

Web (API) Development

- Why?
- API
- HTTP Protocol
- HTML / JSON

Sorry, no code today

Why learning Web Server Development?

- Learning curve is moderate
- Web Developer (Front-end, **Backend**, Full Stack)
- Mobile App Developer (Android, iOS, Hybrid (React Native, ...))
- OS App Developer (MacOS, Windows, Linux)
- Salary
 - Junior : 35-45K€ / year
 - Senior : 55-65K€ / year

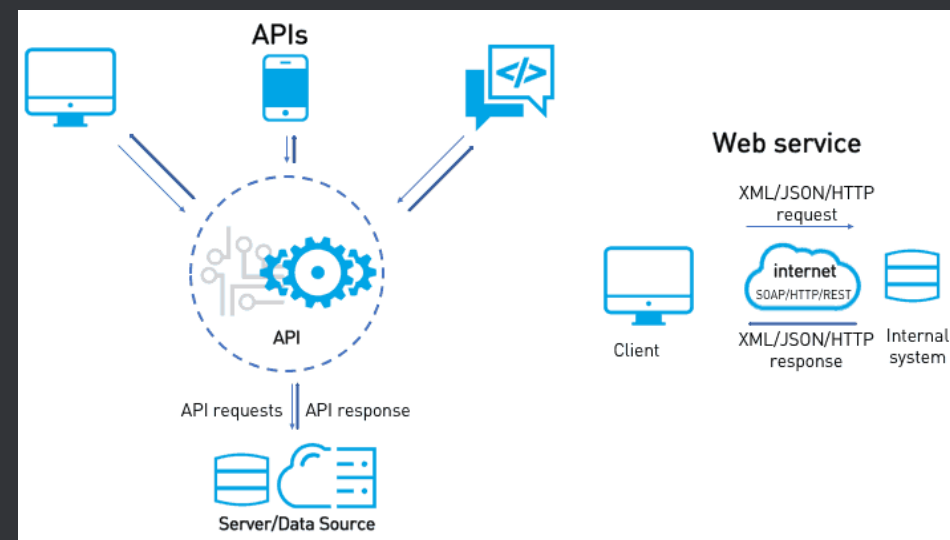
Year	# Developers
2018	23.9M
2019	26.4M
2023	28.7M
2030	45M

-- <https://www.daxx.com/blog/development-trends/number-software-developers-world>

(Web) API

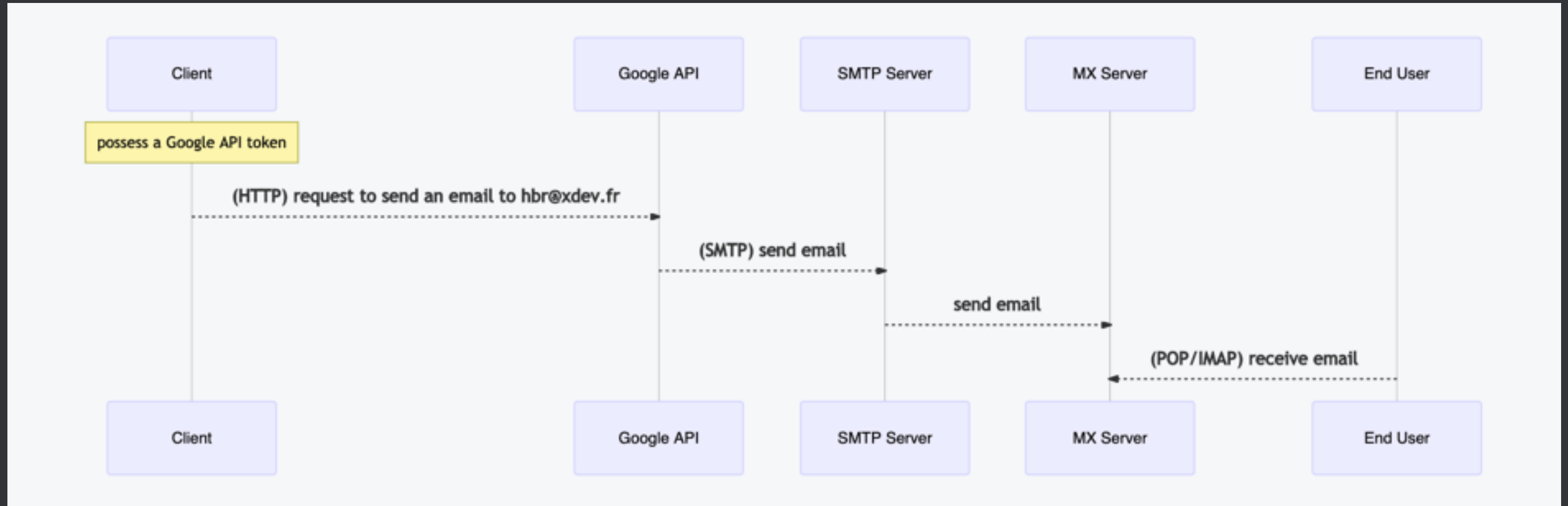
An application programming interface (API) is a connection between computers or between computer programs.
— <https://en.wikipedia.org/wiki/API>

