HTML5, CSS and Javascript

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| HTML structure | CSS presentation/appearance | JavaScript dynamism/action |

https://d2v4zi8pl64nxt.cloudfront.net/javascript-seo/5948abfc0e2df5.02876591.gif

Examples are from : https://www.w3schools.com/html/default.asp

Web

- Enormously popular application that provides a tremendous wealth of information

- Origins: 1989 Tim Berners-Lee (CERN) proposed mechanism to distribute high-energy physics data (reports, photos, blueprints etc)

  - Proposal eventually lead to World Wide Web (WWW)

- 1993, first graphical browser Mosaic was released

- 1994, W3C (world wide web consortium) was formed to develop web and standards

- **Web page** consists of base **HTML** file which includes several referenced **objects**
  - Object can be other HTML files, JPEG images, Java applets, audio files,……
  - Text/Image that links to another page is called a **hyperlink** (often highlighted by some means)
- Each object is addressable by a **URL** (Uniform Resource Locator)
  - E.g. http://www.iitb.ac.in/images/header/iitb_logo.gif

    Protocol   Host Name   Path
- Web pages are viewed by a program called a browser
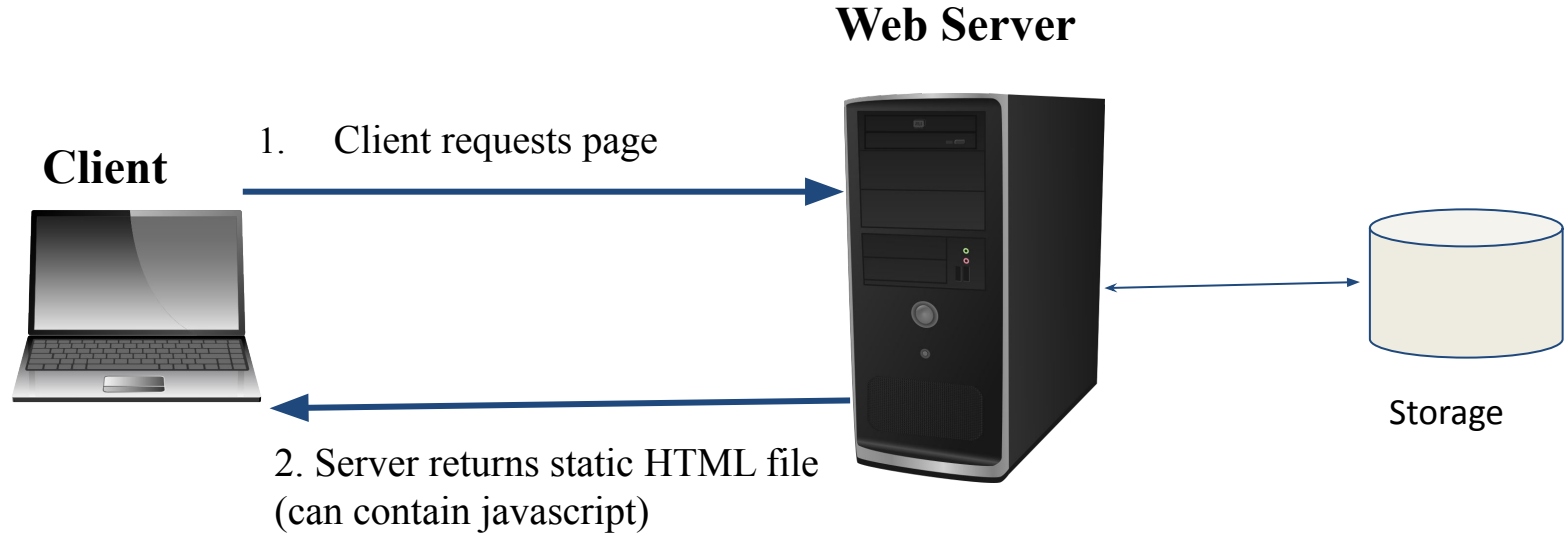 - E.g. Internet Explorer, Google Chrome, Mozilla Firefox

