JÖNKÖPING UNIVERSITY

School of Engineering

INTRODUCTION

Web Development with JavaScript and DOM

TWJK14 Spring 2017

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PING PONG

Ping Pong event:

Web Development with JavaScript and DOM - TWJK14 - S17

Ping Pong password:

TWJK14S1717

Read `study-guide.pdf` on Ping Pong,
and the documents it links to.

CHARSETS & ENCODINGS

"Computers only understand numbers."

```
char string[] = "Hello";
```

A string in C.

Each character is mapped to a number.

Which character is mapped to which number?

- Is described by the used character encoding.

Which characters can we use?

- Is described by the used charset.

De facto standard encoding: ASCII

ASCII

American Standard Code for Information Interchange

- Each character represented by 7 bits.
  - $2^7 = 128$.
- http://www.ascii-code.com
- Does not contain å, ä, ö, Å, Ä or Ö ☹

Number	Character
0	NUL
…	…
65	A
66	B
…	…
97	a
98	b
…	…
127	DEL

Computers usually work with 8 bits.

- Encodings extending ASCII has been created.
- 128 additional characters!

EXTENDED ASCII

There exists many of them!

ISO 8859-1 / ISO Latin-1

Number	Character
0	NUL
…	…
127	DEL
128	PAD
…	…
196	Ä
197	Å
…	…
214	Ö
…	…
255	ÿ

Windows-1252 / ANSI

Number	Character
0	NUL
…	…
127	DEL
128	€
…	…
196	Ä
197	Å
…	…
214	Ö
…	…
255	ÿ

UNICODE

The solution to all encoding problems!

- A charset that can store ~1.000.000 characters.
- Numbers 0-127 mapped the same way as in ASCII.
  - It is backward compatible with ASCII.
- Exists different encodings:
  - UTF-32: each character represented by 32 bits.
    - But most common characters (a-z, A-Z) only requires 7 bits!
  - UTF-8: each character represented by 8, 16, 24 or 32 bits.
    - ASCII characters represented by 8 bits.

WEB BROWSER ENCODINGS

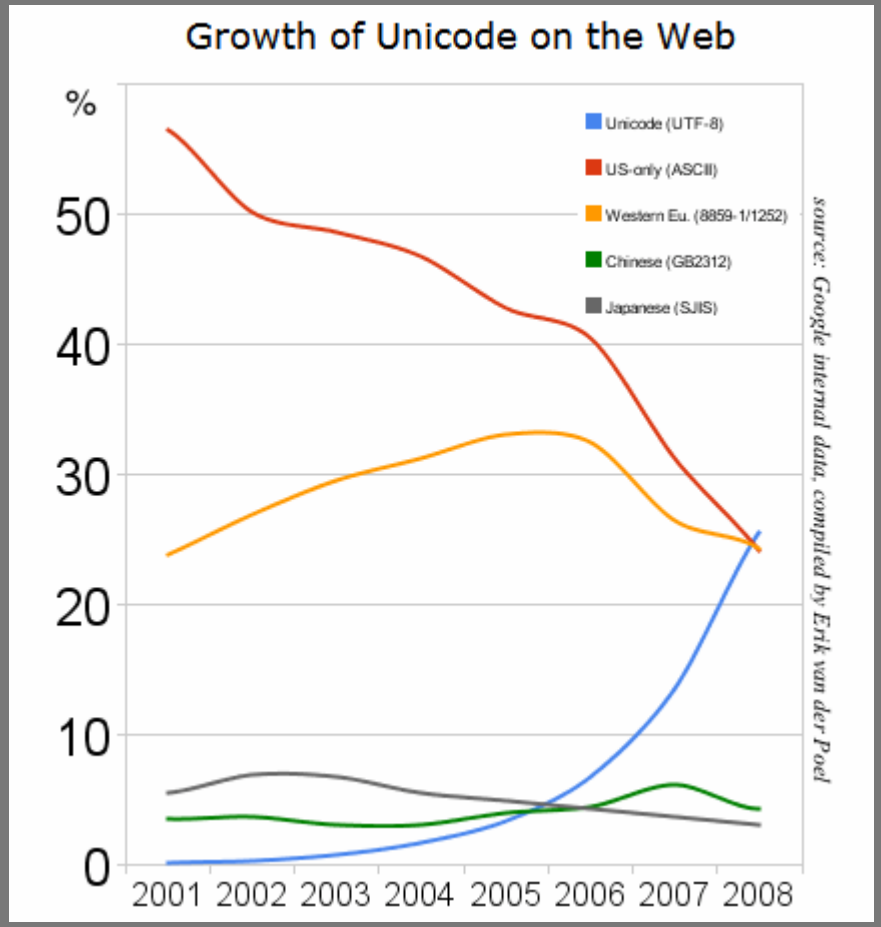
Which character encoding do web browsers use?