- An API is a contract
- Public API
- Versionize

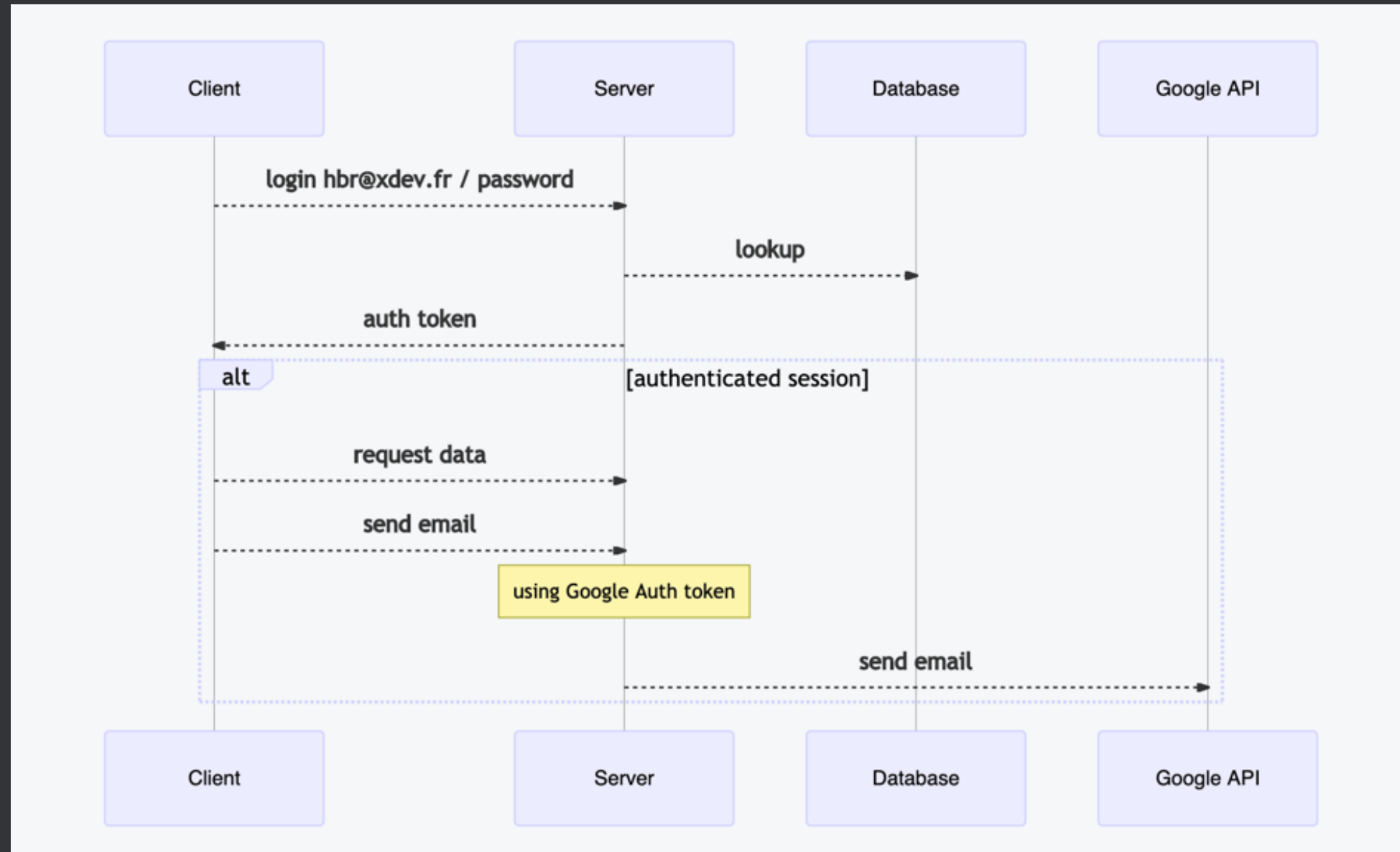


- HTTP
- SOAP / XML
- REST / JSON

Public API

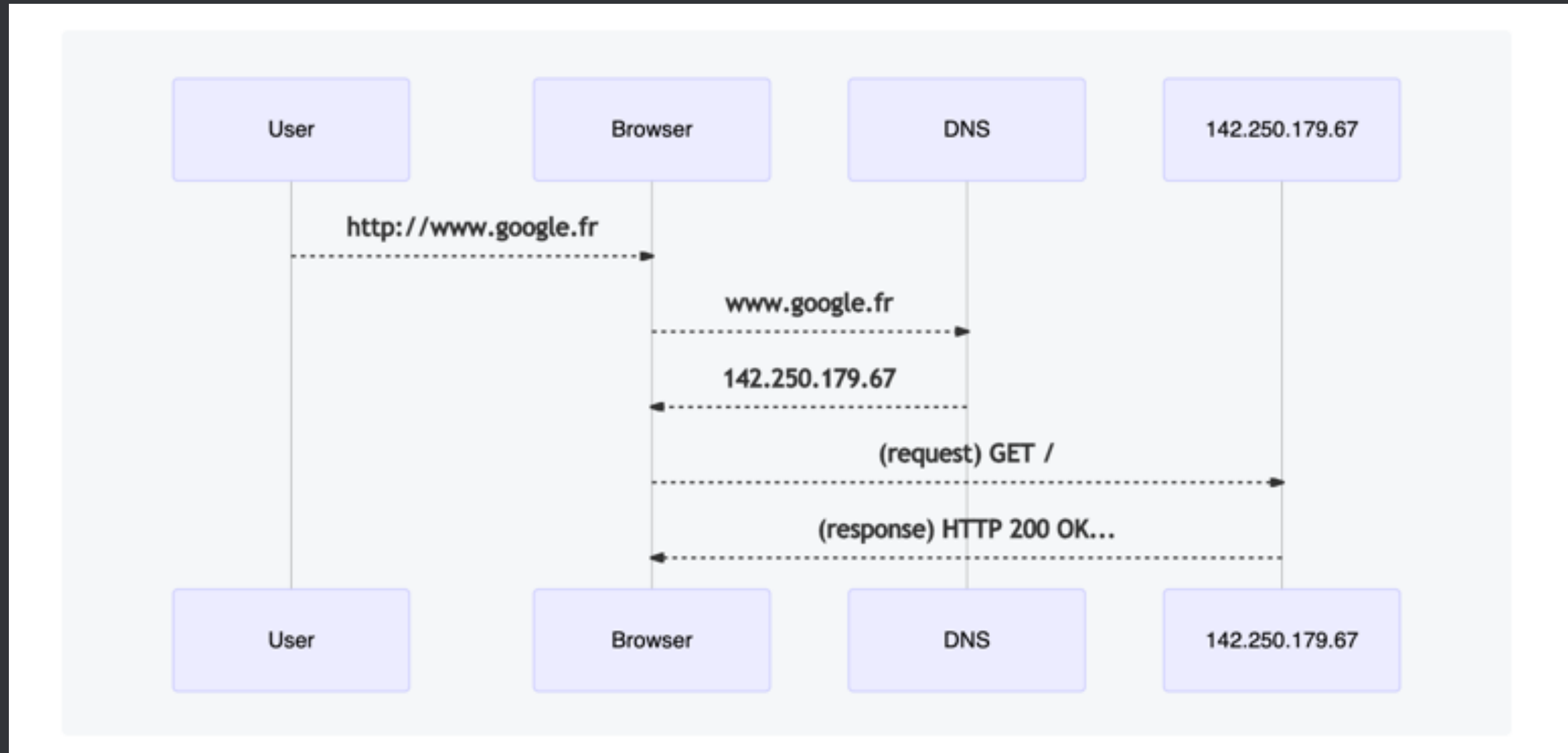


App API



HTTP

Accessing a website



URL (URI)

`https://www.google.com/search?q=URL`

