

4 INTRO TO HTML, CSS, AND JAVASCRIPT

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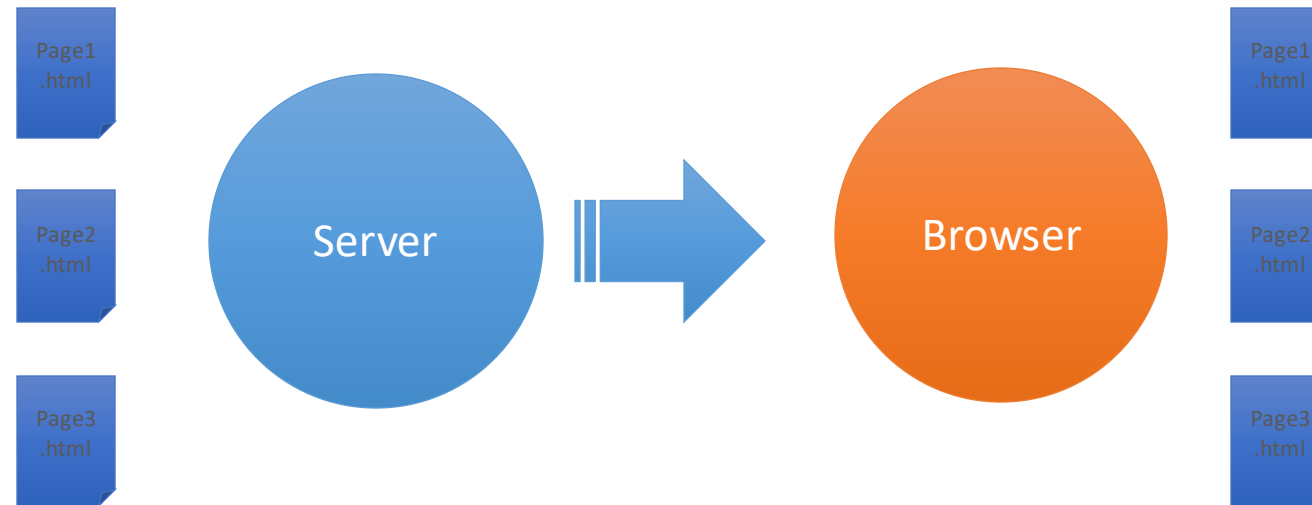
OUTLINE

- Web Application Architecture
- Crash courses on:
 - HTML
 - CSS
 - Javascript
- Web Server
 - Node.js and NPM

