

<WA/>

2025

# Cascading Style Sheets

## Styling the Web

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*Some slides adapted from Laura Farinetti*



# Goal

- Styling web content - CSS
- Advanced layout in web pages
- Responsive layouts
- CSS frameworks

# Outline

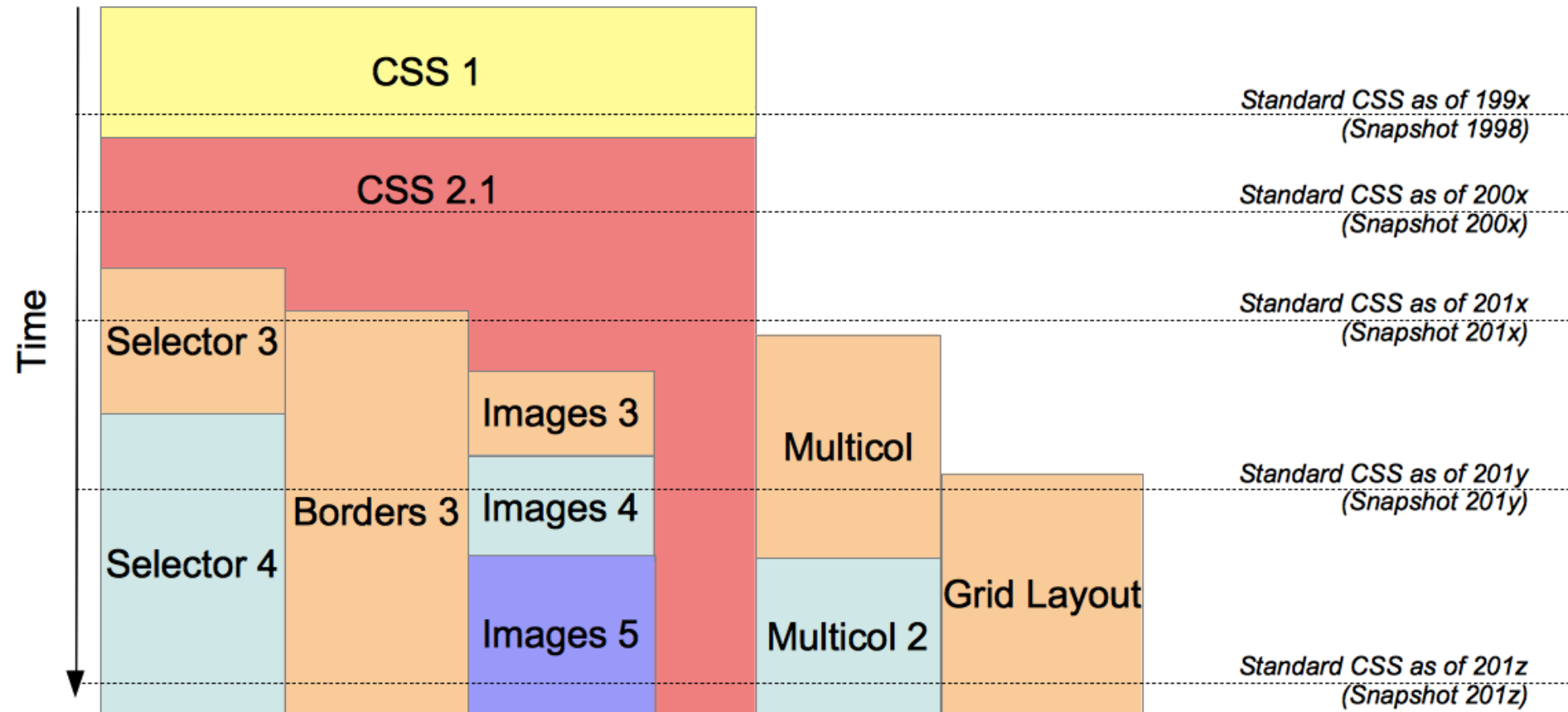
- CSS syntax
- CSS selectors
- CSS cascading
- CSS box model
- Page layout approaches (float, grid, flex)
- Responsive layout
- CSS frameworks



# Cascading Style Sheets

- CSS 1: W3C recommendation (17 Dec 1996)
- CSS 2.1: W3C Recommendation (7 June 2011)
- CSS 3: modular approach, different stages (REC, PR, CR, WD) for different parts
  - See <https://www.w3.org/Style/CSS/>
- Resources:
  - <https://developer.mozilla.org/en-US/docs/Web/CSS>
  - <https://developer.mozilla.org/en-US/docs/Web/CSS/Reference>

# Overview of CSS development approach



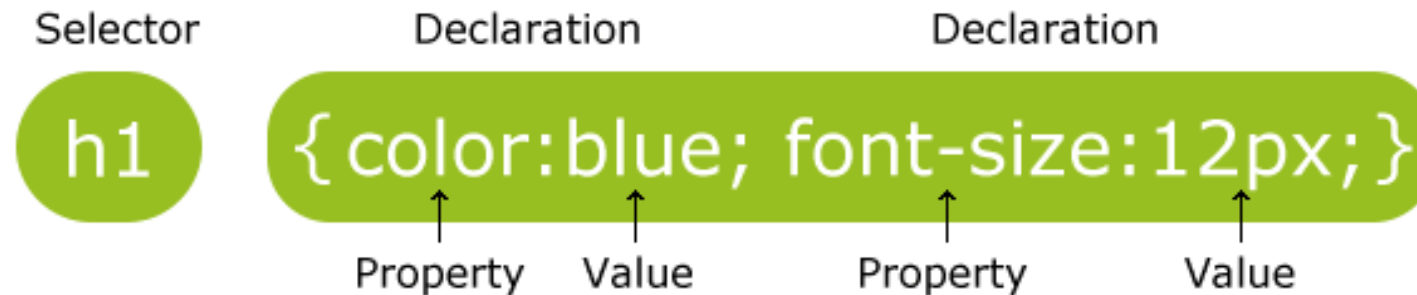
<https://developer.mozilla.org/en-US/docs/Web/CSS/CSS3>