- Written in the webpage by the webpage author.

If the character encoding is not written in the webpage?

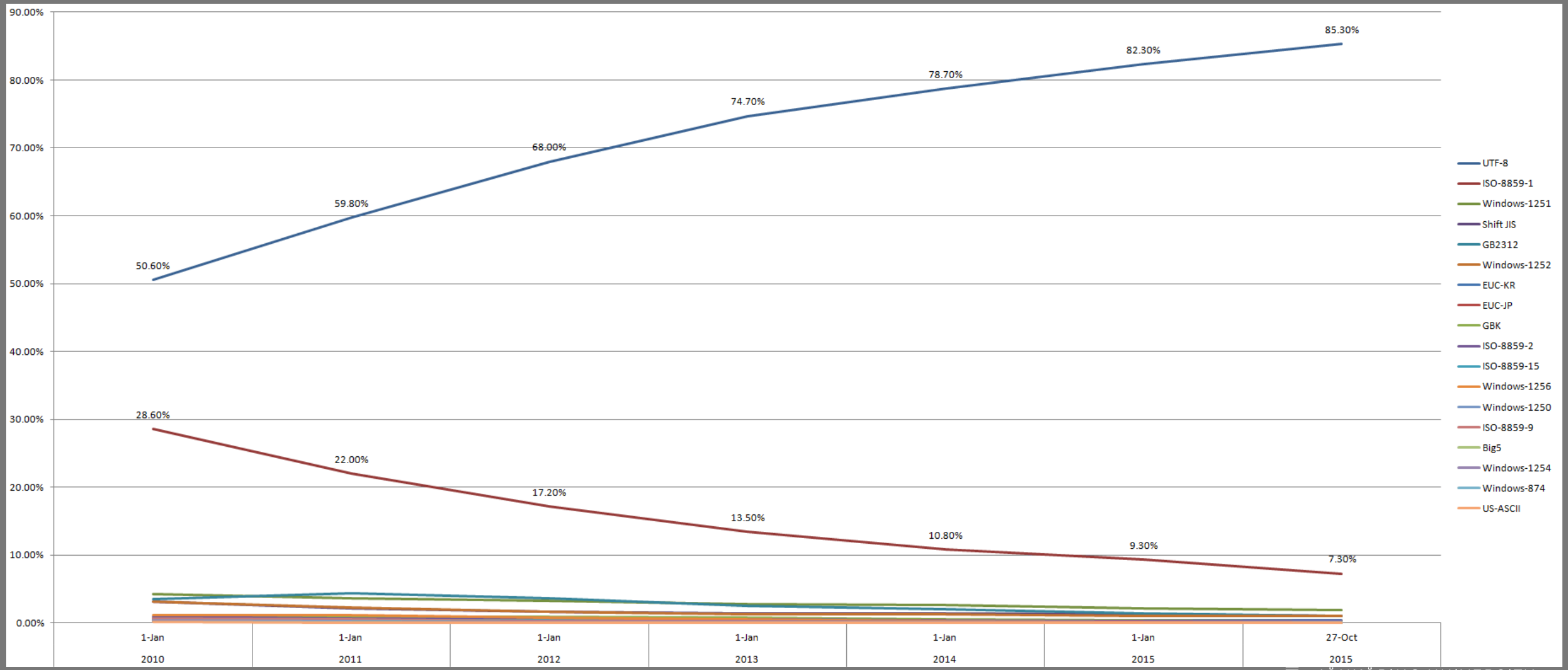
- Up to the web browser to decide.
  - In practice: UTF-8

