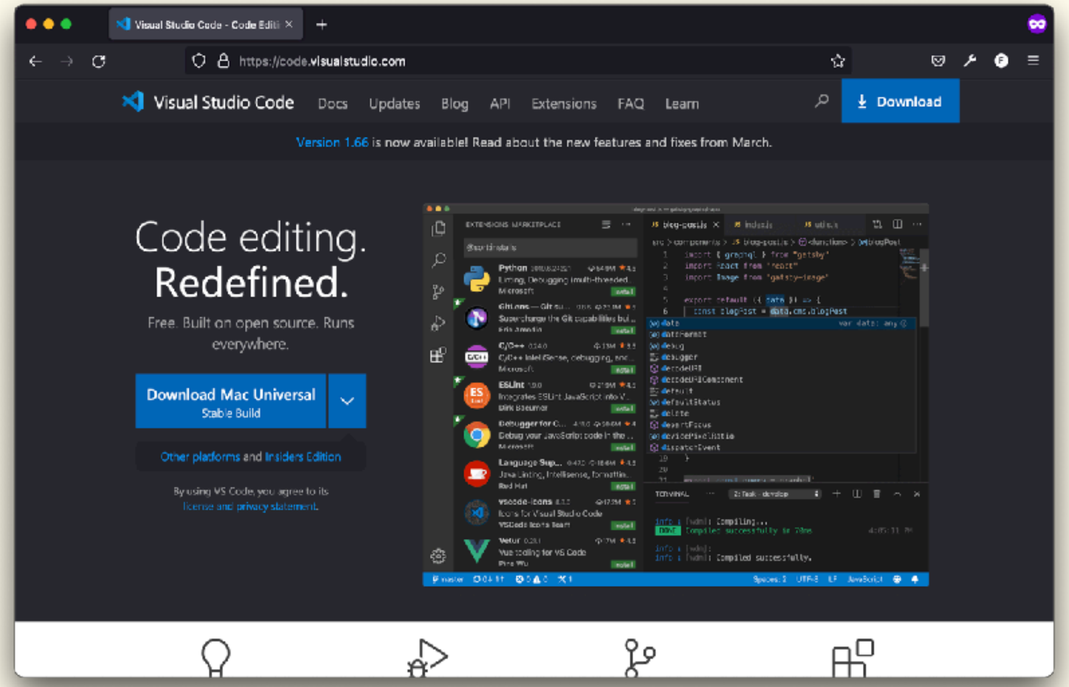
JavaScript

```
function registerPartials(directory, type, component) {
    var files = fs.readdirSync(directory);

    files.forEach(function (file) {
        var nextComponent = component;
        if (file == 'atoms' || file == 'molecules' || file == 'organisms') {
            type = file;
        } else if (!file.includes('.') && file != 'views') {
            nextComponent = file;
        }

        if (fs.statSync(directory + '/' + file).isDirectory()) {
            registerPartials(directory + '/' + file, type, nextComponent);
        } else {
            var matches = /^([^.]+).hbs$/.exec(file);
            if (matches) {
                var name = `views/${type}/${component}/${matches[1]}`;
                var template = fs.readFileSync(directory + '/' + file, 'utf8');
                hbs.registerPartial(name, template);
            }
        }
    });
}
```