Client-side Programming

- Code that runs in the browser
- Primarily concerned with improving the appearance and behavior of a rendered web page
  - Selecting and styling UI components, creating layouts, form validation etc
- E.g. Javascript
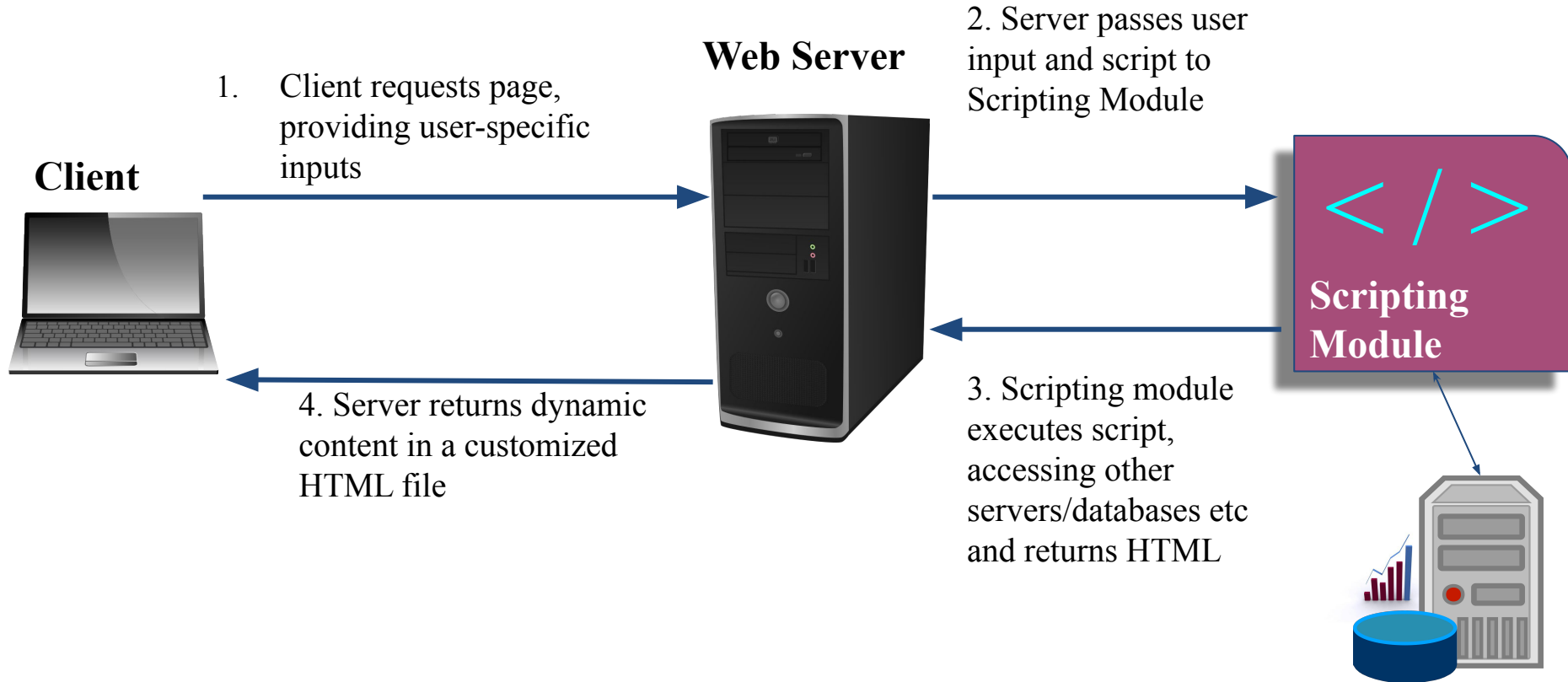 - HTML, CSS are for markup/styling

Server-side Programming

- Code that runs in the server
- Helps choose which content is to be returned to the browser in response to request
  - validating submitted data and requests, using databases to store and retrieve data, sending the correct data to the client as required.
- E.g. PHP, Python, Ruby, C#, and JavaScript (NodeJS)
- Developers typically write their code using web frameworks (Django/Python)
  - Collections of functions, objects, rules and other code constructs
 - Helps solve common problems, speed up development etc

Static Web Pages

Web Server

Client

1. Client requests page

2. Server returns static HTML file (can contain javascript)

Storage

Dynamic Web Pages Architecture

Client

1. Client requests page, providing user-specific inputs

Web Server

2. Server passes user input and script to Scripting Module

</​ >

Scripting Module

3. Scripting module executes script, accessing other servers/databases etc and returns HTML

4. Server returns dynamic content in a customized HTML file

Scripting Languages: PHP, Python, Ruby etc

Hyper Text Transfer Protocol (HTTP)

