

WEB DEVELOPMENT

The presentation was developed using color-blind friendly palette.
Because everyone deserves to see all the details.



THE INTERNET

INDEX

1. Topic 1: HTTP and HTML

- i. The Internet
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- iii. The URL
- iv. The HTTP

2. Topic 2: Working with Data Sources and Data Security

- i. Structured Data Representation formats
- ii. Application Programming Interface (API & REST API)



THE INTERNET

THE INTERNET

DEFINITION



What exactly is the internet?

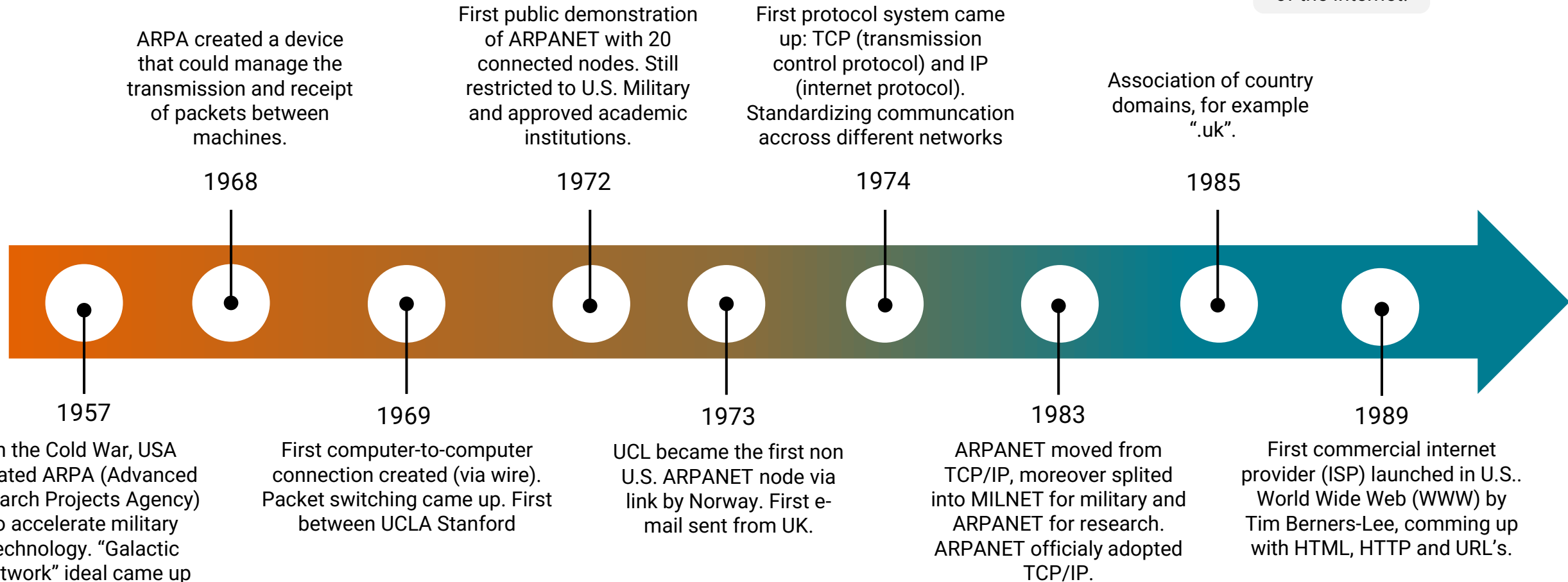
According to *Kurose and Ross (2021)*, the Internet is the global infrastructure that enables digital communication and allows devices to exchange data using the TCP/IP protocols



THE INTERNET HISTORY



The entire story of the internet!



THE HTML



HTML

DEFINITION

What is HTML?

HTML stands for “HyperText Markup Language”, a markup language used to structure webpages



HTML

Semantic

Refers to the use of tags that convey meaning about the content they enclose



Well-Formed

Means that the syntax follows proper nesting, has closed tags, uses quoted attributes, and avoids structural ambiguity.

Valid

Means that the code follows the rules of the W3C HTML specification.