WEB APPLICATIONS ARCHITECTURE

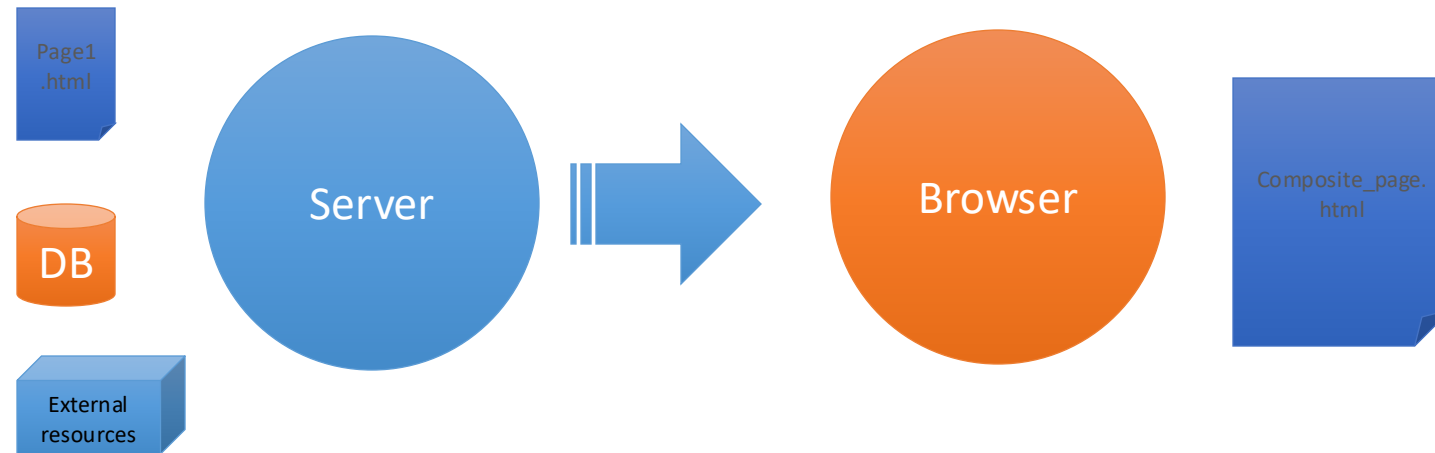
STATIC WEBSITES

- The content of each page is sent AS IS from the server to the client



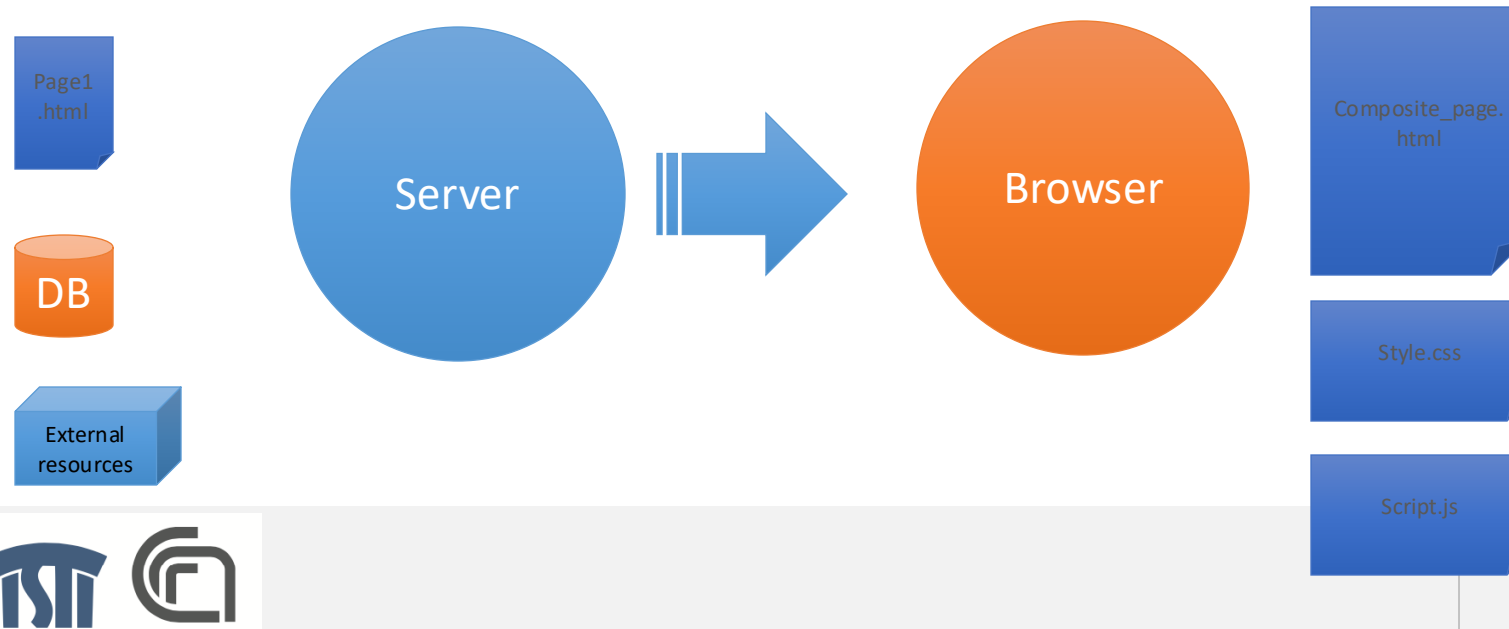
DYNAMIC WEBSITE

- Web page content is composed on demand
- Content is stored in different forms: databases, external resources, other static web pages



SERVER SIDE VS CLIENT SIDE

- Client-side coding includes HTML, CSS, and Javascript
- This code is transmitted AS IS and executed in the browser