- The protocol employed by Web application

- Based on client-server model

  - Client (browser) requests web objects

    - GET and POST method

  - Server responds with status code and requested object (if present)

    - 200 OK, 404 not found etc

- Operates over TCP, server port 80 (http), 443 (https)

Request

Response

Request

Response
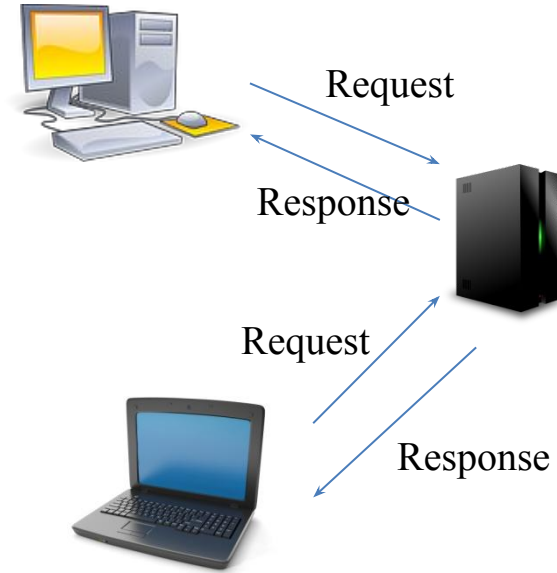
Our Focus

- Static Web pages: HTML, CSS and Javascript

- How to View HTML Source?
  - Right-click a HTML page in browser and select "View Page Source"

HTML5

- HTML stands for Hyper Text Markup Language
  - Many versions, current version is 5
- Tells browsers how to display the content
- Supports text, text elements, tables, embedded images, audio/video elements
- Supports hyperlinks: links to other documents or document parts
- Also supports embedded code, executed at client-side browser: javascript

Run >

```html
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
</head>
<body>

<h1>My First Heading</h1>
<p>My first paragraph.</p>

</body>
</html>
```

My First Heading

My first paragraph.

From https://www.w3schools.com/html/

Elements/Tags

- HTML is just a series of elements
- Element defined by a start tag, some content, and an end tag
- Tag: Enclosed within <,>
  - E.g. <p>, </p>, <li>,
  - HTML tags are not case sensitive; <P> same as <p>.
  - But strongly recommend use of lowercase
- Example Element: <p> This is a para </p>
- The <html> element is the root element and it defines the whole HTML document
- HTML elements with no content are called empty elements.
  - The <br> tag defines a line break, and is an empty element without a closing tag
- Elements can be nested

Attributes

- Attributes provide additional information about elements
    - Always specified in the start tag
- Attributes usually come in name/value pairs like: name="value"
    - E.g: <p style="color:red;">This is a red paragraph.</p>
    - E.g: Visit W3Schools
    - <img src="img_girl.jpg" width="500" height="600">

Headings

Run 〉

```
<!DOCTYPE html>
<html>
<body>

<h1>Heading 1</h1>
<h2>Heading 2</h2>
<h3>Heading 3</h3>
<h4>Heading 4</h4>
<h5>Heading 5</h5>
<h6>Heading 6</h6>

</body>
</html>
```

Heading 1

Heading 2

Heading 3

Heading 4

Heading 5

Heading 6

Paragraph


```html
<!DOCTYPE html>
<html>
<body>

<h2>This is heading 2</h2>
<p>This is some other text.</p>
<hr>


<p>This is<br>a paragraph<br>with line breaks.</p>
<hr>


 <p>
  My Bonnie lies over the ocean.

  My Bonnie lies over the sea.

  My Bonnie lies over the ocean.

  Oh, bring back my Bonnie to me.
</p>
<hr>

 <pre>
  My Bonnie lies over the ocean.

  My Bonnie lies over the sea.

  My Bonnie lies over the ocean.

  Oh, bring back my Bonnie to me.
</pre>

</body>
</html>
```

Result:

This is heading 2

This is some other text.

This is
a paragraph
with line breaks.