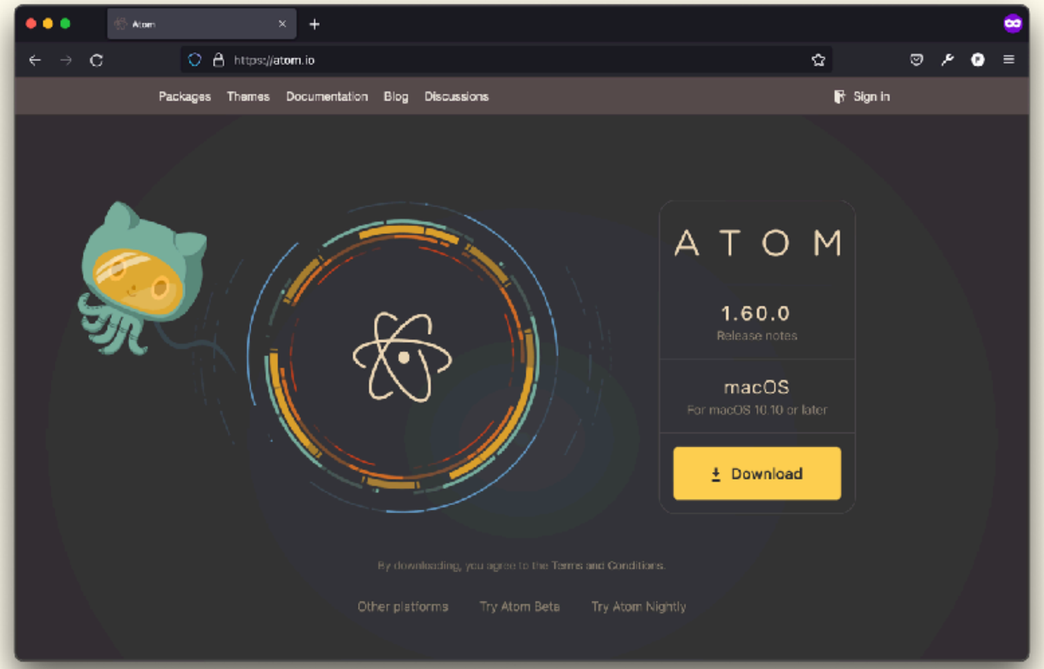
Tools

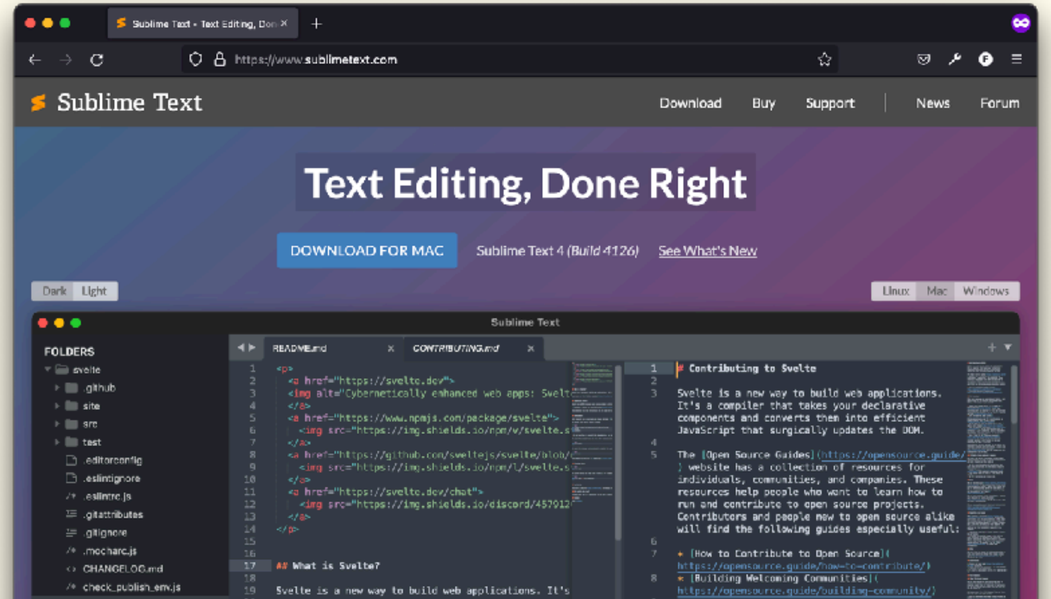
- Code-Editor (VS Code, Atom etc.)
- Browser (Firefox, Brave, Chrome, Safari, etc....)
  - Developer Tools
- Git Version Control (Github, Gitlab, Bitbucket...)
- Forums and Web-Resources (Stackoverflow, Mozilla Dev Network, W3C etc.)