UNICODE ON THE WEB



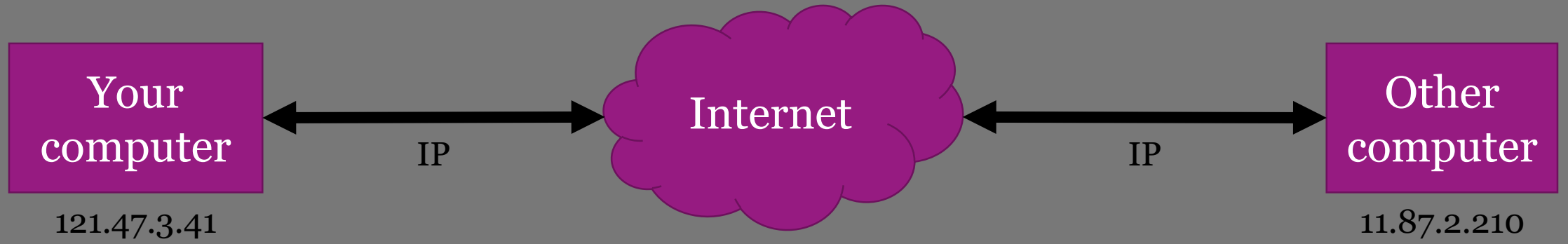
http://pinyin.info/news/2015/utf-8-unicode-vs-other-encodings-over-time/

UNICODE ON THE WEB



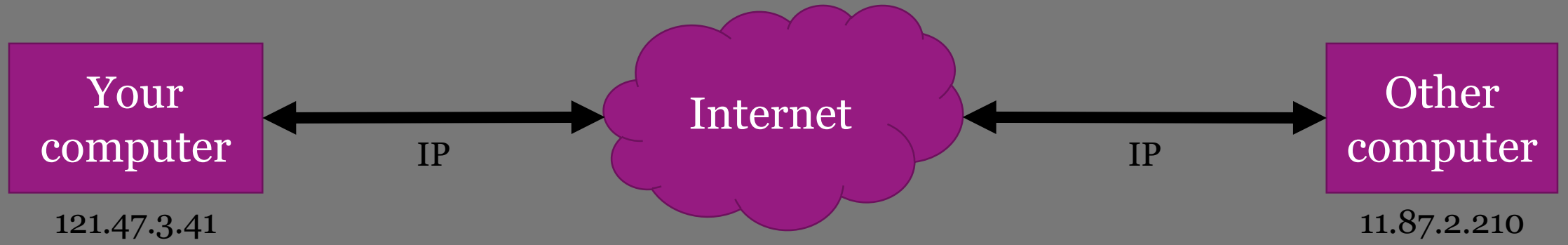
http://pinyin.info/news/2015/utf-8-unicode-vs-other-encodings-over-time/

THE INTERNET



- A network that has grown bigger and bigger since 1950's.
  - http://www.submarinecablemap.com
- The Internet Protocol is used for communications.
  - Each connected computer is assigned a unique IP address (32 bit).
  - Find your computer's IP address: http://www.whatsmyip.org
  - Find your computer's IP address: `Get-NetIPAddress` in Windows PowerShell
  - A package contains a small message, delivery not guaranteed.

THE INTERNET



Services

- E-mail (SMTP, Simple Mail Transfer Protocol).
- File sharing (FTP, File Transfer Protocol).
- DNS, Domain Name System (UDP or TCP).
- World Wide Web (HTTP, HyperText Transfer Protocol).
- And more!

The port indicates the protocol.

THE WEB

Created by Tim Berners-Lee at CERN 1989.

- http://home.cern/topics/birth-web

The first web page:

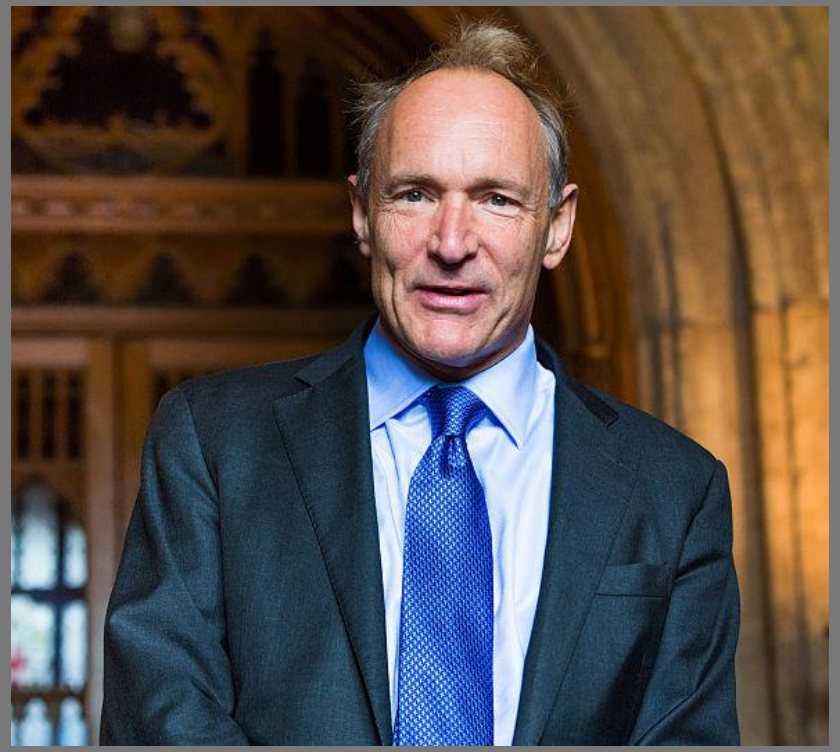
- http://info.cern.ch/hypertext/WWW/TheProject.html

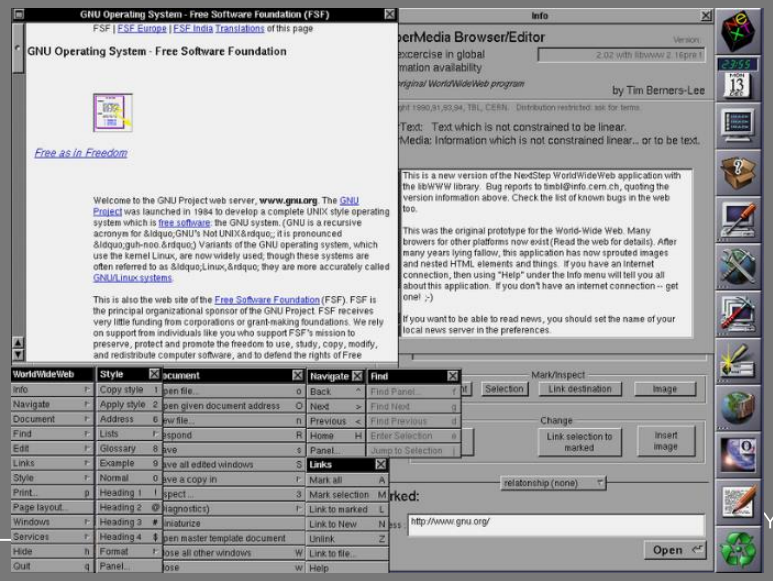
The first web browser:

- WorldWideWeb

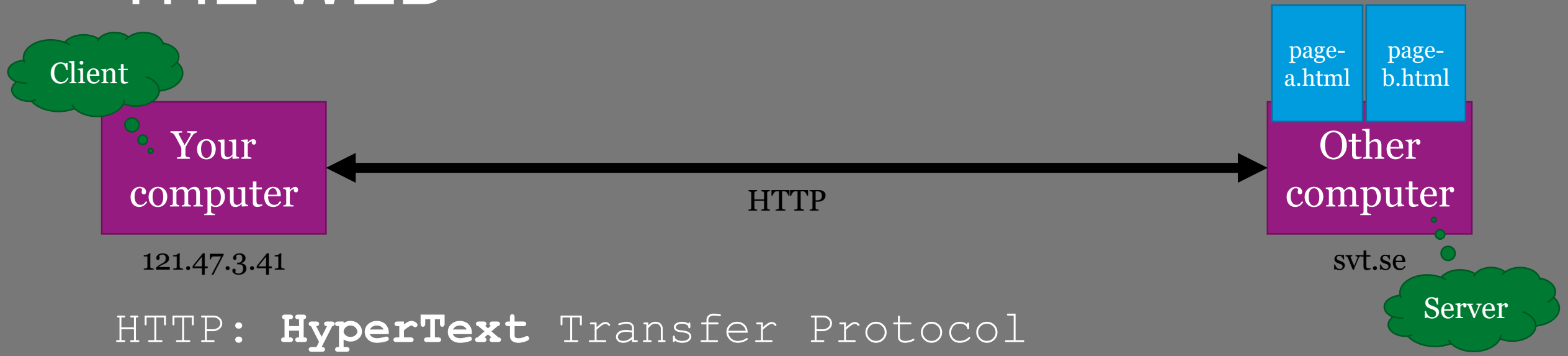
"Maintained" by W3, World Wide Web Consortium.