My Bonnie lies over the ocean. My Bonnie lies over the sea. My Bonnie lies over the ocean. Oh, bring back my Bonnie to me.

```
  My Bonnie lies over the ocean.

  My Bonnie lies over the sea.

  My Bonnie lies over the ocean.

  Oh, bring back my Bonnie to me.
```

Style


```
<!DOCTYPE html>
<html>
<body>

<h1 style="background-
color:powderblue;">This is a heading</h1>
<p style="background-color:tomato;">This is
a paragraph.</p>
<hr>
 <h1 style="color:blue;">This is a
heading</h1>
<p style="color:red;">This is a
paragraph.</p>
<hr>
 <h1 style="font-family:verdana;">This is a
heading</h1>
<p style="font-family:courier;">This is a
paragraph.</p>
<hr>
 <h1 style="font-size:300%;">This is a
heading</h1>
<p style="font-size:160%;">This is a
paragraph.</p>
<hr>
 <h1 style="text-align:center;">Centered
Heading</h1>
<p style="text-align:center;">Centered
paragraph.</p>

</body>
</html>
```

Result Size: 717 x 773

This is a heading

This is a paragraph.

This is a heading

This is a paragraph.

This is a heading

This is a paragraph.

This is a heading

This is a paragraph.

Centered Heading

Centered paragraph.

Comment

```
<!DOCTYPE html>
<html>
<body>

<p>This is a paragraph.</p>
<!--
<p>Look at this cool image:</p>
<img border="0" src="pic_trulli.jpg" alt="Trulli">
-->
<p>This is a paragraph too.</p>

<hr>

 <p>This <!-- great text --> is a paragraph.</p>

</body>
</html>
```

This is a paragraph.

This is a paragraph too.

This is a paragraph.

Run ›

Links

- Use the <a> element to define a link
  a. Use the href attribute to define the link address
  b. Use the target attribute to define where to open the linked document
- Use the <img> element (inside <a>) to use an image as a link
- Use the mailto: scheme inside the href attribute to create a link that opens the user's email program

```html
<!DOCTYPE html>
<html>
<body>

<h2>The target Attribute</h2>

<a href="https://www.w3schools.com/" target="_blank">Visit
W3Schools!</a>

<p>If target="_blank", the link will open in a new browser window
or tab.</p>

<hr>

 <h2>Absolute URLs</h2>
<p><a href="https://www.w3.org/">W3C</a></p>
<p><a href="https://www.google.com/">Google</a></p>

<h2>Relative URLs</h2>
<p><a href="html_images.asp">HTML Images</a></p>
<p><a href="/css/default.asp">CSS Tutorial</a></p>

<hr>
 <a href="default.asp">
<img src="smiley.gif" alt="HTML tutorial" style="width:42px;
height:42px;">
</a>

<hr>

<a href="mailto:someone@example.com">Send email</a>
<hr>

<button onclick="document.location='default.asp'">HTML
Tutorial</button>

</body>
</html>
```

Result Size: 498 x 773

The target Attribute

Visit W3Schools!

If target="_blank", the link will open in a new browser window or tab.

Absolute URLs

W3C

Google

Relative URLs

HTML Images

CSS Tutorial

Send email

[HTML Tutorial]

Tables


```
<!DOCTYPE html>
<html>
<style>
table, th, td {
  border:1px solid black;
}
</style>
<body>

<h2>A basic HTML table</h2>

<table style="width:100%">
  <tr>
    <th>Company</th>
    <th>Contact</th>
    <th>Country</th>
  </tr>
  <tr>
    <td>Alfreds Futterkiste</td>
    <td>Maria Anders</td>
    <td>Germany</td>
  </tr>
  <tr>
    <td>Centro comercial Moctezuma</td>
    <td>Francisco Chang</td>
    <td>Mexico</td>
  </tr>
</table>

<p>To understand the example better, we have added borders to the table.</p>

<hr>


</body>
</html>
```

Run ❯

Result Size: 1079 x 782

Get your own website

A basic HTML table

Company	Contact	Country
Alfreds Futterkiste	Maria Anders	Germany
Centro comercial Moctezuma	Francisco Chang	Mexico

To understand the example better, we have added borders to the table.