HTML documents should follow three essential principles for high-quality markup:



THE URL



URL

DEFINITION

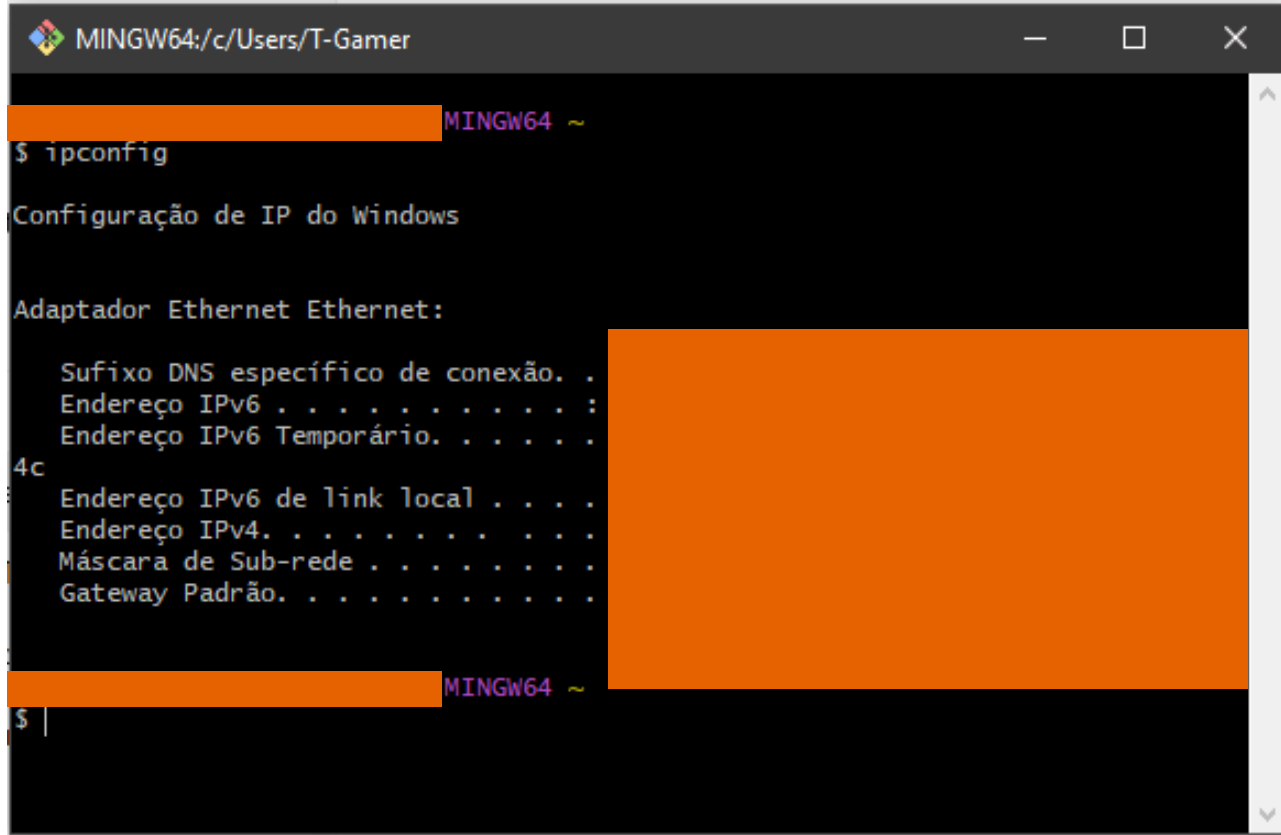
What is URL?

URL stands for Uniform Resource Locator, is the address used to locate a resource from the internet.



URL

HOW TO CHECK YOUR IP ADDRESS



```
MINGW64:/c/Users/T-Gamer
$ ipconfig

Configuração de IP do Windows

Adaptador Ethernet Ethernet:

    Sufixo DNS específico de conexão. .
    Endereço IPv6 . . . . . :
    Endereço IPv6 Temporário. . . . .
4c  Endereço IPv6 de link local . . . .
    Endereço IPv4. . . . .
    Máscara de Sub-rede . . . . .
    Gateway Padrão. . . . .

MINGW64 ~
$ |
```

Using *ipconfig*,
you're able to
check your IPv6,
IPv4, etc.



THE HTTP PROTOCOL



HYPER TEXT TRANSFER PROTOCOL (HTTP)

DEFINITION

What is HTTP?