The target of an HTTP request is called a "resource", whose nature isn't defined further; it can be a document, a photo, or anything else. Each resource is identified by a Uniform Resource Identifier (URI) used throughout HTTP for identifying resources.

The most common form of URI is the Uniform Resource Locator (URL), which is known as the web

`https://www.google.fr/abc/123?param1=value1¶ms2=value2#header`

`[PROTOCOL]://[HOST]/[PATH]?[QUERY]#[SEGMENT]`

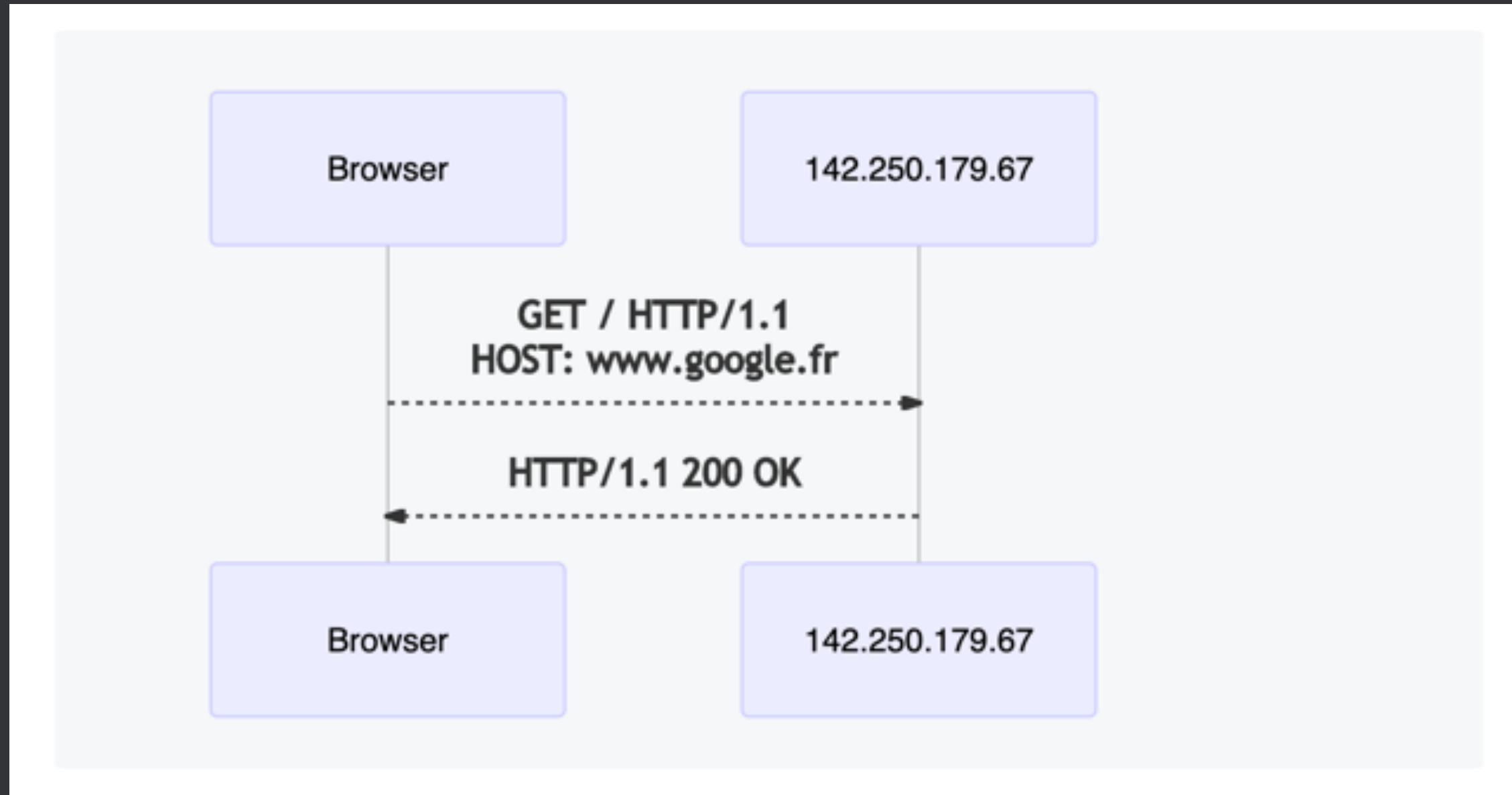
-- `https://developer.mozilla.org/en-US/docs/Web/HTTP/BasicsofHTTP/IdentifyingresourcesontheWeb`