Cascading Style Sheets

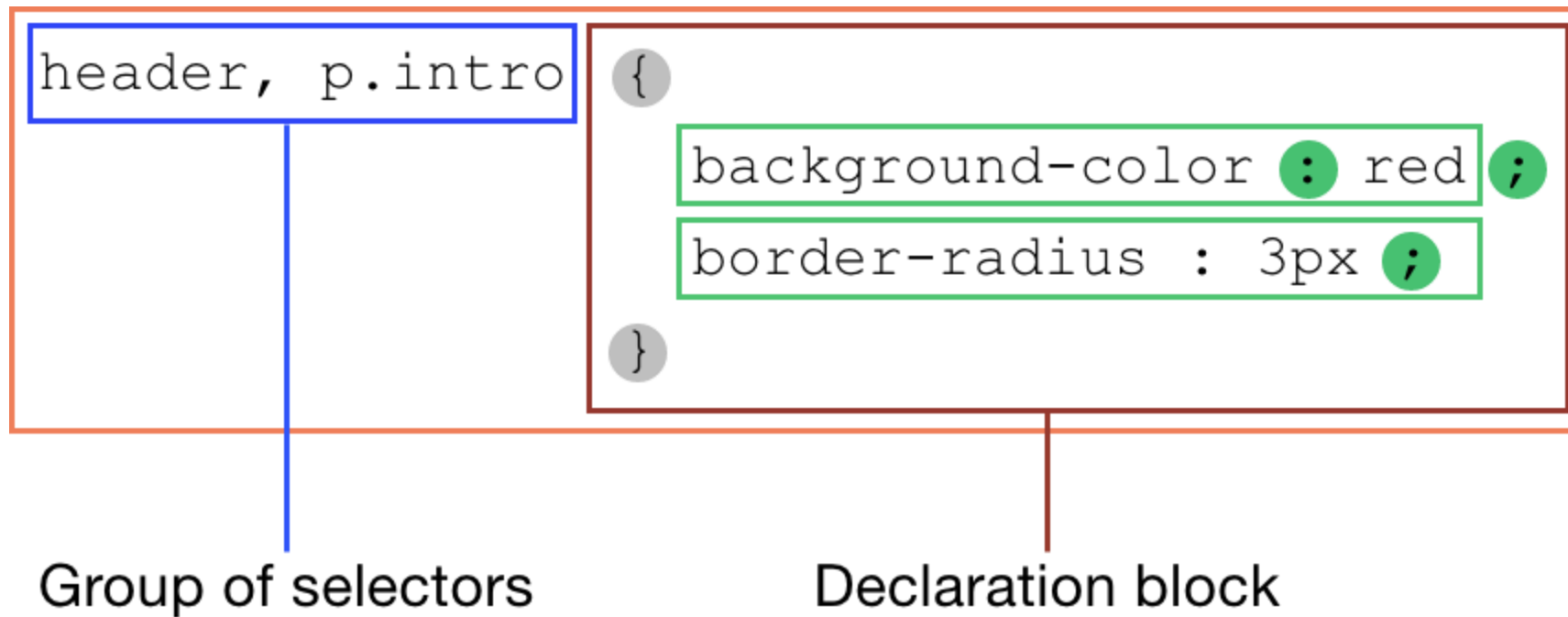
# CSS SYNTAX

# CSS Syntax

- CSS is based on **rules**
- A rule is a statement about one [stylistic] aspect of one or more HTML element
  - **Selector** + **Declaration(s)**
- A style sheet is a set of one or more rules that apply to an HTML document