It's an application protocol created in 1989 by Tim Berners-Lee to enable communication between browser and servers



HYPER TEXT TRANSFER PROTOCOL (HTTP)

DEFINITION

What about the
HTTPS?



Uses a different port (443 by default) and is encrypted via TLS (Transporter Layer Security). Ensuring:

- Confidentiality
- Integrity
- Authenticity



HYPER TEXT TRANSFER PROTOCOL (HTTP)

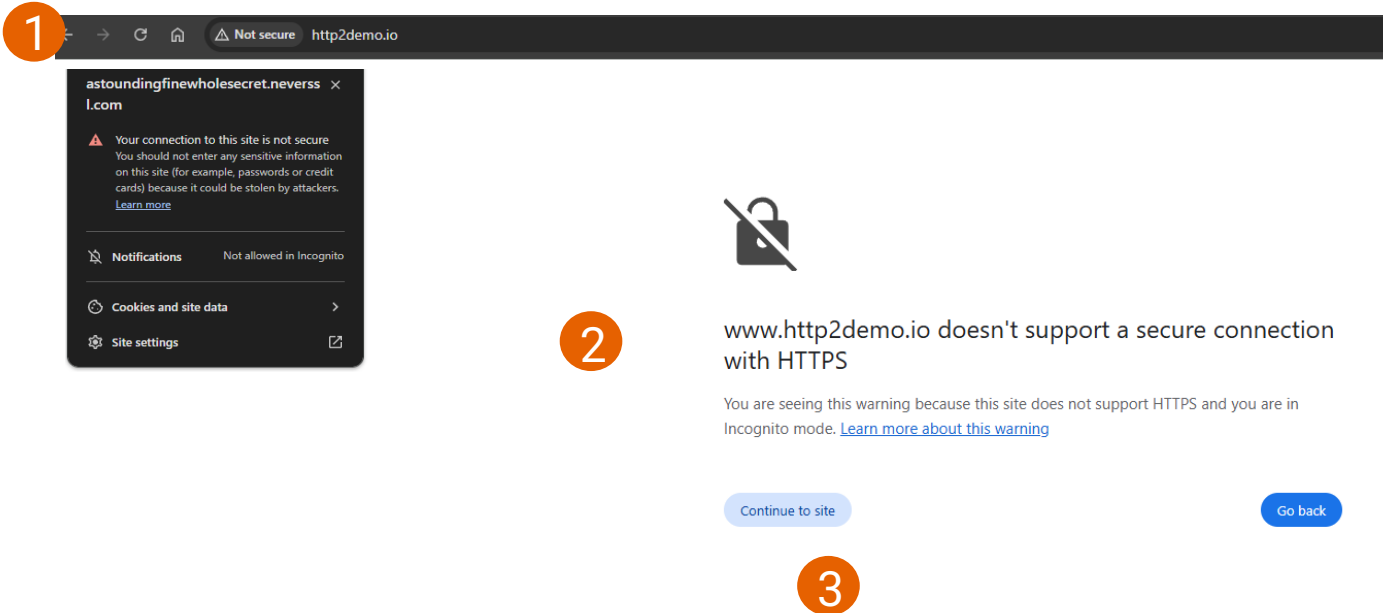
LAB

It's LAB time! In this section it's going to be presented the differences from HTTP and HTTPS using browser and Wireshark.



HYPER TEXT TRANSFER PROTOCOL (HTTP) *(Presented Live)*

LAB



Check the website <http://www.http2demo.io/> with HTTP protocol.