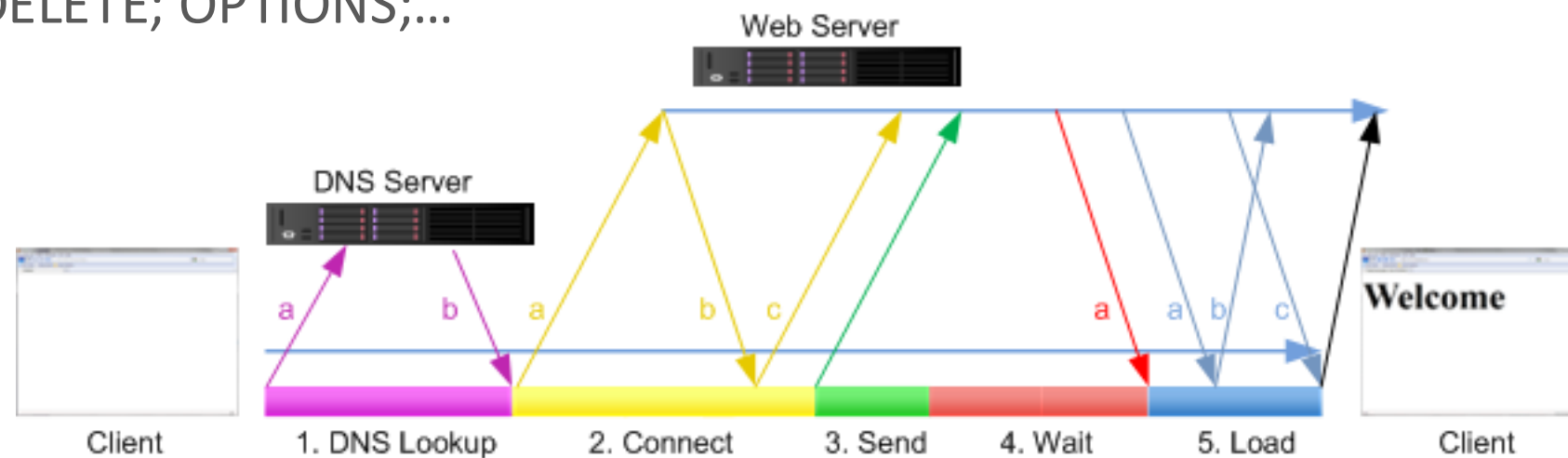


WEB SERVER

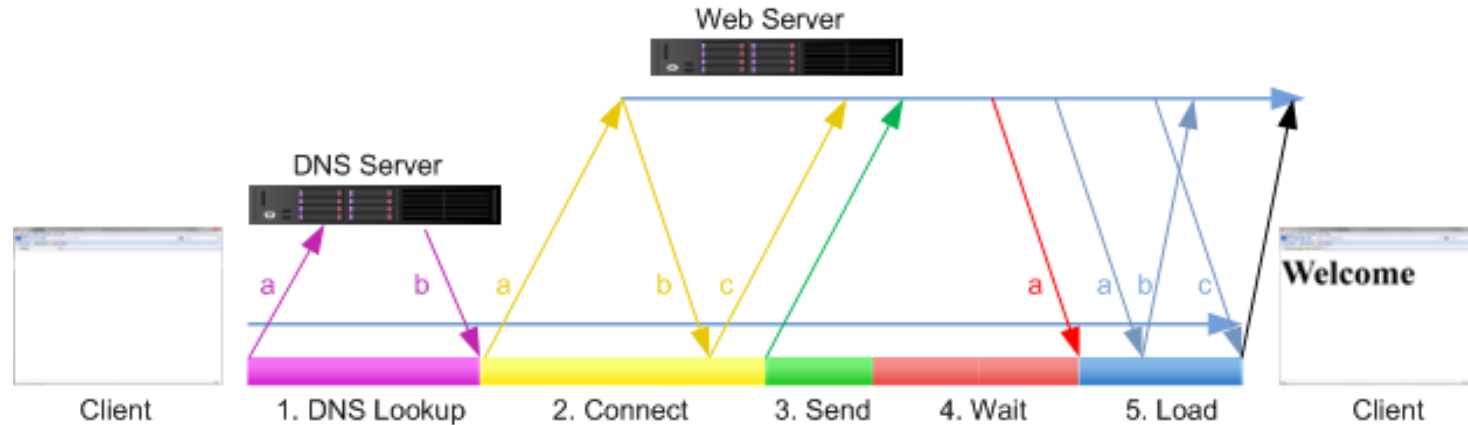
- Implements **HTTP protocol**
 - The web server handles a folder, called **Document Root**
 - For security reasons, only the files within the DocRoot are visible for the web server
- A web server is reachable via a URL
- A URL consists of 4 parts:
 - A selector of the protocol (http or https)
 - The domain name of the server (www.nytimes.com)
 - The port number (by default it is 80)
 - A path to localize additional information
- Ex: <http://www.nytimes.com:80/sport/baseball>

HTTP

- 3. Send
- HTTP Request
 - Methods to tell server what the client need
- HTTP Methods:
 - GET; POST; PUT; DELETE; OPTIONS;...



HTTP



- 4. Wait and 5. Load
- HTTP Response
 - Read Response Codes
 - Read data

- HTTP Response Codes
 - 1xx – Informational
 - 2xx – Success
 - 3xx – Redirection
 - 4xx – Client Error
 - 5xx – Server Error

EXAMPLE – REQUESTING PAGE.HTML

Client

- GET '/page.html'
- ... wait ...
- Download and parse file
- GET '/css/style.css'
- ... wait ...
- Download and parse file
- GET /page.hhtml
- ... wait ...
- Page not found error

Web Server

- Search for the file page.html
- Send response 200
- Send the content of file
- Look in folder css for file
- Send response 200
- Send content of file
- Search for file page.hhtml
- Send response 404

HTML, CSS, AND JAVASCRIPT

- HTML
- CSS
- Javascript

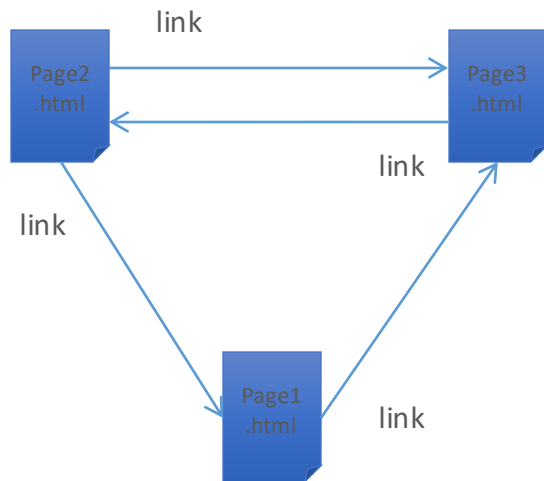


- Structure
- Presentation
- Behavior

HTML 101

HYPER TEXT MARKUP LANGUAGE (HTML)

- Hyper Text



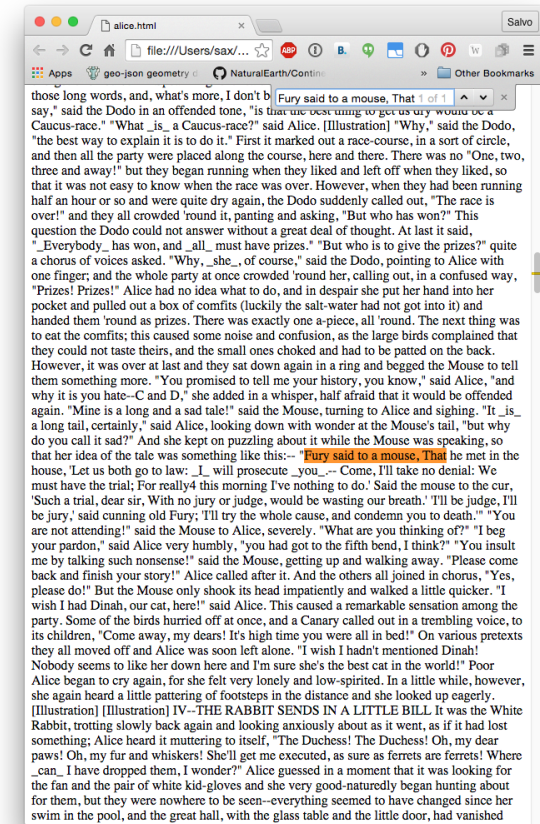
- Markup Language

- Composed of **markup tags**
- Tags group and describe page content

HTML STRUCTURE



```
448 "It is a long tail, certainly," said Alice, looking down with wonder
449 at the Mouse's tail, "but why do you call it sad?" And she kept on
450 puzzling about it while the Mouse was speaking, so that her idea of the
451 tale was something like this:--
452
453     "Fury said to
454     ... a mouse, That
455     ... he met in the
456     ... house, 'Let
457     ... us both go
458     ... to law: I
459     ... will prosecute
460     ... you.--
461     ... Come, I'll
462     ... take no denial:
463     ... We
464     ... must have
465     ... the trial;
466     ... For really4
467     ... this morning
468     ... I've
469     ... nothing
470     ... to do.'
471     ... Said the
472     ... mouse to--
473     ... the cur,
474     ... 'Such a
475     ... trial, dear
476     ... sir, With
477     ... no jury
478     ... or judge,
479     ... would
480     ... be wasting
481     ... our
482     ... breath.'"
483     ... 'I'll be
484     ... judge,
485     ... I'll be
486     ... jury.'"
487     ... said
488     ... cunning
489     ... old
490     ... Fury;
491     ... 'I'll
492     ... try
493     ... the
494     ... whole
495     ... cause,
496     ... and
497     ... condemn
498     ... you to
499     ... death.'"
500
501 "You are not attending!" said the Mouse to Alice, severely. "What are
502 you thinking of?"
503
504
505
```