HTTP

Hypertext Transfer Protocol (HTTP) is an *application-layer* (OSI Model) protocol for transmitting hypermedia documents, such as HTML

-- <https://developer.mozilla.org/en-US/docs/Web/HTTP>

Request / Response



Request

A request header is an HTTP header that can be used in an HTTP request to provide information about the request context, so that the server can tailor the response

CMD RESOURCE PROTOCOL

HEADER: VALUE

HEADER: VALUE

...

[EMPTY LINE]

BODY

```
GET /home.html HTTP/1.1
Host: developer.mozilla.org
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.9; rv:50.0) Gecko/20100101 Firefox/50.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate, br
Referer: https://developer.mozilla.org/testpage.html
Connection: keep-alive
Upgrade-Insecure-Requests: 1
If-Modified-Since: Mon, 18 Jul 2016 02:36:04 GMT
If-None-Match: "c561c68d0ba92bbeb8b0fff2a9199f722e3a621a"
Cache-Control: max-age=0
```

-- https://developer.mozilla.org/en-US/docs/Glossary/Request_header

POST

POST /chats/123/messages HTTP/1.1

Host: slack.com

Content-Type: application/json

```
{  
  "message": "Hello, World!",  
  "sender": "hugues",  
  "mention": "@marc, @claire, @alix"  
}
```

Request Type

GET /home.html HTTP/1.1

Command	Action	Safe	Idempotent
GET	Read	x	x
POST	Create	-	-
PUT	Update	-	x
DELETE	Delete	-	x

- HEAD
- PATCH

An HTTP method is idempotent if an identical request can be made once or several times in a row with the same effect while leaving the server in the same state
-- <https://developer.mozilla.org/en-US/docs/Glossary/Idempotent>
An HTTP method is safe if it doesn't alter the state of the server. In other words, a method is safe if it leads to a read-only operation
— <https://developer.mozilla.org/en-US/docs/Glossary/Safe>

User-Agent

User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.9; rv:50.0) Gecko/20100101 Firefox/50.0

Browser, helps the server interpreting the request

Accept

Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8

Type of document accepted (**text/html, application/json, ...**) -- ie MIME type.

A media type (also known as a Multipurpose Internet Mail Extensions or MIME type) is a standard that indicates the nature and format of a document, file, or assortment of bytes.