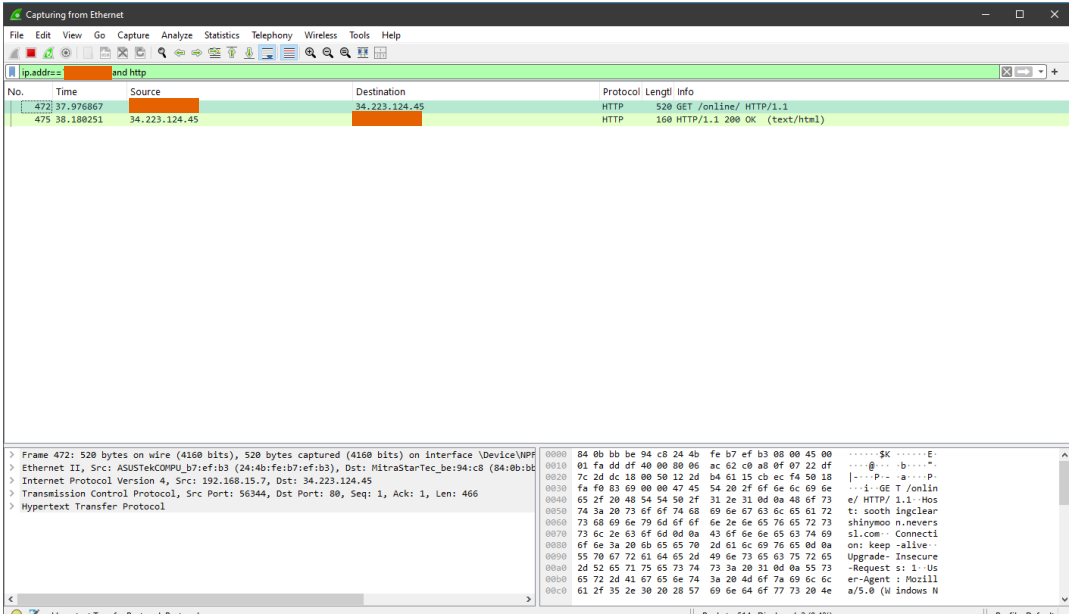
By accessing a non-secure webpage, the browser:

1. Automatically warns the user about a not secure website
2. States the website doesn't support HTTPS
3. Asks if the user wants to continue to the site



EXPERIMENTATION LAB

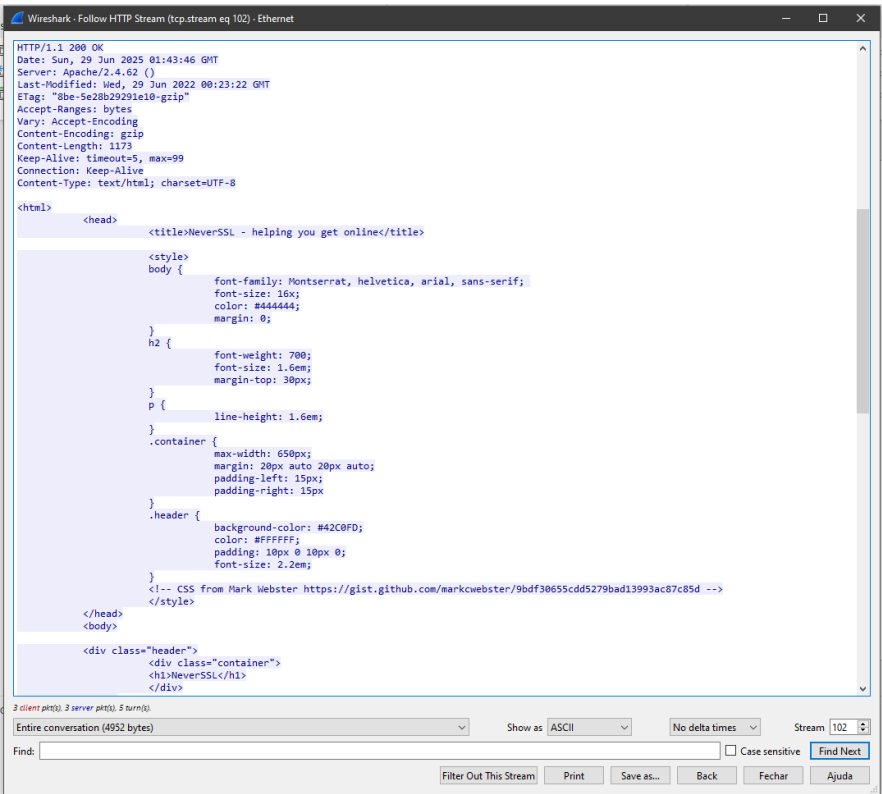
(Presented Live)



Filtering the IP computer address and for HTTP.