Code-Editor



https://code.visualstudio.com/

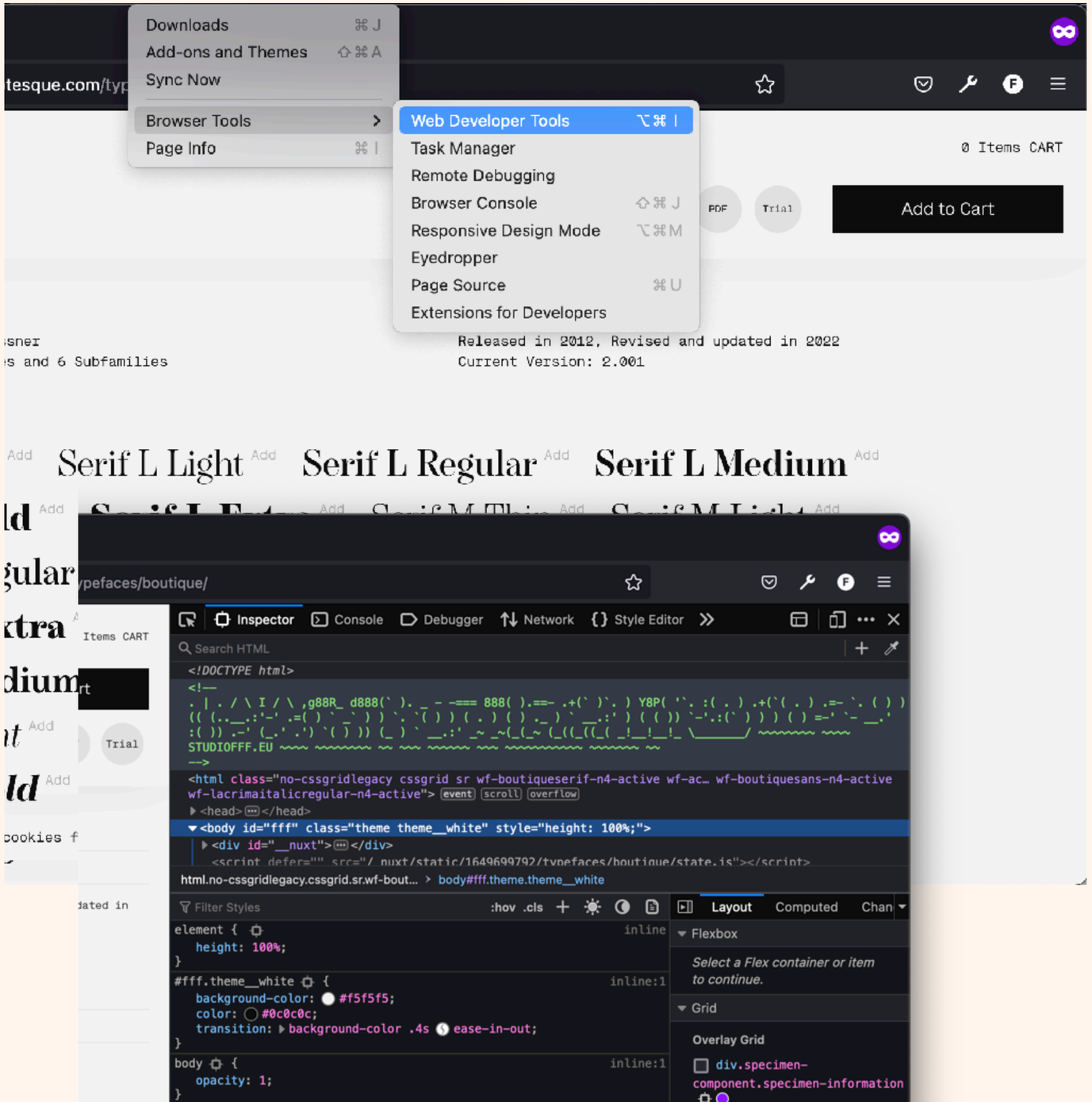




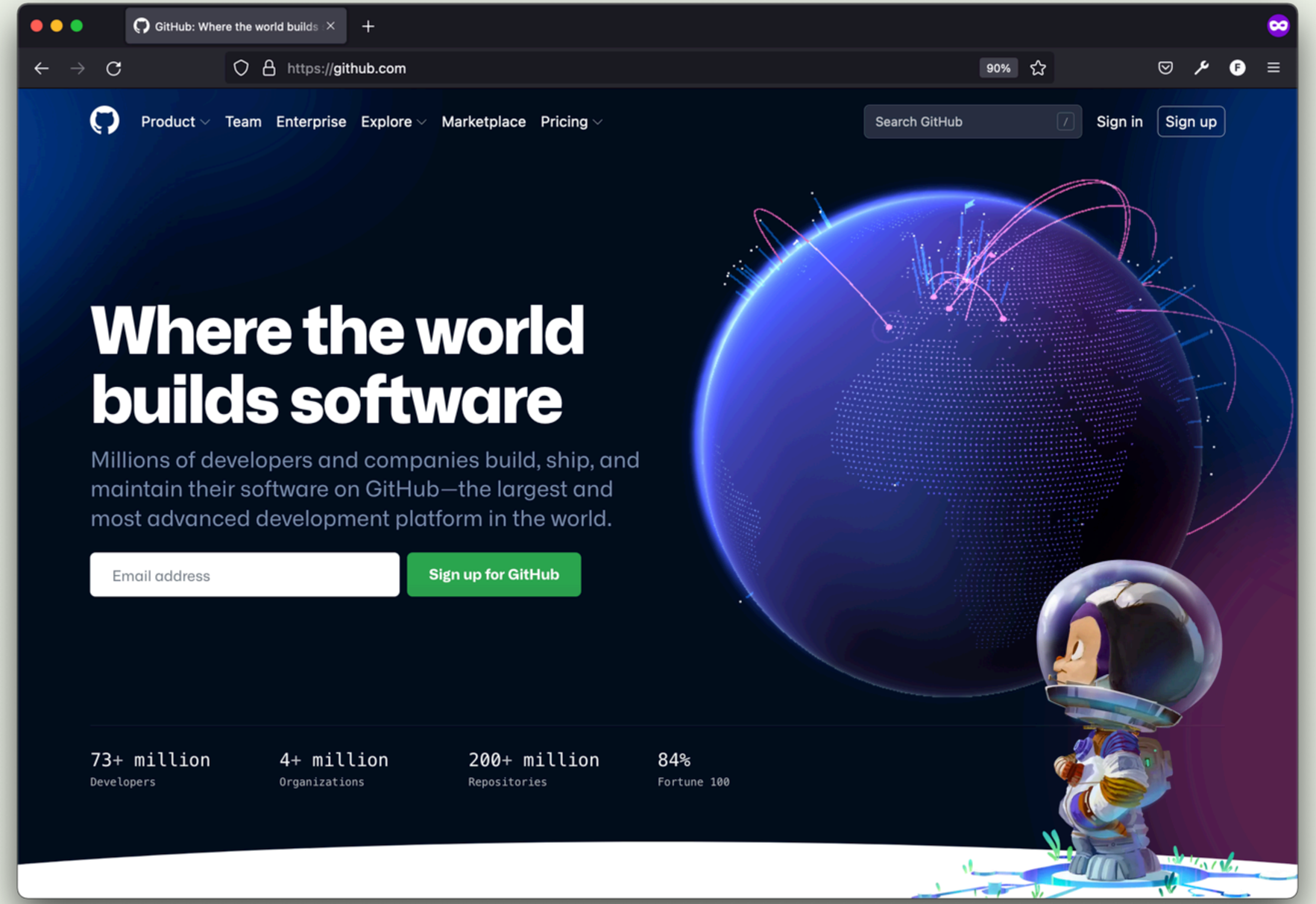
Developer Tools

Every browser is a bit different.
Look for terms like «Inspector», «Web Developer Tools» or «Console».