- https://www.w3.org/Consortium





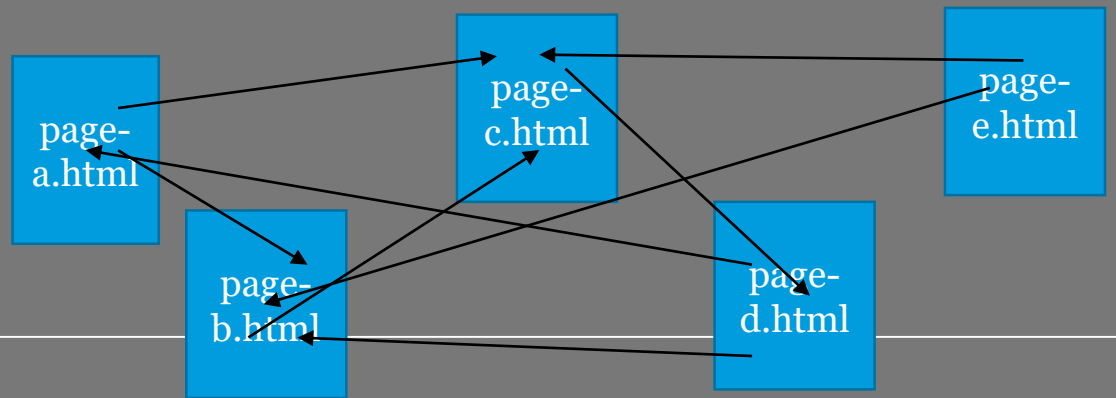
THE WEB



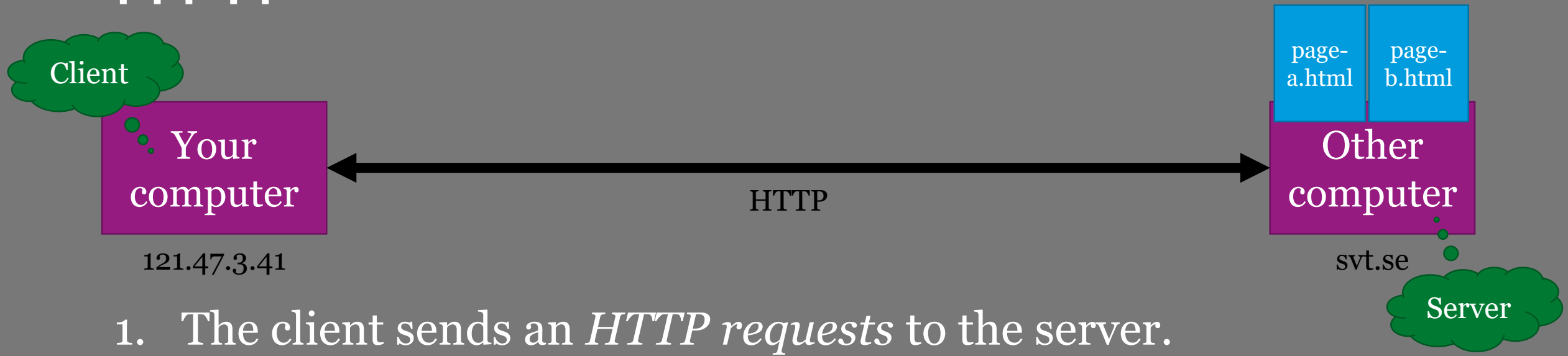
`HTTP:` **`HyperText`** `Transfer Protocol`

`HTML:` **`HyperText`** `Markup Language`

HyperText = a hyperlink to another web page (forms a web!).