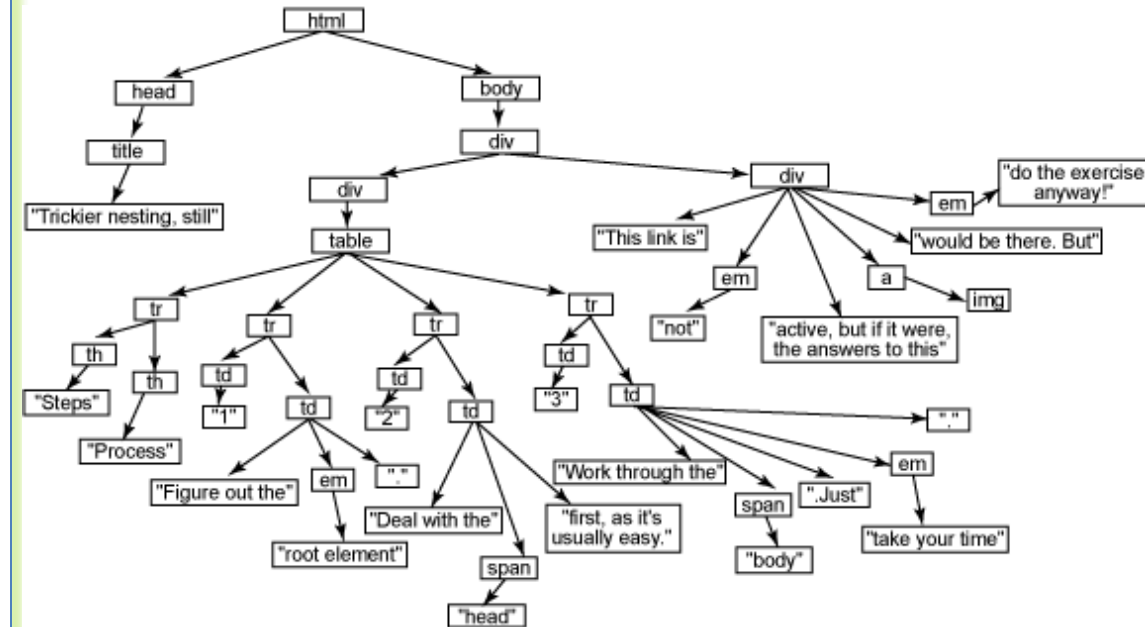
# General syntax





# HTML nested structure

```
<html lang="en">
<head>
  <title>Trickier nesting, still</title>
</head>
<body>
  <div>
    <div>
      <table>
        <tr><th>Steps</th><th>Processes</th></tr>
        <tr><td>1</td><td>Figure out the <em>root element</em>.</td></tr>
        <tr><td>2</td><td>Deal with the <span>head</span> first as it's
usually easy.</td></tr>
        <tr><td>3</td><td>Work through the <span>body</span>. Just <em>take
your time</em>.</td></tr>
      </table>
    </div>
    <div>
      This link is <em>not</em> active, but if it were, the answer to this
<a></a> would be there. But <em>do the exercise
anyway!</em>
    </div>
  </div>
</body>
</html>
```



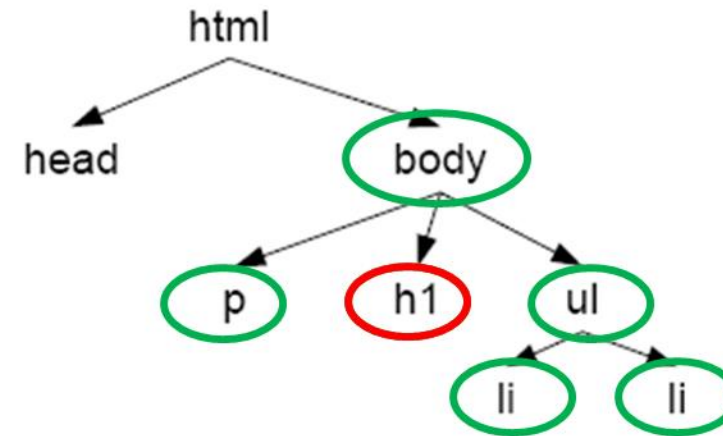
# Tree structure and inheritance

- HTML documents are trees
- **Styles are inherited along trees**
- Override: when two rules are in conflict the most specific wins
- Example

– body {color: green}

– h1 {color: red}

That is why it is called **CASCADING**!



# CSS properties (200+)

- Allowed Values (and Default Value):
  - Numbers, measurements, percentage
  - Enumerated options (strings)
  - Colors (name, RGB[A], HSL[A])
- Applies to:
  - Which elements may have this property
- Inherited:
  - Does also apply to children elements?

align-content align-items align-self all animation animation-delay animation-direction animation-duration animation-fill-mode animation-iteration-count animation-name animation-play-state animation-timing-function backface-visibility background background-attachment background-blend-mode background-clip background-color background-image background-origin background-position background-repeat background-size border border-bottom border-bottom-color border-bottom-left-radius border-bottom-right-radius border-bottom-style border-bottom-width border-collapse border-color border-image border-image-outset border-image-repeat border-image-slice border-image-source border-image-width border-left border-left-color border-left-style border-left-width border-radius border-right border-right-color border-right-style border-right-width border-spacing border-style border-top border-top-color border-top-left-radius border-top-right-radius border-top-style border-top-width border-width bottom box-decoration-break box-shadow box-sizing break-after break-before break-inside caption-side caret-color @charset clear clip clip-path color column-count column-fill column-gap column-rule column-rule-color column-rule-style column-rule-width column-span column-width columns content counter-increment counter-reset cursor direction display empty-cells filter flex flex-basis flex-direction flex-flow flex-grow flex-shrink flex-wrap float font @font-face font-family font-feature-settings font-kerning font-size font-size-adjust font-stretch font-style font-variant font-variant-caps font-weight grid grid-area grid-auto-columns grid-auto-flow grid-auto-rows grid-column grid-column-end grid-column-gap grid-column-start grid-gap grid-row grid-row-end grid-row-gap grid-row-start grid-template grid-template-areas grid-template-columns grid-template-rows hanging-punctuation height hyphens @import isolation justify-content @keyframes left letter-spacing line-height list-style list-style-image list-style-position list-style-type margin margin-bottom margin-left margin-right margin-top max-height max-width @media min-height min-width mix-blend-mode object-fit object-position opacity order outline outline-color outline-offset outline-style outline-width overflow overflow-x overflow-y padding padding-bottom padding-left padding-right padding-top page-break-after page-break-before page-break-inside perspective perspective-origin pointer-events position quotes resize right scroll-behavior tab-size table-layout text-align text-align-last text-decoration text-decoration-color text-decoration-line text-decoration-style text-indent text-justify text-overflow text-shadow text-transform top transform transform-origin transform-style transition transition-delay transition-duration transition-property transition-timing-function unicode-bidi user-select vertical-align visibility white-space width word-break word-spacing word-wrap writing-mode z-index