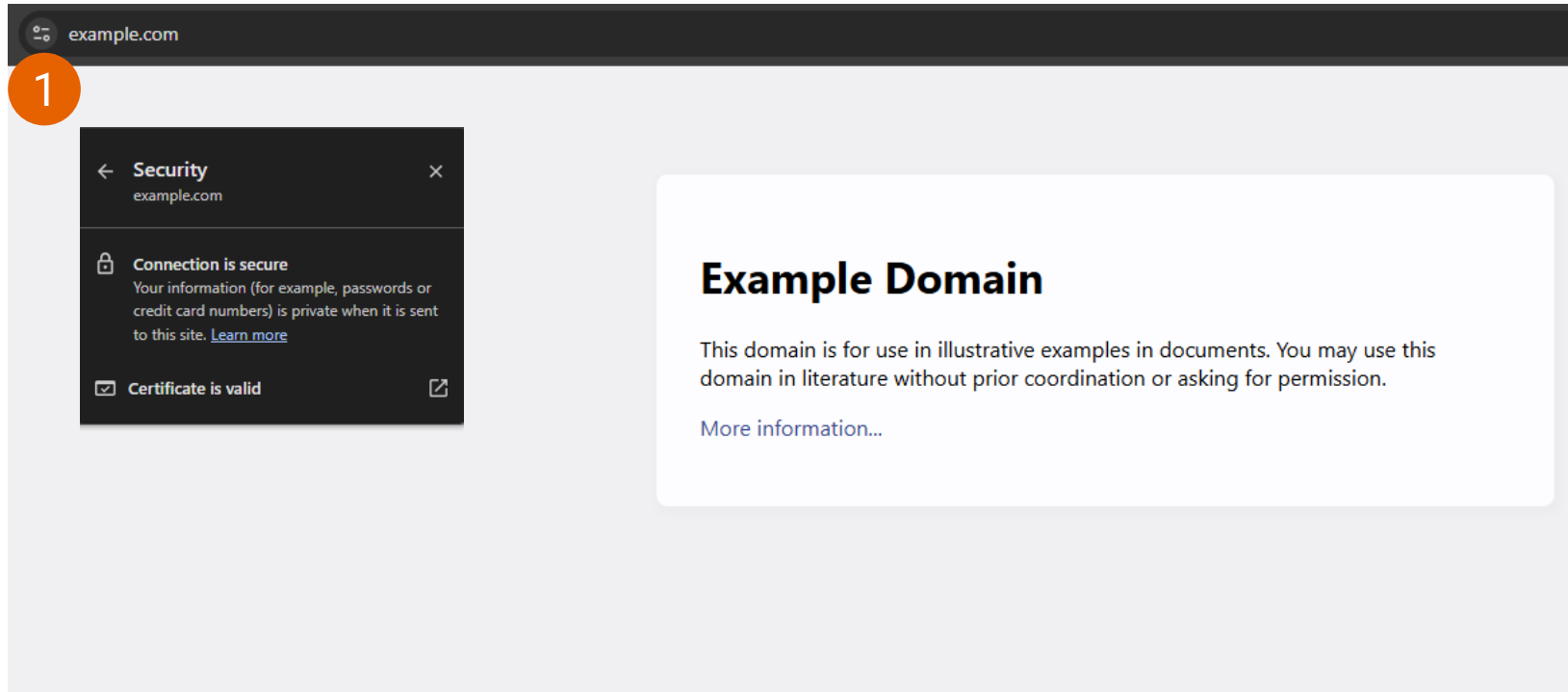


All data from HTML can be seen here (even passwords!).



HYPER TEXT TRANSFER PROTOCOL (HTTP) *(Presented Live)*

LAB



Check the website <https://example.com/> with **HTTPS** protocol.

By accessing a secure webpage, the browser normally access the page.