HTTP



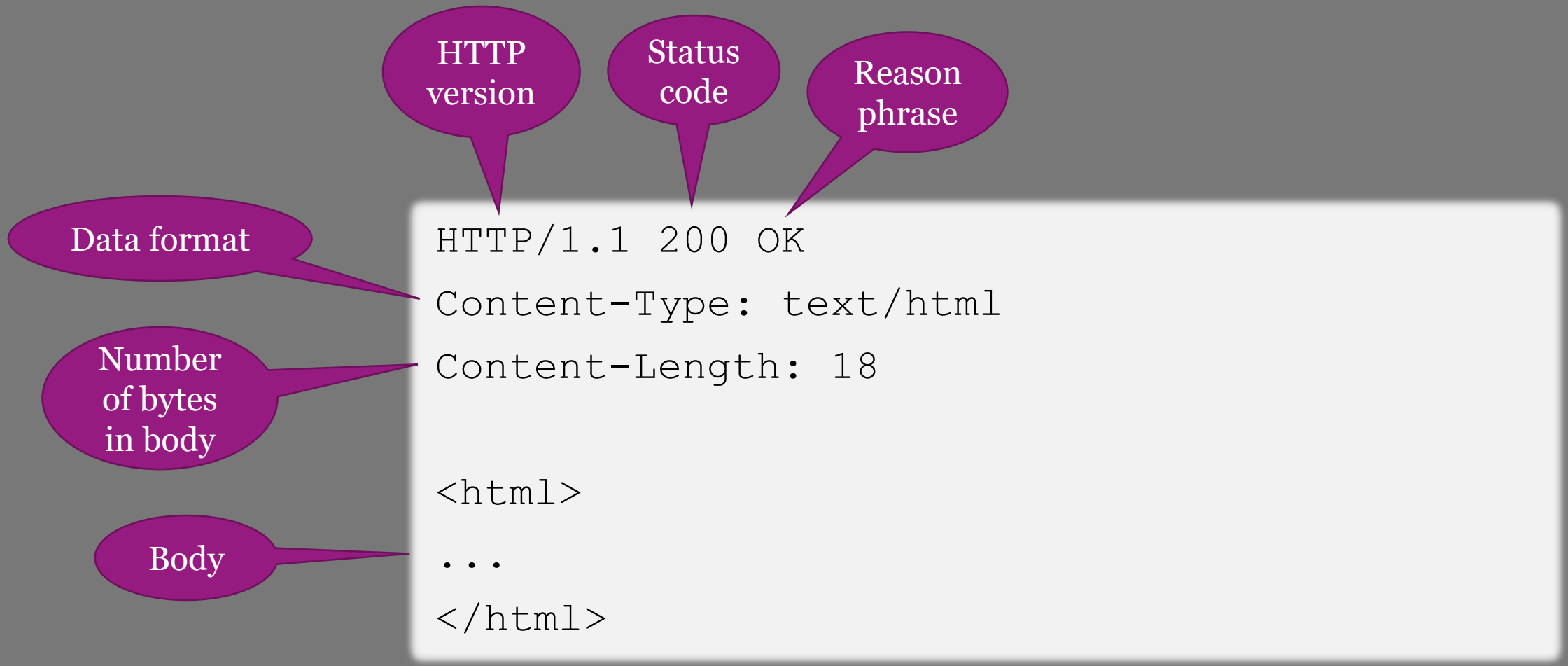
1. The client sends an *HTTP requests* to the server.
   - *Give me resource X!*
2. The server sends back an *HTTP response*.
   - *Here's resource X!*

HTTP specification: https://tools.ietf.org/html/rfc2616

HTTP REQUESTS

Specification: https://tools.ietf.org/html/rfc2616#section-5

HTTP RESPONSE



Specification: https://tools.ietf.org/html/rfc2616#section-6

HTTP METHODS

Method

```
GET /path/to/the-page.html HTTP/1.1
Host: www.the-website.com
Accept: text/html,application/xhtml+xml;q=0.9,*/*;q=0.8
Accept-Language: en-US;0.8,en;q=0.6,sv
```

GET

- Should not result in changes on the server.

POST

- May result in changes on the server.
- Data can be passed in the body of the request.