Shortcut:
Mac: *Option + Command + I*
Windows: *F12*



Git



Github
https://github.com/join

Help

- stackoverflow.com
- Mozilla Dev Network
- caniuse.com
- GitHub issues
- Search engines
- Validation W3C
- Framework/Library Documentations
  - e.g.: nuxt.js
  - e.g.: lodash

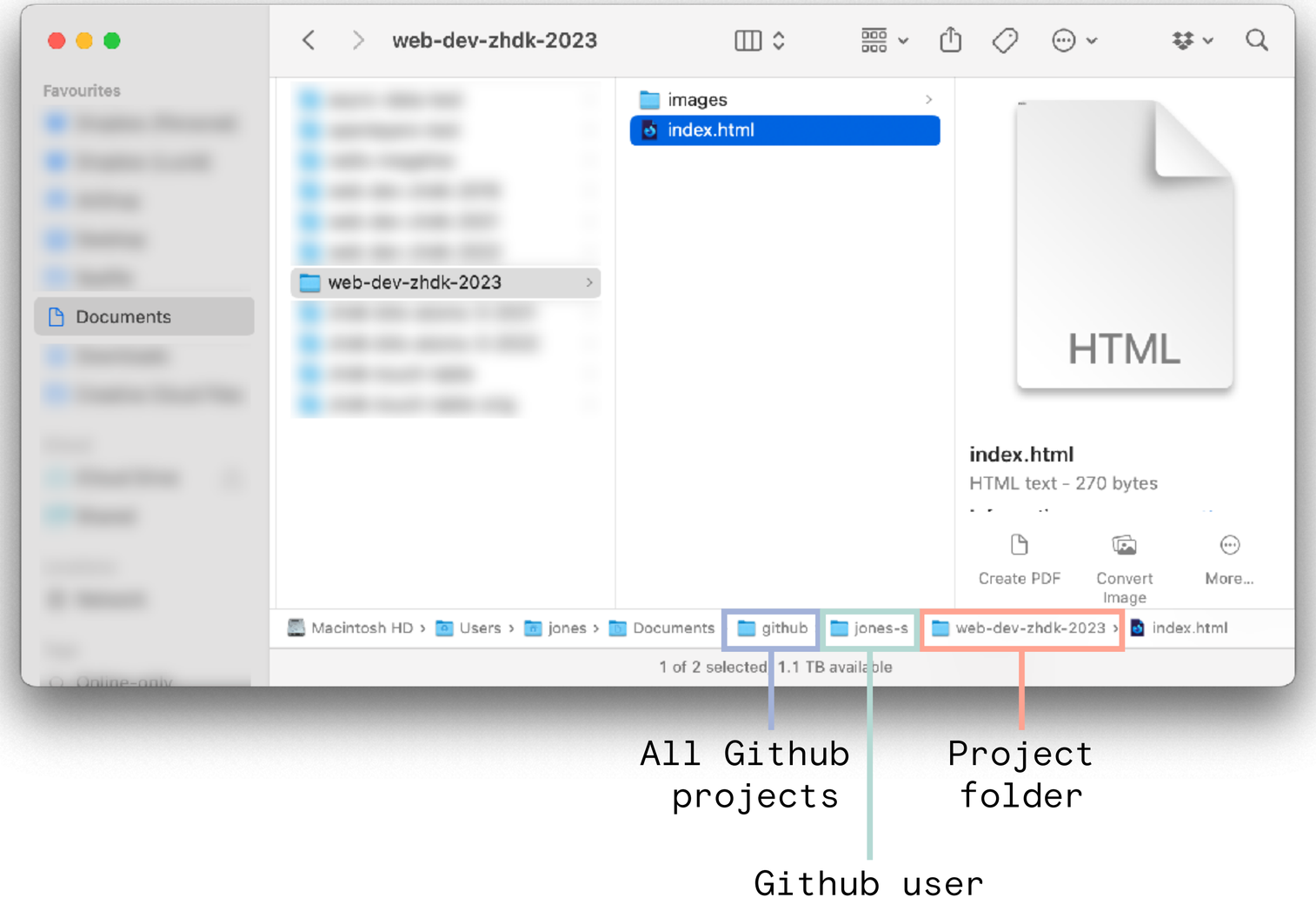
Hands-On

- Download code editor ✅
- Open dev tools in browser of your choice
- Create your first *.html* file.

Folder Structure and File Names

- Don’t use uppercase letters
- Don’t use special characters
- Don’t use spaces. Use dashes or underscores
- Keep everything in one place

Example


web-dev-zhdk-2023
Favourites
Documents
images
index.html
web-dev-zhdk-2023
HTML
index.html
HTML text - 270 bytes
Create PDF
Convert Image
More...