Lists


```html
<!DOCTYPE html>
<html>
<body>

<h2>An ordered HTML list</h2>

<ol>
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ol>

<hr>
 <ul>
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ul>

<hr>

 <dl>
  <dt>Coffee</dt>
  <dd>- black hot drink</dd>
  <dt>Milk</dt>
  <dd>- white cold drink</dd>
</dl>

</body>
</html>
```

An ordered HTML list

1. Coffee
2. Tea
3. Milk

- Coffee
- Tea
- Milk

Coffee
- black hot drink
Milk
- white cold drink

HTML Video

```
<!DOCTYPE html>
<html>
<body>

<video width="320" height="240" controls>
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
  Your browser does not support the video tag.
</video>

</body>
</html>
```

id

- id attribute is used to specify a unique id for an HTML element
- value of the id attribute must be unique within the HTML document
- id attribute is used by CSS and JavaScript to style/select a specific element
- The value of the id attribute is case sensitive

```
<!DOCTYPE html>
<html>
<body>

<p><a href="#C4">Jump to Chapter 4</a></p>

<h2>Chapter 1</h2>
<p>This chapter explains ba bla bla</p>

<h2>Chapter 2</h2>
<p>This chapter explains ba bla bla</p>

<h2>Chapter 3</h2>
<p>This chapter explains ba bla bla</p>

<h2 id="C4">Chapter 4</h2>
<p>This chapter explains ba bla bla</p>


</body>
</html>
```

Jump to Chapter 4

Chapter 1

This chapter explains ba bla bla

Chapter 2

This chapter explains ba bla bla

Chapter 3

This chapter explains ba bla bla

Chapter 4

This chapter explains ba bla bla

Cascading Style Sheets (CSS)

- Separates document content from presentation
- Used for describing the presentation of a document (layout, colors, fonts etc);
  - Can control the color, font, the size of text
  - The spacing between elements, how elements are positioned and laid out
  - What background images or background colors are to be used
  - different displays for different devices and screen sizes, and much more!
- Saves effort, can control the layout of multiple web pages all at once

Cascading Style Sheets (CSS)

- CSS can be added to HTML documents in 3 ways:
  - Inline - by using the style attribute inside HTML elements
  - Internal - by using a <style> element in the <head> section
  - External - by using a <link> element to link to an external CSS file (most common)

Inline

```
<!DOCTYPE html>
<html>
<body>

<h1 style="color:blue;">A Blue Heading</h1>

<p style="color:red;">A red paragraph.</p>

</body>
</html>
```

A Blue Heading

A red paragraph.

Internal

```
<!DOCTYPE html>
<html>
<head>
<style>
body {background-color: powderblue;}
h1    {color: blue;}
p     {color: red;}
</style>
</head>
<body>

<h1>This is a heading</h1>
<p>This is a paragraph.</p>

<p>This is another paragraph.</p>

</body>
</html>
```

This is a heading

This is a paragraph.

This is another paragraph.

External

```
<!DOCTYPE html>
<html>
<head>
  <link rel="stylesheet" href="styles.css">
</head>
<body>

<h1>This is a heading</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

This is a heading

This is a paragraph.

"styles.css":

```css
body {
  background-color: powderblue;
}
h1 {
  color: blue;
}
p {
  color: red;
}
```

```
≡  💾  ◇  ◐  [ Run ❯ ]
```

```html
<!DOCTYPE html>
<html>
<head>
<style>
h1 {
  color: blue;
  font-family: verdana;
  font-size: 300%;

}
p  {
  color: red;
  font-family: courier;
  font-size: 160%;
}
</style>
</head>
<body>

<h1>This is a heading</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

This is a heading

This is a paragraph.

Javascript

- A lightweight programming language (scripting) used to make web pages interactive
  - Not related to Java
- Usage:
  - react to events (ex: user click)
  - get information about a user's computer (ex: browser type)
  - perform calculations on user's computer (ex: form validation)
- <script> tag is used to signal to the browser that stuff between the tags is JavaScript code that needs to be executed

```
<!DOCTYPE html>
<html>
<body>

<h1>My First JavaScript</h1>

<script>
        alert('Hello, world!');
</script>


</body>
</html>
```

Run ❯

My First JavaScript

🌐 www.w3schools.com

Hello, world!

OK

```html
<!DOCTYPE html>
<html>
<body>

<h1>My First JavaScript</h1>

<p id="demo">JavaScript can change the style of an HTML element.</p>

<script>
function myFunction() {
  document.getElementById("demo").style.fontSize = "25px";
  document.getElementById("demo").style.color = "red";
  document.getElementById("demo").style.backgroundColor = "yellow";
}
</script>

<button type="button" onclick="myFunction()">Click Me!</button>

</body>
</html>
```

My First JavaScript

JavaScript can change the style of an HTML element.