- <http://www.w3schools.com/cssref/>
- <https://developer.mozilla.org/en-US/docs/Web/CSS/Reference>
- <https://www.tutorialrepublic.com/css-reference/css3-properties.php>

# CSS properties by category

- Animation Properties
- Background Properties
- Border Properties
- Color Properties
- Dimension Properties
- Generated Content Properties
- Flexible Box Layout
- Font Properties
- List Properties
- Margin Properties
- Multi-column Layout Properties
- Outline Properties
- Padding Properties
- Print Properties
- Table Properties
- Text Properties
- Transform Properties
- Transitions Properties
- Visual formatting Properties

<https://www.tutorialrepublic.com/css-reference/css3-properties.php>

# CSS Units: Most Used

- CSS has several different **units** for expressing a length
  - format: a number followed by a unit (e.g., 10px)
- Two types of length units
  - absolute (fixed)
  - relative
- The most common fixed unit is pixel (**px**)
  - they are relative to the viewing device
  - for low-dpi devices, 1px is one device pixel (dot) of the display
  - for printers and high-resolution screens, 1px implies multiple device pixels
  - not well suited for responsive design (later on)

```
{  
    width: 100%,  
    font-size: 2em,  
    margin: 10px 20px 10px 20px,  
    padding: 10px, ...  
}
```

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

# CSS Units: Most Used

Viewport: The browser's viewport is the area of the window in which web content can be seen. This is often not the same size as the rendered page, in which case the browser provides scrollbars for the user to scroll around and access all the content.

- The most common relative units, instead:

Unit	Description
<b>em</b>	Relative to the font-size of the element. 2em means 2 times the size of the font of the current element
<b>rem</b>	Relative to font-size of the root element of the HTML page (Root EM)
<b>vw</b>	Relative to 1% of the width of the viewport, i.e., the browser window size
<b>vh</b>	Relative to 1% of the height of the viewport
<b>%</b>	Relative to the <u>parent</u> / container element

- Suggestions:
  - prefer **relative** units to absolute ones, when possible
  - **rem** is (nowadays) preferred to em

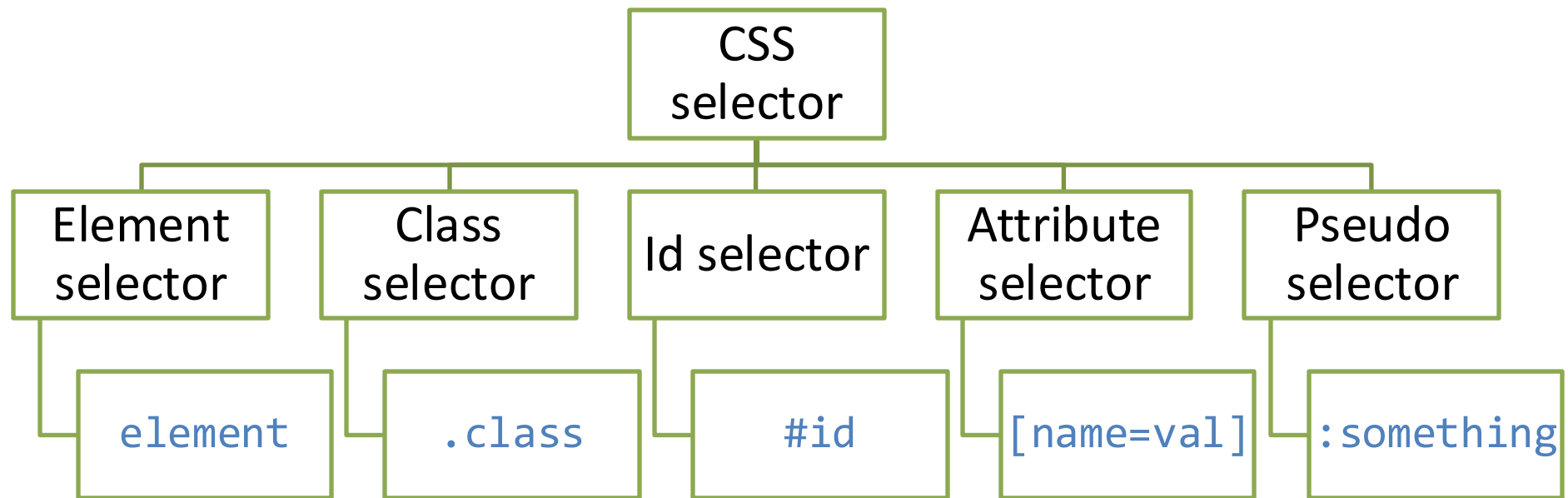
Cascading Style Sheets

# CSS SELECTORS

See Developer Console > Styles

# CSS selectors

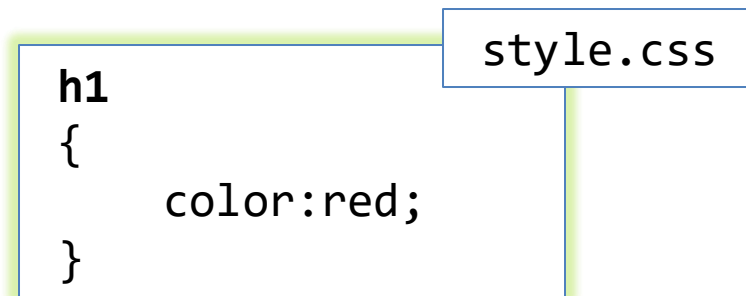
- Patterns used to select the element(s) you want to style
- Three main types of selectors plus “pseudo-selectors”