MARKUP LANGUAGE

- HTML tags give structure
- They also provide semantics
 - Headings for headers
 - UL for unordered list
 - ...

```
<p>
    'To begin with,' said the Cat, 'a dog's not mad. You grant that?'
</p>
<p>
    'I suppose so,' said Alice.
</p>
<p>
    "
        'Well, then,' the Cat went on, 'you see, a dog growls when it's angry, and
        wags its tail when it's pleased. Now "
        <i>I</i>
        " growl when I'm pleased, and wag my
        tail when I'm angry. Therefore I'm mad."
    "
</p>
<p>...</p>
<p>...</p>
<p>...</p>
<p>
    'You'll see me there,' said the Cat, and vanished.
</p>
<p>...</p>
<p>...</p>
<p>...</p>
<p>
    'I thought it would,' said the Cat, and vanished again.
</p>
<p>...</p>
<p>
    'Did you say pig, or fig?' said the Cat.
</p>
<p>...</p>
<p>...</p>
<p>...</p>
<p>...</p>
<p>...</p>
<div style="height: 4em;">...</div>
<h2>
```

CHAPTER VII. A Mad Tea-Party

- Browser applies built-in styles to each tag
- Even with default style, web pages should be readable and its hierarchy clear

CHAPTER IV. The Rabbit Sends in a Little Bill

It was the White Rabbit, trotting slowly back again, and looking anxiously about as it went, as if it had lost something; and she heard it muttering to itself 'The Duchess! The Duchess! Oh my dear paws! Oh my fur and whiskers! She'll get me executed, as sure as ferrets are ferrets! Where *can* I have dropped them, I wonder?' Alice guessed in a moment that it was looking for the fan and the pair of white kid gloves, and she very good-naturedly began hunting about for them, but they were nowhere to be seen—everything seemed to have changed since her swim in the pool, and the great hall, with the glass table and the little door, had vanished completely.

Very soon the Rabbit noticed Alice, as she went hunting about, and called out to her in an angry tone, 'Why, Mary Ann, what *are* you doing out here? Run home this moment, and fetch me a pair of gloves and a fan! Quick, now!' And Alice was so much frightened that she ran off at once in the direction it pointed to, without trying to explain the mistake it had made.

'He took me for his housemaid,' she said to herself as she ran. 'How surprised he'll be when he finds out who I am! But I'd better take him his fan and gloves—that is, if I can find them.' As she said this, she came upon a neat little house, on the door of which was a bright brass plate with the name 'W. RABBIT' engraved upon it. She went in without knocking, and hurried upstairs, in great fear lest she should meet the real Mary Ann, and be turned out of the house before she had found the fan and gloves.

'How queer it seems,' Alice said to herself, 'to be going messages for a rabbit! I suppose Dinah'll be sending me on messages next!' And she began fancying the sort of thing that would happen: "Miss Alice! Come here directly, and get ready for your walk!" "Coming in a minute, nurse! But I've got to see that the mouse doesn't get out." Only I don't think,' Alice went on, 'that they'd let Dinah stop in the house if it began ordering people about like that!'

By this time she had found her way into a tidy little room with a table in the window, and on it (as she had hoped) a fan and two or three pairs of tiny white kid gloves: she took up the fan and a pair of the gloves, and was just going to leave the room, when her eye fell upon a little bottle that stood near the looking-glass. There was no label this time with the words 'DRINK ME,' but nevertheless she uncorked it and put it to her lips. 'I know *something* interesting is sure to happen,' she said to herself, 'whenever I eat or drink anything; so I'll just see what this bottle does. I do hope it'll make me grow large again, for really I'm quite tired of being such a tiny little thing!'

It did so indeed, and much sooner than she had expected: before she had drunk half the bottle, she found her head pressing against the ceiling, and had to stoop to save her neck from being broken. She hastily put down the bottle, saying to herself 'That's quite enough—I hope I shan't grow any more—As it is, I can't get out at the door—I do wish I hadn't drunk quite so much!'

Alas! it was too late to wish that! She went on growing, and growing, and very soon had to kneel down on the floor: in another minute there was not even room for this, and she tried the effect of lying down with one elbow against the door, and the other arm curled round her head. Still she went on growing, and, as a last resource, she put one arm out of the window, and one foot up the chimney, and said to herself 'Now I can do no more, whatever happens. What *will* become of me?'

Luckily for Alice, the little magic bottle had now had its full effect, and she grew no larger: still it was very uncomfortable, and, as there seemed to be no sort of chance of her ever getting out of the room again, no wonder she felt unhappy.

'It was much pleasanter at home,' thought poor Alice, 'when one wasn't always growing larger and smaller, and being ordered about by mice and rabbits. I almost wish I hadn't gone down that rabbit-hole—and yet—and yet—it's rather curious, you know, this sort of life! I do wonder what *can* have happened to me! When I used to read fairy-tales, I fancied that kind of thing never happened, and now here I am in the middle of one! There ought to be a book written about me, that there ought! And when I grow up, I'll write one—but I'm grown up now,' she added in a sorrowful tone; 'at least there's no room to grow up any more *here*.'