Macintosh HD › Users › jones › Documents › github › jones-s › web-dev-zhdk-2023 › index.html
1 of 2 selected, 1.1 TB available
All Github projects
Project folder
Github user

Tags and Attributes

Tag

```
<html>…</html>
```

Opening tag

Class attribute

Closing tag

```
<p data-attribute=“content” class=“paragraph”>…</p>
```

Attribute

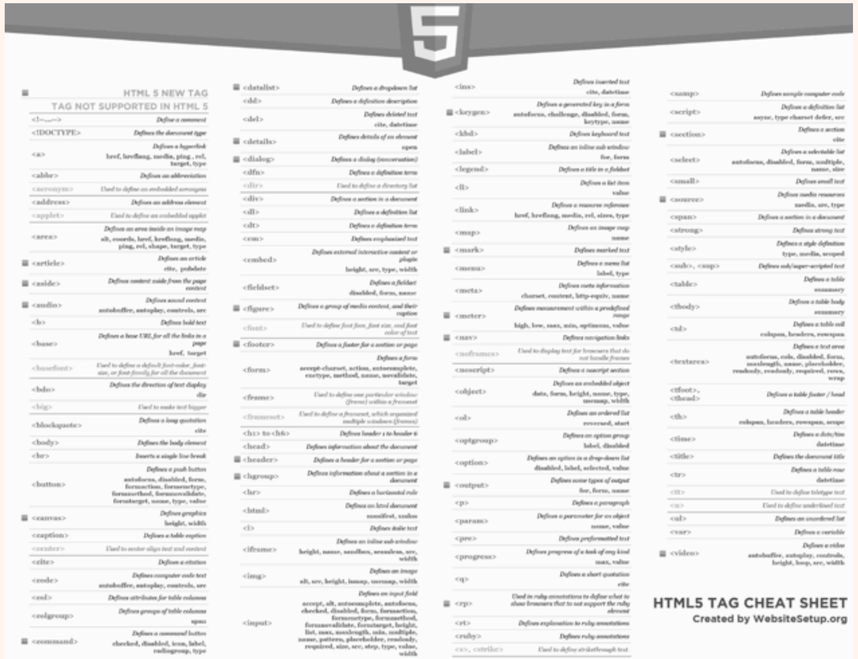
index.html

```html
<html>
  <head>
    <title>Bits and Atoms II</title>
  </head>

  <body>
    Hello
  </body>
</html>
```

index.html

Selection of important tags:

```
<p>
<h1>-<h6>
<a>
<img>
<ul>/<ol>
<input>
<table>
<div>
```



https://websitesetup.org/wp-content/uploads/2014/09/html5-cheat-sheet.png

Task (15min)

- Create a document featuring
  - A title
  - A paragraph

Bits & Atoms II

Coding together

Task 2 (10min)

- Add an image
- Add a link (<a>)