# Element selector

- Used to apply the same style to all instances of a specific element in a document
- Example: apply the color red to all h1 elements that appear in the document



The diagram illustrates a CSS rule. A light blue box contains the CSS code: `h1 { color:red; }`. A small blue box labeled `style.css` is positioned to the right of the code box, with a line connecting it to the code box, indicating the file where the rule is defined.

```
h1
{
    color:red;
}
```

style.css

# Class selector

- Used to apply the same style to all elements belonging to a specific (defined) class
- Applies a specific style to a set of related elements, identified by class

1. Identify element with class name (or list of class names)

```
<h1 id="titlemessage">Education is must</h1>  
  <p class="bluetext">Education in its general sense is a  
    form of learning in which [...]  
  </p>  
<h3 class="bluetext">Try to teach</h3>
```

doc.html

```
.bluetext  
{  
    color:blue;  
}
```

style.css

Often the classname has a semantic meaning  
(e.g. username, warning, etc.)

2. Define class style

# Id selector

- Used to apply a style to a specific element in a document
- You can select a specific element by its (declared) id and apply a style to that (and possibly its children)

1. Identify element with ID name (UNIQUE)

```
<h1 id="titlemessage">Education is must</h1>  
  <p class="bluetext">Education in its general sense is a  
form of learning in which [...]  
  </p>  
<h3 class="bluetext">Try to teach</h3>
```

doc.html

```
#titlemessage  
{  
  color:gray  
}
```

style.css

2. Define ID style

# Attribute selectors

Selector	Example	Example description	CSS
<code>[attribute]</code>	<code>[target]</code>	Selects all elements with a target attribute	2
<code>[attribute=value]</code>	<code>[target=_blank]</code>	Selects all elements with target="_blank"	2
<code>[attribute~value]</code>	<code>[title~flower]</code>	Selects all elements with a title attribute containing the word "flower"	2
<code>[attribute =value]</code>	<code>[lang =en]</code>	Selects all elements with a lang attribute value starting with "en"	2
<code>[attribute^=value]</code>	<code>a[href^="https"]</code>	Selects every <a> element whose href attribute value begins with "https"	3
<code>[attribute\$=value]</code>	<code>a[href\$=".pdf"]</code>	Selects every <a> element whose href attribute value ends with ".pdf"	3
<code>[attribute*=value]</code>	<code>a[href*="w3schools"]</code>	Selects every <a> element whose href attribute value contains the substring "w3schools"	3

# Pseudo class selector

- Used to style an element based on something other than the structure of the document
  - E.g., the status of a form element or link

```
/* makes all unvisited links blue */  
a:link {color:blue;}  
/* makes all visited links green */  
a:visited {color:green;}  
/* makes links red when hovered or activated */  
a:hover, a:active {color:red;}  
/* makes table rows red when hovered over */  
tr:hover {background-color: red;}  
/* makes input elements yellow when focus is applied */  
input:focus {background-color:yellow;}
```

# Combining selectors

- `element.class#id[n=v]`  
→ may be combined
- `S1, S2`  
→ S1 union S2 **[or]**
- `S1 S2`  
→ S2 **nested** within S1 **[descendant]**
- `S1 > S2`  
→ S2 if a **direct children** of S1
- `S1 + S2`  
→ S2 if it comes after a S1 **[next/adjacent sibling]**
- `S1 ~ S2`  
→ S2 if it comes later than S1 **[subsequent sibling]**

Example:

```
ul > li[class="a"]
```

[https://developer.mozilla.org/en-US/docs/Learn/CSS/Building\\_blocks/Selectors/Combinators](https://developer.mozilla.org/en-US/docs/Learn/CSS/Building_blocks/Selectors/Combinators)

# CSS selectors

Selector	Example	Example description	CSS
<i>.class</i>	.intro	Selects all elements with class="intro"	1
<i>#id</i>	#firstname	Selects the element with id="firstname"	1
<i>*</i>	*	Selects all elements	2
<i>element</i>	p	Selects all <p> elements	1
<i>element,element</i>	div, p	Selects all <div> elements and all <p> elements	1
<i>element element</i>	div p	Selects all <p> elements inside <div> elements	1
<i>element&gt;element</i>	div > p	Selects all <p> elements where the parent is a <div> element	2
<i>element+element</i>	div + p	Selects all <p> elements that are placed immediately after <div> elements	2
<i>element1~element2</i>	p ~ ul	Selects every <ul> element that are preceded by a <p> element	3

[http://www.w3schools.com/cssref/css\\_selectors.asp](http://www.w3schools.com/cssref/css_selectors.asp)

# Display property

- Property that allows to control element visualization (block or inline)
- Changing an inline element to a block element, or vice versa, can be useful for making the page look a specific way

```
li {display:inline;}
```

```
span {display:block;}
```