'But then,' thought Alice, 'shall I *never* get any older than I am now? That'll be a comfort, one way—never to be an old woman—but then—always to have lessons to learn! Oh, I shouldn't like *that*!'

'Oh, you foolish Alice!' she answered herself. 'How can you learn lessons in here? Why, there's hardly room for *you*, and no room at all for any lesson-books!'

And so she went on, taking first one side and then the other, and making quite a conversation of it altogether; but after a few minutes she heard a voice outside, and stopped to listen.

'Mary Ann! Mary Ann!' said the voice. 'Fetch me my gloves this moment!' Then came a little pattering of feet on the stairs. Alice knew it was the Rabbit coming to look for her, and she trembled till she shook the house, quite forgetting that she was now

RELEVANT TAGS: DOCTYPE

- It is not a common tag
 - No closing tag
 - Opening with “!”
- It is a **declaration**
- Select the correct dialect of HTML the page is using
- E.g.: `<!DOCTYPE html>` selects HTML5

RELEVANT TAGS: HTML

- This tag enclose the whole document
- `<html></html>`

RELEVANT TAGS: HEAD

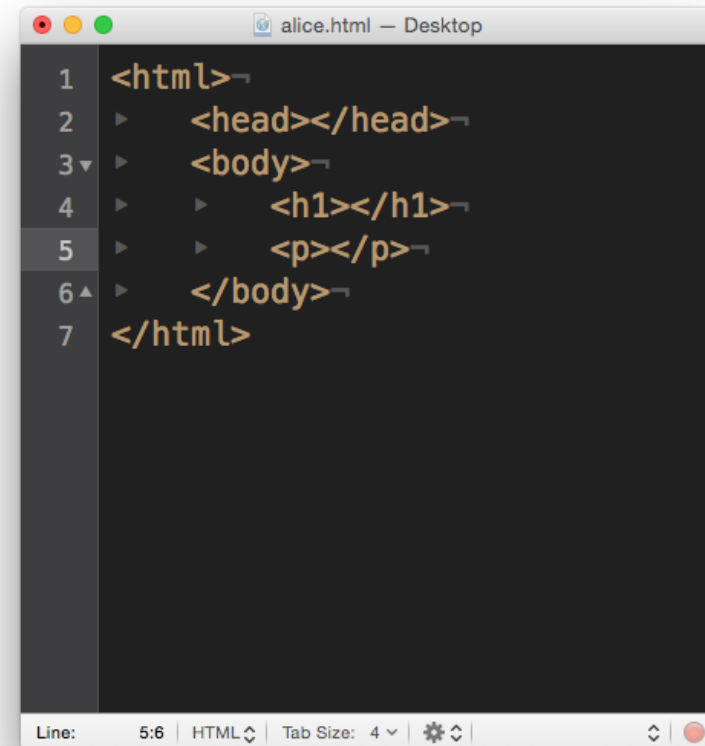
- It provides information to browser to retrieve additional information for the page
 - Javascript, styles, information, meta, etc.
- `<head></head>`

RELEVANT TAGS: BODY

- Contains the document content
- The enclosed tags are showed in the browser window
- `<body></body>`

MINIMAL STRUCTURE

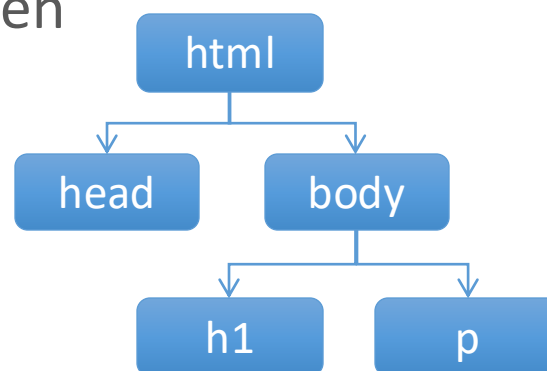
- This is a basic structure for a web page
- HTML uses **nesting** to code hierarchies
- For readability, enclosed tags are indented w.r.t. container



```
1 <html>
2   <head></head>
3   <body>
4     <h1></h1>
5     <p></p>
6   </body>
7 </html>
```

DOCUMENT HIERARCHY

- Each tag has a parent
- A tag may have children or siblings
- Examples:
 - **h1** is a child of **body**
 - **body** has two children
 - **p** is sibling of **h1**



```
1 <html>
2   <head></head>
3   <body>
4     <h1></h1>
5     <p></p>
6   </body>
7 </html>
```

HTML ELEMENT

- An element is the union of two corresponding tags and their content
- Tags are usually present in pairs:
 - **Start tag**
 - **End tag**

<tag>Content</tag>

NAMED TAGS

- HTML has a set of predefined tag names, associated with special structures

`<h1>My Title</h1>`

ESSENTIAL TAGS

- Primary Structure

- html
- head
- body

- Head Elements

- title
- meta
- link

- Formatting elements (inline)

- em, i
- strong, b
- q, blockquote
- Span

- Structural Elements (blocks)

- p
- h1-h6
- ul, ol
- a
- img
- div

CSS 101

CSS – CASCADING STYLESHEET

- A stylesheet specifies a set of rules to define how html elements are presented on the browser
- Each rule applies to a specific set of elements of the page
- Rules have a cascading behaviour
 - Conflicts between multiple rules are resolved by priorities
 - Elements not covered by explicit rules inherit presentation of ancestors