HYPER TEXT TRANSFER PROTOCOL (HTTP) *(Presented Live)*

LAB



Capturing from Ethernet

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

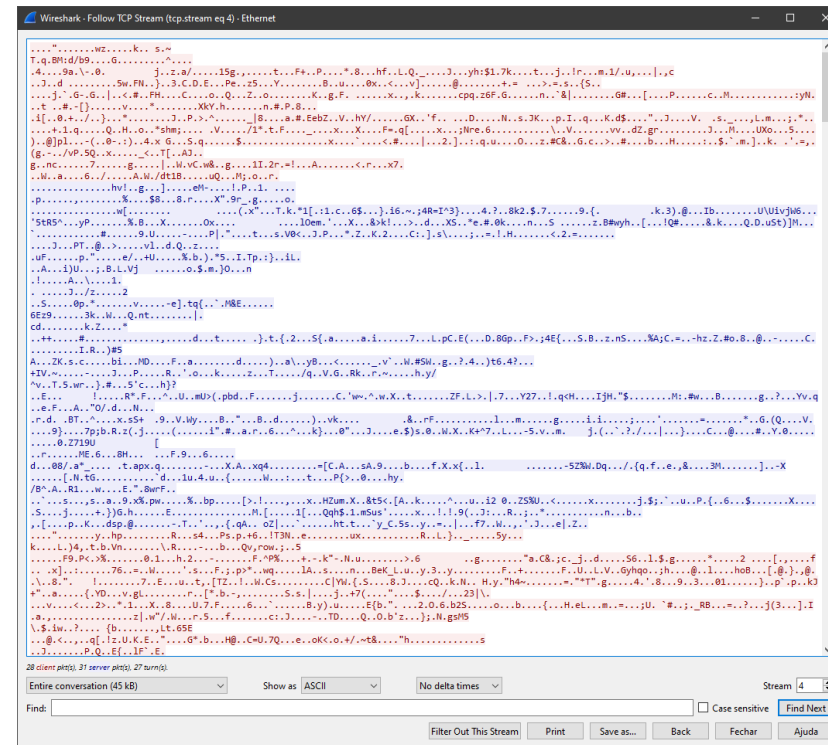
(ip.addr == [redacted] and (tcp.port == 443))

No.	Time	Source	Destination	Protocol	Length	Info
81	7.785065	[redacted]	[redacted]	TLSv1.2	108	Application Data
82	7.793020	[redacted]	[redacted]	TLSv1.2	110	Application Data
84	7.837497	[redacted]	[redacted]	TCP	54	53280 → 443 [ACK] Seq=55 Ack=57 Win=1024 Len=0
86	8.771714	[redacted]	[redacted]	TLSv1.2	108	Application Data
87	8.781292	[redacted]	[redacted]	TLSv1.2	110	Application Data
89	8.832774	[redacted]	[redacted]	TCP	54	53284 → 443 [ACK] Seq=55 Ack=57 Win=1023 Len=0
98	9.280288	[redacted]	[redacted]	TLSv1.2	1146	Application Data
109	9.340326	[redacted]	[redacted]	TCP	54	53284 → 443 [ACK] Seq=55 Ack=1149 Win=1025 Len=0

Filtering the IP address from the computer and for HTTPS (here, using its port 443)



Fully encrypted!



STRUCTURED DATA REPRESENTATION FORMATS



STRUCTURED DATA REPRESENTATION FORMATS

DEFINITION



What are structured data representation formats?

Structured data representation formats are standardized ways to organize and encode data using predictable structures such as key-value pairs, tables, or hierarchies.



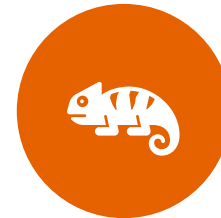
STRUCTURED DATA REPRESENTATION FORMATS

DEFINITION



- Verbose
- Used in older and enterprise systems
- SOAP-based services

The two main types of archives for data transfer, specially between APIs



- Lightweight
- Readable
- Widely supported accross browsers and languages

APPLICATION PROGRAMMING INTERFACE (API)



APPLICATION PROGRAMMING INTERFACE (API)