Overrides li “block” default value: becomes an horizontal list

[http://www.w3schools.com/Css/css\\_display\\_visibility.asp](http://www.w3schools.com/Css/css_display_visibility.asp)



# Display and visibility properties

- The property **display** allows to hide an element, too
  - The element will be hidden, the page will be displayed as if the element is **not there**

```
h1.hidden {  
    display: none;  
}
```

- The property **visibility** also can hide an element, but the element will still take up the same space as before
  - The element will be hidden, but **still affects the layout**

All the elements  
around do not move to  
fit the empty space

```
h1.hidden {  
    visibility: hidden;  
}
```

# CSS pseudo-class selectors

Selector	Example	Example description	CSS
:active	a:active	Selects the active link	1
::after	p::after	Insert something after the content of each <p> element	2
::before	p::before	Insert something before the content of each <p> element	2
:checked	input:checked	Selects every checked <input> element	3
:disabled	input:disabled	Selects every disabled <input> element	3
:empty	p:empty	Selects every <p> element that has no children (including text nodes)	3
:enabled	input:enabled	Selects every enabled <input> element	3
:first-child	p:first-child	Selects every <p> element that is the first child of its parent	2
::first-letter	p::first-letter	Selects the first letter of every <p> element	1
::first-line	p::first-line	Selects the first line of every <p> element	1

Selector	Example	Example description	CSS
:first-of-type	p:first-of-type	Selects every <p> element that is the first <p> element of its parent	3
:focus	input:focus	Selects the input element which has focus	2
:hover	a:hover	Selects links on mouse over	1
:in-range	input:in-range	Selects input elements with a value within a specified range	3
:invalid	input:invalid	Selects all input elements with an invalid value	3
:lang( <i>language</i> )	p:lang(it)	Selects every <p> element with a lang attribute equal to "it" (Italian)	2
:last-child	p:last-child	Selects every <p> element that is the last child of its parent	3
:last-of-type	p:last-of-type	Selects every <p> element that is the last <p> element of its parent	3
:link	a:link	Selects all unvisited links	1

and many others...

<https://developer.mozilla.org/en-US/docs/Web/CSS/Pseudo-classes>

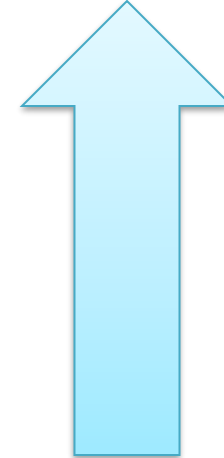
Cascading Style Sheets

# CSS CASCADING

# Cascading Style Sheets

- The term “cascading” means that a document can include more than one style sheet
- In this case, visualization follows **priority rules**
  - Inline Style (inside HTML tag)
  - Internal Style (usually in the HTML head section)
  - External Style
  - Browser Default Style

NOT recommended



**priority**

# External style

- Link to an external style sheet using the `<link>` element

PREFERRED for  
modularity



```
h1 { font-size:17px;
      font-family:verdana; color:green; }
h2 { font-size:18px;
      font-family:arial; color:red; }
```

style.css

```
<head>
  <link rel=stylesheet type="text/css"
        href="style.css">
</head>
<body>
  <h1>This text is green, and uses verdana font
      at 17 pixels </h1>
  <h2>This text is red, and uses verdana font
      at 18 pixels </h2>
</body>
```

# Internal style

- `<style>` element inside the document header
- Not recommended – prefer external styles

```
<head>
  <style type="text/css">
    h1 { font-size:17px; font-family:verdana;
        color:green; }
    h2 { font-size:18px; font-family:arial;
        color:red; }
  </style>
</head>
```

# Inline style

NOT recommended

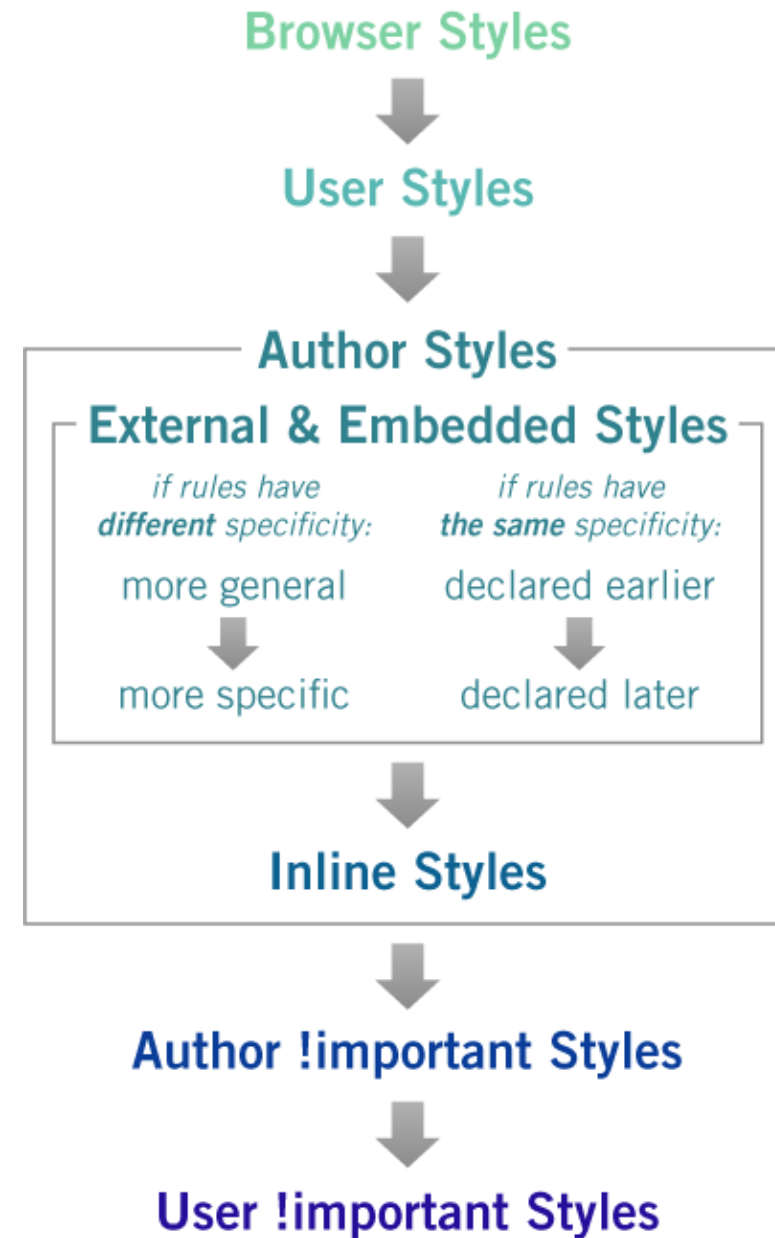
- `<style>` attribute within an HTML element
- Last resort, just for local (very local) changes

```
<h1 style="font-size:17px;  
    font-family:verdana; color:green; "> This text is  
green, and uses verdana font at 17 pixels </h1>
```