DELETE, HEAD, PUT, PATCH, …

Specification: https://tools.ietf.org/html/rfc2616#section-9

HTTP STATUS CODES

List of status codes:

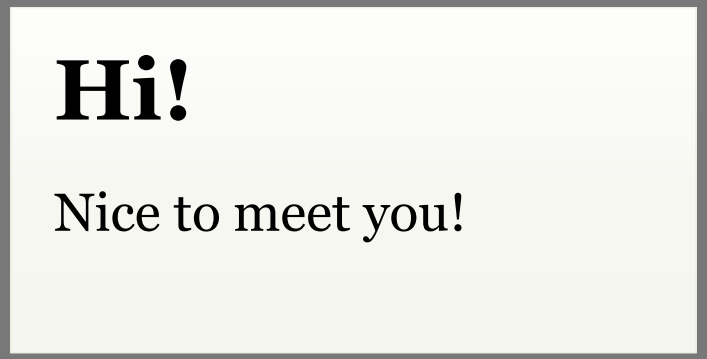
- http://www.restapitutorial.com/httpstatuscodes.html

Specification: https://tools.ietf.org/html/rfc2616#section-6.1.1

A WEB PAGE

Clients primarily requests HTML files.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Hello</title>
  </head>
  <body>
    <h1>Hi!</h1>
    <p>Nice to meet you!</p>
  </body>
</html>
```



HTML page rendered by web browsers.

A WEB PAGE

Clients primarily requests HTML files.

- But an HTML file usually depends on other files.

```
<!DOCTYPE html>
<html>
  ...
  <body>
    <h1>An image</h1>
    <img src="smiley.jpeg">
  </body>
</html>
```

A new GET request!

An image

HTML page rendered by web browsers.

A WEB PAGE

Clients primarily requests HTML files.

- But an HTML file usually depends on other files.

A web page usually consists of:

- Data.
  - Ordinary text.
- HTML, HyperText Markup Language.
  - Marks the data.
- CSS, Cascading Style Sheet.
  - Tells the web browser how to render the data.
- JS, JavaScript.
  - Interacts with the web page.

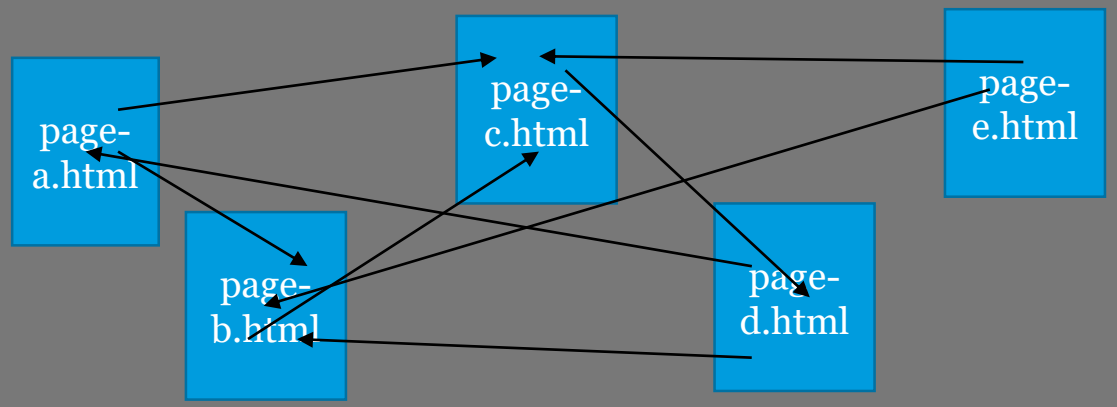
USER AGENTS (THE CLIENTS)

Web browsers.

- Chrome, Firefox, Internet Explorer, Safari, Opera, Edge, …

Web spiders.

- Google, Bing, Yahoo, …



HTML, CSS & JS NOT ONLY FOR THE WEB

Games:

- http://www.schillmania.com/survivor

Extensions/Add-ons for browsers:

- https://developer.chrome.com/extensions/getstarted

Apps for smartphones/tablets:

- https://cordova.apache.org

Programs for computers:

- https://atom.io

JavaScript on the server:

- https://nodejs.org

WEB PAGES

Benefits

Easy to get started.

Fast development.

OS independent.

Drawback

Runs slowly.

Are limited.

Standards not always followed by web browsers.

RECOMMENDED READING

The Absolute Minimum Every Software Developer Absolutely, Positively Must Know About Unicode and Character Sets (No Excuses!) written by *Joel Spolsky*:

https://www.joelonsoftware.com/2003/10/08/the-absolute-minimum-every-software-developer-absolutely-positively-must-know-about-unicode-and-character-sets-no-excuses/

HTTP Made Really Easy, written by *James Marshall*:

https://www.jmarshall.com/easy/http

HTTP specification:

https://tools.ietf.org/html/rfc2616

The birth of the web

http://home.cern/topics/birth-web