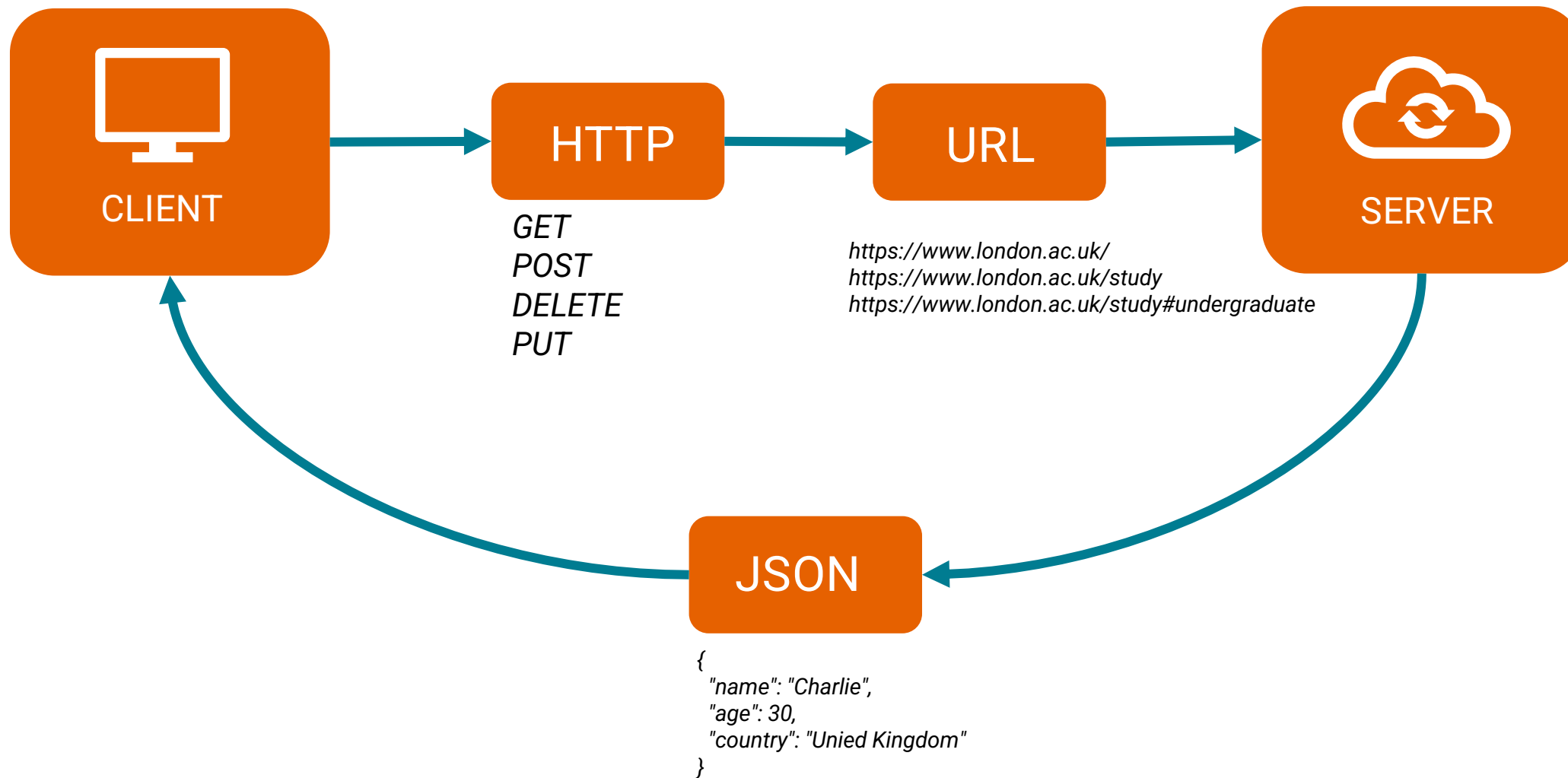


What is an API? And a REST API?

An API (Application Programming Interface) is a set of rules that allows different software systems to communicate with each other. REST (Representational State Transfer) is an architecture style to build web APIs.
Roy Fielding (2000).



REST API



APPLICATION PROGRAMMING INTERFACE (API)

```
1 <!DOCTYPE html>
2 <html lang="en">
3 <head>
4   <meta charset="UTF-8">
5   <title>Currency Fetch Demo</title>
6 </head>
7 <body>
8   <button onclick="getRate()">Fetch Rate</button>
9   <p id="result"></p>
10
11   <script>
12     function getRate() {
13       fetch("https://api.frankfurter.dev/v1/latest?base=USD&symbols=EUR")
14         .then(res => res.json())
15         .then(data => {
16           document.getElementById("result").textContent =
17             `1 USD = ${data.rates.EUR} EUR`;
18         });
19     }
20   </script>
21 </body>
22 </html>
```



Fetch Rate

1 USD = 0.85441 EUR



REFERENCES

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THANK YOU!