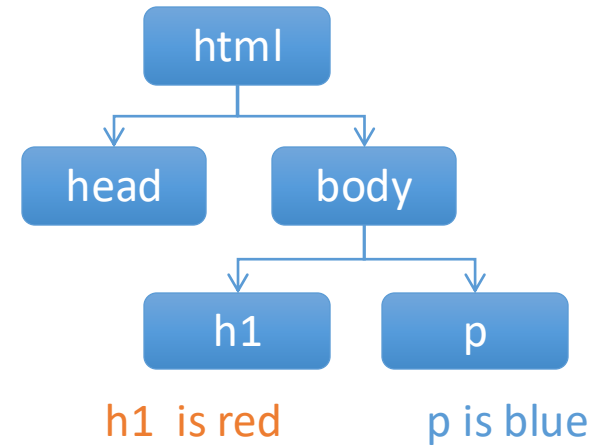
RULE PRIORITIES

- Browser stylesheet
- Linked external stylesheet
- Embedded stylesheet (tag style)
- Inline style (attribute style)

INHERITANCE

body
make font 16px, Verdana, red

↓
p
make font blue



ANATOMY OF A CSS RULE

- Every rule is composed of a selector and a **declaration**
- Declaration contains at least one pair **property/value**

```
selector {property: value;}
```

_____ selector _____ declaration _____

BASIC CSS SELECTORS

- Type selectors
 - Target an element by name
 - `body {font-family: Verdana }`
 - `h1 {color: red}`
- ID selectors
 - An ID is an attribute added to an HTML element
 - `#logo {declaration}`
 - ``
- Class selectors
 - An identifier attribute added to a set of HTML elements
 - `.ingredients {declaration}`
 - `<ul class="ingredients">`

ID OR CLASS

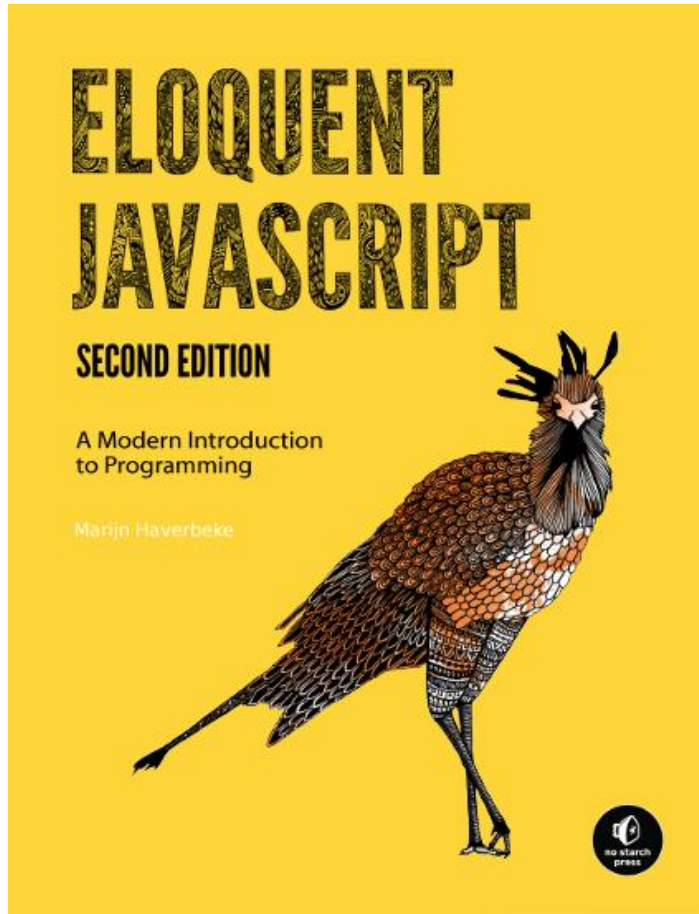
- There can be only one element with a given ID
- ID is more specific than a class
- An element can have both ID and classes

DESCENDANT SELECTORS

- Descendant selectors are composed of two basic selectors separated by a space
- The rule targets the elements of the second selectors that are descendant of the element of the first selector
- Example
 - `#sidebar .author {declaration}`
 - ```
<div id="sidebar">
 <p class="author"></p>
</div>
<p class="author"></p>
```