Click Me!

```
<!DOCTYPE html>
<html>
<body>

<h1>My First JavaScript</h1>

<p id="demo">JavaScript can change the style of an HTML element.</p>

<script>
function myFunction() {
  document.getElementById("demo").style.fontSize = "25px";
  document.getElementById("demo").style.color = "red";
  document.getElementById("demo").style.backgroundColor = "yellow";
}
</script>

<button type="button" onclick="myFunction()">Click Me!</button>

</body>
</html>
```

My First JavaScript

JavaScript can change the style of an HTML element.

Click Me!

```html
<!DOCTYPE html>
<html>
<body>

<h1>My First JavaScript</h1>
<p>Here, a JavaScript changes the value of the src (source) attribute of an image.</p>

<script>
function light(sw) {
  var pic;
  if (sw == 0) {
    pic = "pic_bulboff.gif"
  } else {
    pic = "pic_bulbon.gif"
  }
  document.getElementById('myImage').src = pic;
}
</script>

<img id="myImage" src="pic_bulboff.gif" width="100" height="180">

<p>
<button type="button" onclick="light(1)">Light On</button>
<button type="button" onclick="light(0)">Light Off</button>
</p>

</body>
</html>
```

My First JavaScript

Here, a JavaScript changes the value of the src (source) attribute of an image.

Light On Light Off

Noscript

The HTML <noscript> tag defines an alternate content to be displayed to users that have disabled scripts in their browser or have a browser that doesn't support scripts:

Example:

<noscript>Sorry, your browser does not support JavaScript!</noscript>

Classes

- Often used to point to a class name in a style sheet
- Can also be used by JavaScript to access and manipulate elements with a specific class name.
- A class name can be used by multiple HTML elements
  - an id name must only be used by one HTML element within the page

```
<!DOCTYPE html>
<html>
<head>
<style>
.city {
  background-color: tomato;
  color: white;
  padding: 10px;
}

.main {
  text-align: center;
}
</style>
</head>
<body>

<h2>Multiple Classes</h2>
<p>Here, all three h2 elements belongs to the "city"
class. In addition, London also belongs to the
"main" class, which center-aligns the text.</p>

<h2 class="city main">London</h2>
<h2 class="city">Paris</h2>
<h2 class="city">Tokyo</h2>

</body>
</html>
```
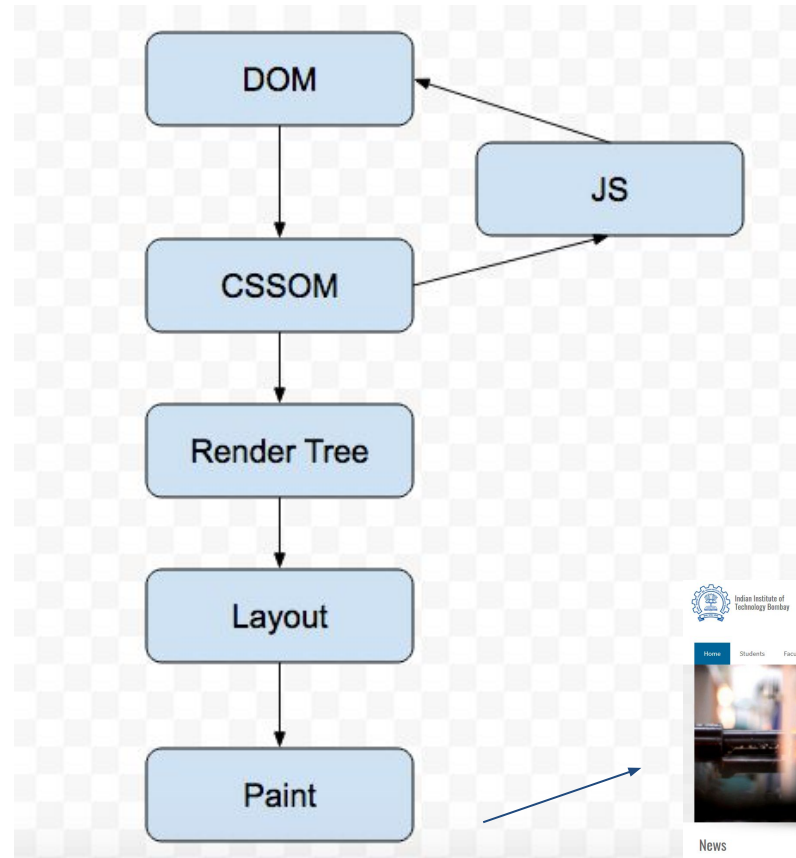
Multiple Classes

Here, all three h2 elements belongs to the "city" class. In addition, London also belongs to the "main" class, which center-aligns the text.