— https://developer.mozilla.org/en-US/docs/Web/HTTP/BasicsofHTTP/MIME_types

Response

A response header is an HTTP header that can be used in an HTTP response and that doesn't relate to the content of the message. Response headers, like Age, Location or Server are used to give a more detailed context of the response.

— https://developer.mozilla.org/en-US/docs/Glossary/Response_header

STATUS STATUS_CODE

HEADER: VALUE

HEADER: VALUE

...

[EMPTY LINE]

BODY


```
200 OK
Access-Control-Allow-Origin: *
Connection: Keep-Alive
Content-Encoding: gzip
Content-Type: text/html; charset=utf-8
Date: Mon, 18 Jul 2016 16:06:00 GMT
Etag: "c561c68d0ba92bbeb8b0f612a9199f722e3a621a"
Keep-Alive: timeout=5, max=997
Last-Modified: Mon, 18 Jul 2016 02:36:04 GMT
Server: Apache
Set-Cookie: mykey=myvalue; expires=Mon, 17-Jul-2017 16:06:00 GMT; Max-Age=31449600; Path=/; secure
Transfer-Encoding: chunked
Vary: Cookie, Accept-Encoding
X-Backend-Server: developer2.webapp.scl3.mozilla.com
X-Cache-Info: not cacheable; meta data too large
X-kuma-revision: 1085259
x-frame-options: DENY
```

```
<html>
<..
</html>
```

-- https://developer.mozilla.org/en-US/docs/Glossary/Payload_body

201 Created
HTTP/1.1 201 Created
Date: Sat, 02 Apr 2016 12:22:40 GMT
Location: <http://stackoverflow.com/a/36373586/12597>
Content-Type: application/json

```
{  
  "id": 12597,  
  "message": "how does HTTP protocol works?",  
  "created_by": "hugues",  
  "created_at": "2021-09-10 10:30"  
}
```

Response code

200 OK

Code	Meaning	Example
1XX	informational	
2XX	success	201, 202, 204
3XX	redirect	301, 302, 304
4XX	client error	400, 401, 403, 404, 418
5XX	server error	500, 501, 502

-- <https://developer.mozilla.org/en-US/docs/Web/HTTP/Status>

Content-Type

Content-Type: text/html; charset=utf-8

- **application/json**
- text/html
- text/javascript
- text/css
- text/csv
- image/jpeg
- image/png

The Content-Type representation header is used to indicate the original media type of the resource — <https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/Content-Type>

Cookie

Set-Cookie: mykey=myvalue; expires=Mon, 17-Jul-2017 16:06:00 GMT; Max-Age=31449600; Path=/; secure

A cookie is a small piece of information left on a visitor's computer by a website, via a web browser.

— <https://developer.mozilla.org/en-US/docs/Glossary/Cookie>

HTML

The HyperText Markup Language, or HTML is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.
— <https://en.wikipedia.org/wiki/HTML>

HTML blend presentation and content

```
<html>
<head>
  <title>John Smith</title>
</head>
<body>
<h1>John Smith (27 years old)</h1>

<div>
<h2>Address</h2>
<p>
  21 2nd Street<br/>
  New York, NY 10021-3100
</p>
</div>

<div>
<h2>Phone Numbers</h2>
<ul>
  <li>home: 212 555-1234</li>
  <li>office: 646 555-4567</li>
</ul>
</div>
</body>
</html>
```

John Smith (27 years old)

Address

21 2nd Street
New York, NY 10021-3100

Phone Numbers

- home: 212 555-1234
- office: 646 555-4567

JSON

JSON (JavaScript Object Notation) is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects consisting of attribute–value pairs and arrays (or other serializable values). It is a common data format with a diverse range of functionality in data interchange including communication of web applications with servers.
— <https://en.wikipedia.org/wiki/JSON>

JSON is only about Content, not presentation

```
{
  "firstName": "John",
  "lastName": "Smith",
  "age": 27,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [],
  "spouse": null
}
```

Next week TD

- Inspect HTTP Requests
- Forge HTTP Requests
- Play with some APIs