# Priority rules

- Rules can be marked as “important”

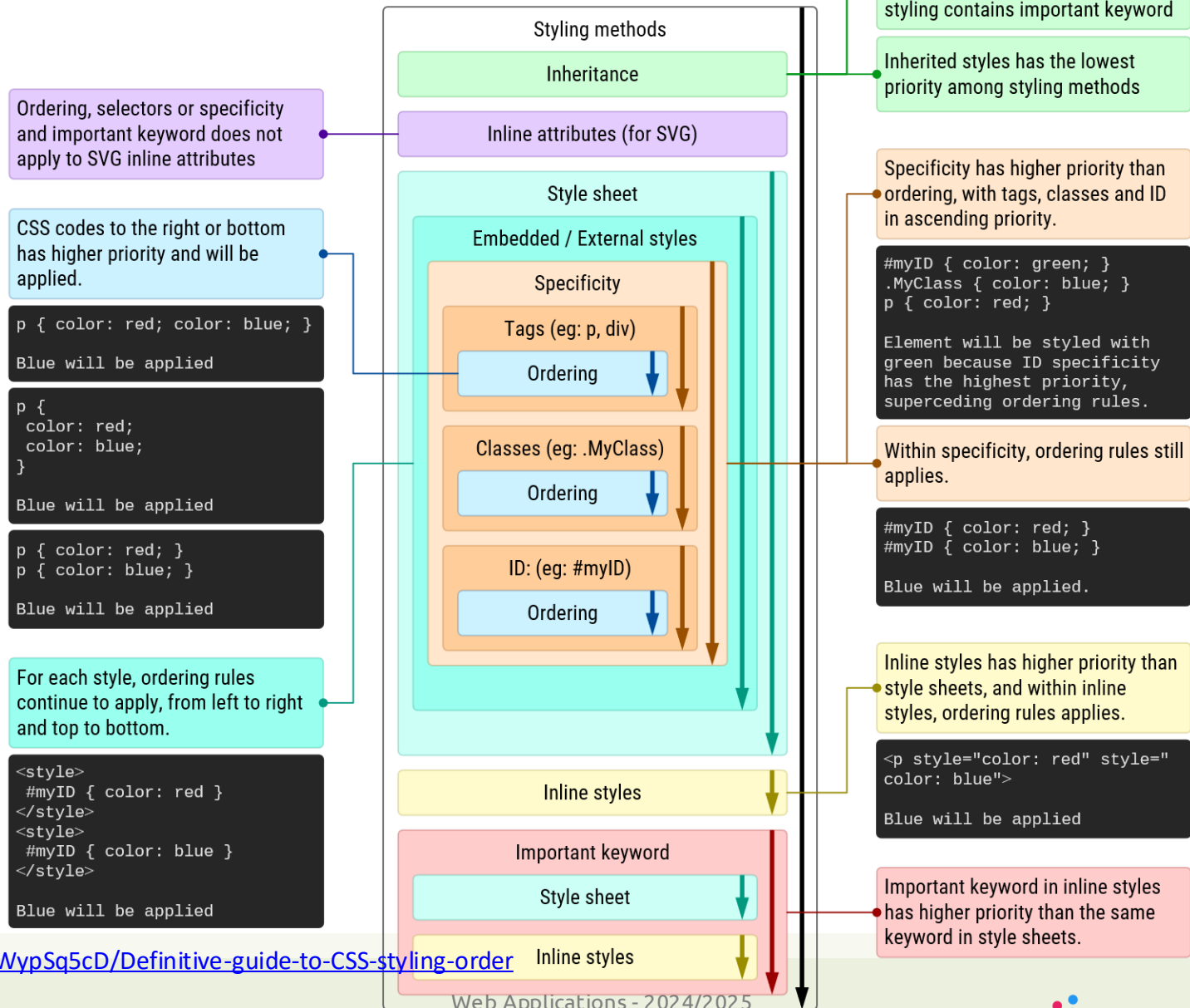
```
h1 {  
  color:red !important  
}
```