London

Paris

Tokyo

Tying it all together

Document Object Model (DOM)

- An application programming interface (api) that extracts a tree structure out of HTML

  – Each node is an object representing a part of the document

  – Objects can be manipulated programmatically via JavaScript

DOM

html
- head
  - meta
  - link
- body
  - p
    - Hello,
    - span
      - web performance
    - students
  - div
    - img

CSSOM

font-size: 16px — body
- p
  - font-size: 16px / font-weight: bold
  - span
    - font-size: 16px / display: none
- span
  - font-size: 16px / color: red
- img
  - font-size: 16px / float: right

Render Tree

font-size: 16px ← body
- p
  - font-size: 16px / font-weight: bold
  - Hello
  - students
- div
  - img
    - font-size: 16px / float: right
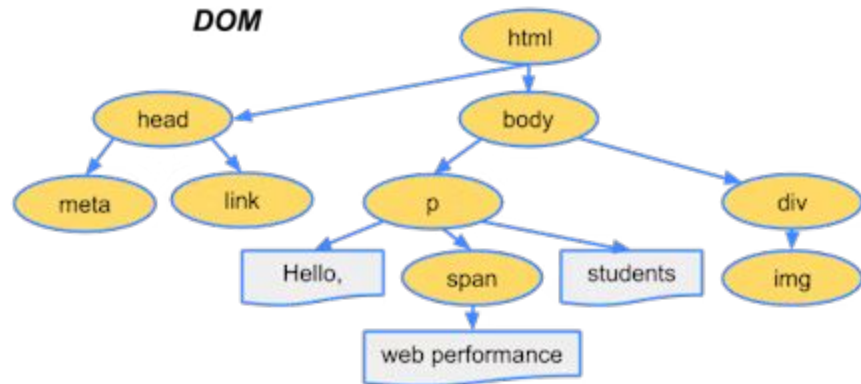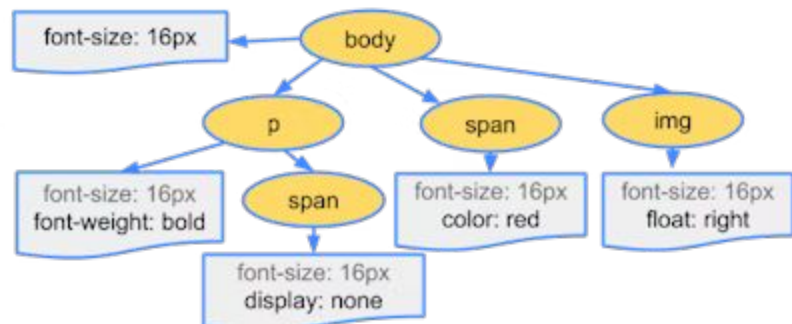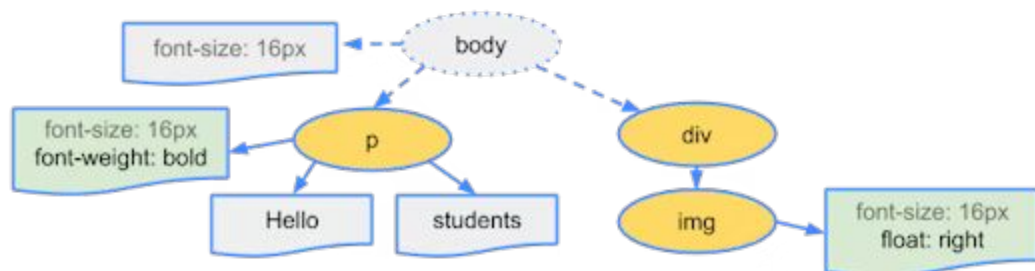
References

Core Reference:

https://www.w3schools.com/html/default.asp

- CSS in depth:

  https://www.w3schools.com/css/default.asp

- Javascript in depth:

  https://www.w3schools.com/js/default.asp