# JAVASCRIPT 101

# JAVASCRIPT



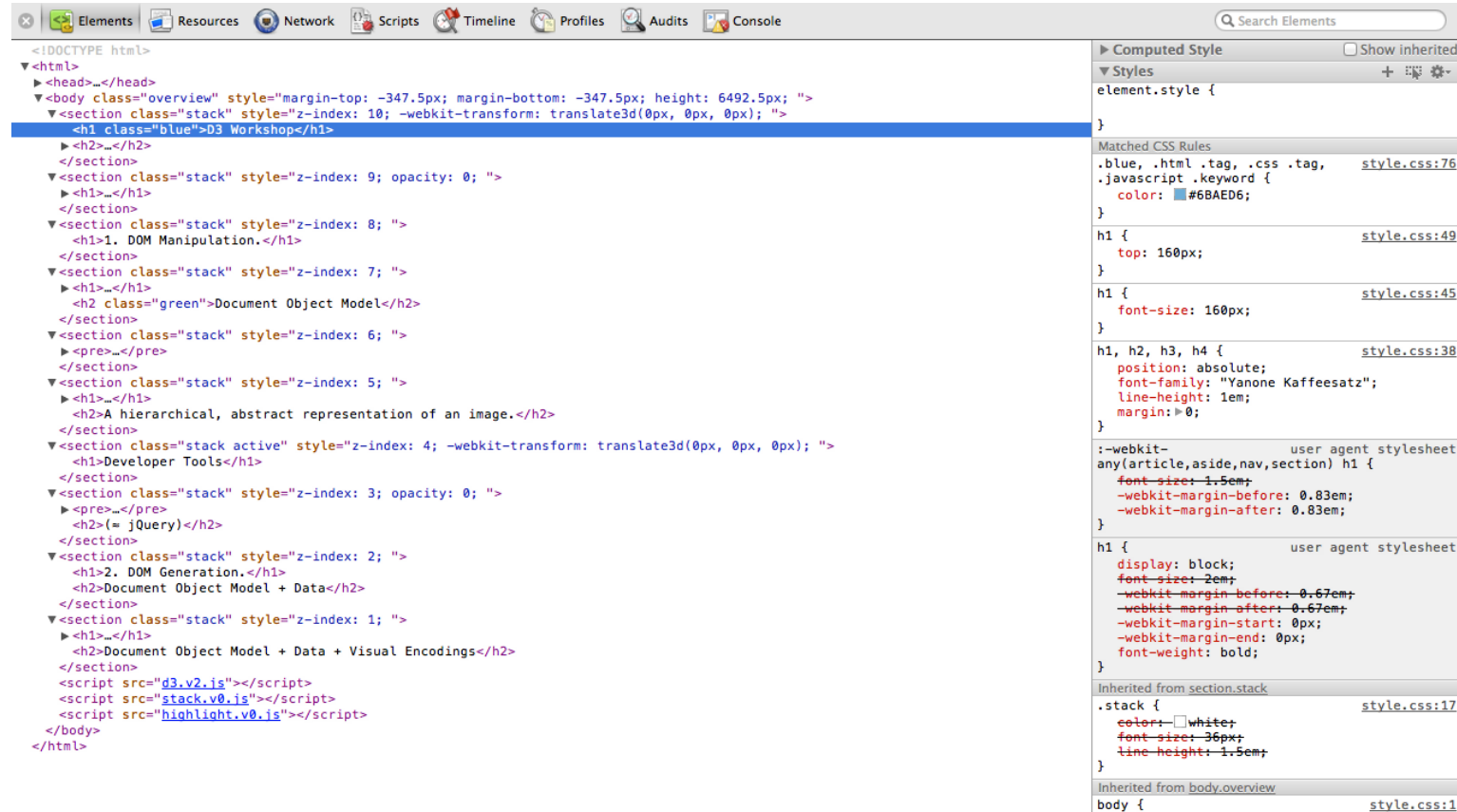
Eloquent Javascript – Second Edition

Marijn Haverbeke

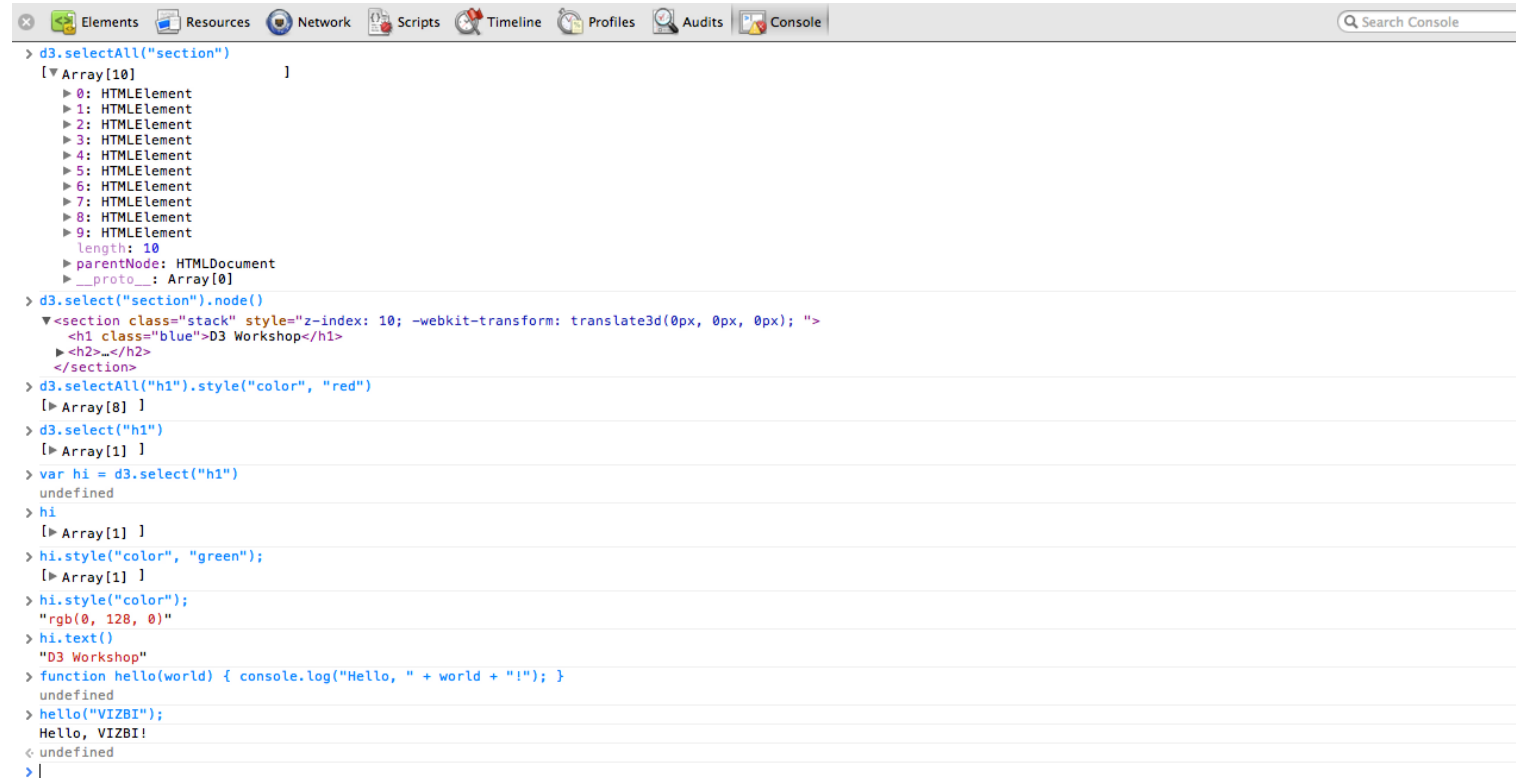
Licensed under CC license.

Available here: <http://eloquentjavascript.net/>

# DEVELOPER TOOLS (SAFARI, CHROME, FIREFOX)



# JAVASCRIPT CONSOLE (SAFARI, CHROME, FIREFOX)



```
> d3.selectAll("section")
[Array(10)]
 ▶ 0: HTMLElement
 ▶ 1: HTMLElement
 ▶ 2: HTMLElement
 ▶ 3: HTMLElement
 ▶ 4: HTMLElement
 ▶ 5: HTMLElement
 ▶ 6: HTMLElement
 ▶ 7: HTMLElement
 ▶ 8: HTMLElement
 ▶ 9: HTMLElement
 length: 10
 parentNode: HTMLDocument
 __proto__: Array(0)

> d3.select("section").node()
<section class="stack" style="z-index: 10; -webkit-transform: translate3d(0px, 0px, 0px); ">
 <h1 class="blue">D3 Workshop</h1>
 <h2></h2>
</section>

> d3.selectAll("h1").style("color", "red")
[Array(8)]

> d3.select("h1")
[Array(1)]

> var hi = d3.select("h1")
undefined

> hi
[Array(1)]

> hi.style("color", "green");
[Array(1)]

> hi.style("color");
"rgb(0, 128, 0)"

> hi.text()
"D3 Workshop"

> function hello(world) { console.log("Hello, " + world + "!"); }
undefined

> hello("VIZBI");
Hello, VIZBI!
< undefined
> |
```

# VARIABLES

- Containers for data

```
let number = 5;
```

```
let address = "Largo Bruno Pontecorvo 5";
```

# OBSERVABLE HQ

- Collection of notebooks for fast prototyping Javascript solutions
  - <https://observablehq.com/collection/@rinziv/va602aa>

# ARRAYS

- Store sequences of values with a single name

```
let numberA = 5;
let numberB = 10;
let numberC = 15;
let numberD = 20;
let numberE = 25;
let numbers = [5, 10, 15, 20, 25];
numbers[0] //Returns 5
numbers[1] //Returns 10
numbers[2] //Returns 15
numbers[3] //Returns 20
numbers[4] //Returns 25
```



# OBJECTS

- A sort of custom data structures
- Object is declared with curly brackets
- A sequence of property value pairs are separated by commas

```
let fruit = {
 kind: "grape",
 color: "red",
 quantity: 12,
 tasty: true
};
fruit.kind //Returns "grape"
fruit.color //Returns "red"
fruit.quantity //Returns 12
fruit.tasty //Returns true
```

# ARRAY OF OBJECT OR OBJECTS OF ARRAYS

```
let fruits = [
 {
 kind: "grape",
 color: "red",
 quantity: 12,
 tasty: true
 },
 {
 kind: "kiwi",
 color: "brown",
 quantity: 98,
 tasty: true
 },
 {
 kind: "banana",
 color: "yellow",
 quantity: 0,
 tasty: true
 }
];
```

```
fruits[0].kind == "grape"
fruits[0].color == "red"
fruits[0].quantity == 12
fruits[0].tasty == true
```

```
fruits[1].kind == "kiwi"
fruits[1].color == "brown"
fruits[1].quantity == 98
fruits[1].tasty == true
```

```
fruits[2].kind == "banana"
fruits[2].color == "yellow"
fruits[2].quantity == 0
fruits[2].tasty == true
```

# CONTROL STRUCTURES

- If statement

```
if (test) {
 //Code to run if true
}
```

- Example

```
if (3 < 5) {
 console.log("Eureka! Three is less than
five!");
}
```

- for statement

```
for (initialization; test; update) {
 //Code to run each time through the loop
}
```

- Example

```
for (let i = 0; i < 5; i++) {
 console.log(i); //Prints value to console
}
```

# FUNCTIONS

- Declaration

```
let functionName= function(arg1, arg2){
 return something;
}
```

- Example

```
let calculateGratuity = function(bill) {
 return bill * 0.2;
};
```

- Call of a function

```
functionName(arg1,arg2)
var tip = calculateGratuity(38);
console.log(tip); //Prints 7.6 to the console
```

# LINK TO JAVASCRIPT FROM A WEB PAGE

- Embedded within body element

```
<body>
 <script type="text/javascript">
 alert("Hello, world!");
 </script>
</body>
```

- Linked from the head section

```
<head>
 <title>Page Title</title>
 <script type="text/javascript"
src="myscript.js"></script>
</head>
```

# DEVELOPMENT CHECKLIST

# TOOLS

- A modern browser (Chrome, Firefox, etc)
- An integrated IDE, like WebStorm for example
- Node.js and NPM installed

# FAST PROTOTYPING WITH OBSERVABLES

The screenshot shows the ObservableHQ web application interface. At the top, there is a navigation bar with the Observable logo, a search bar, and links for Teams, Explore, and a New button. Below the navigation bar, the user profile for Salvo Rinzivillo is displayed. The main content area is titled 'Home' and shows a 'Quickstart' section with four tutorials: 'Five-Minute Introduction', 'Tutorial 1: Lunch calculator', 'Introduction to Data', and 'Introduction to require'. The left sidebar contains a list of navigation options: Home, Notebooks, Collections, Suggestions, Likes, Trash, and Settings.

**Observable** Search Teams Explore New

Salvo Rinzivillo Personal

Home

Notebooks Collections Suggestions Likes Trash Settings

## Home

16 Notebooks 5 Likes 3 Forks

### Quickstart

Welcome to Observable! Get started with these four tutorials:

- Five-Minute Introduction** (5 min read) Learn how Observable notebooks work with simple examples.
- Tutorial 1: Lunch calculator** (3 part series) Build a series of simple notebooks to learn the fundamentals.
- Introduction to Data** (7 minute read) Databases, files, inline, spreadsheets, and data of all kinds.
- Introduction to require** (7 minute read) How to use open source modules with Observable.

<https://observablehq.com/collection/@rinziv/va602aa>