# The definitive guide to CSS styling order

Includes CSS stylings for SVG

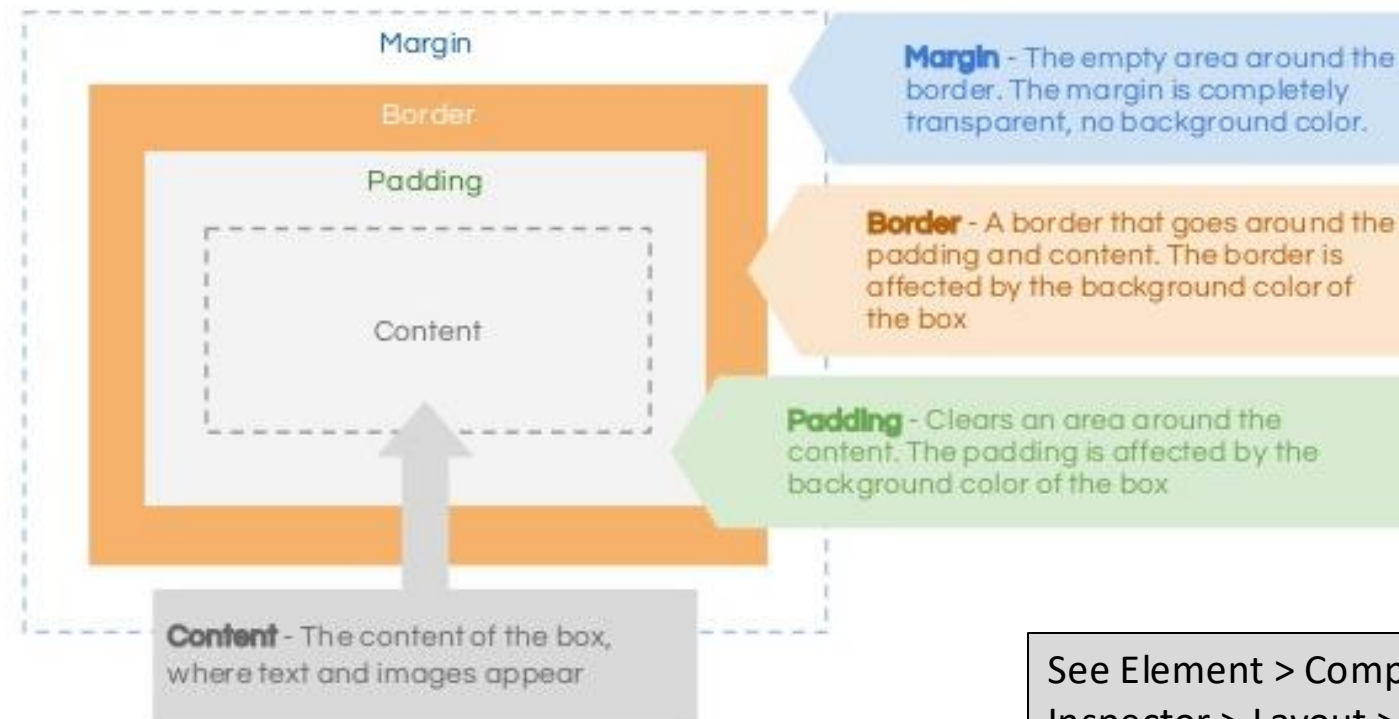


Cascading Style Sheets

# CSS BOX MODEL

# The box model

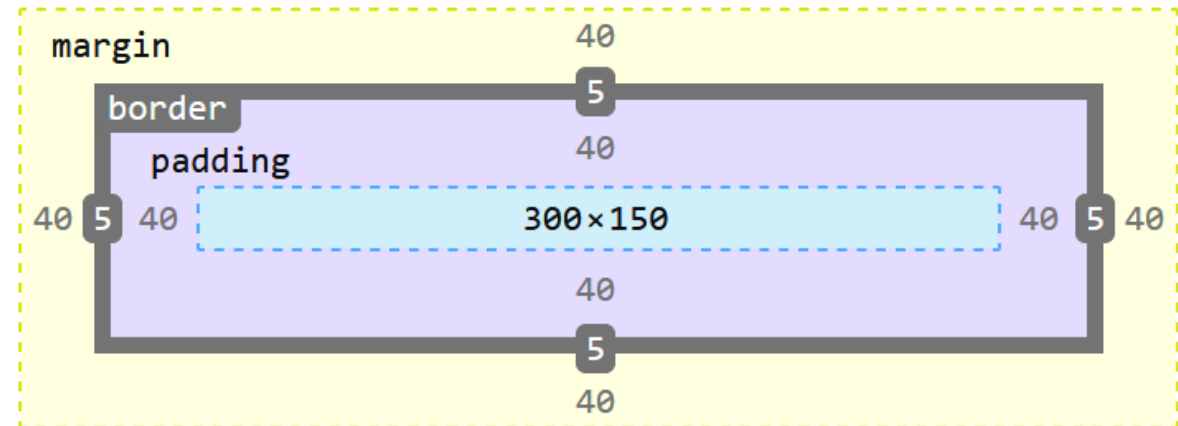
- One of the cornerstones of CSS
- Every **element** on the page is considered to be a **rectangular box**



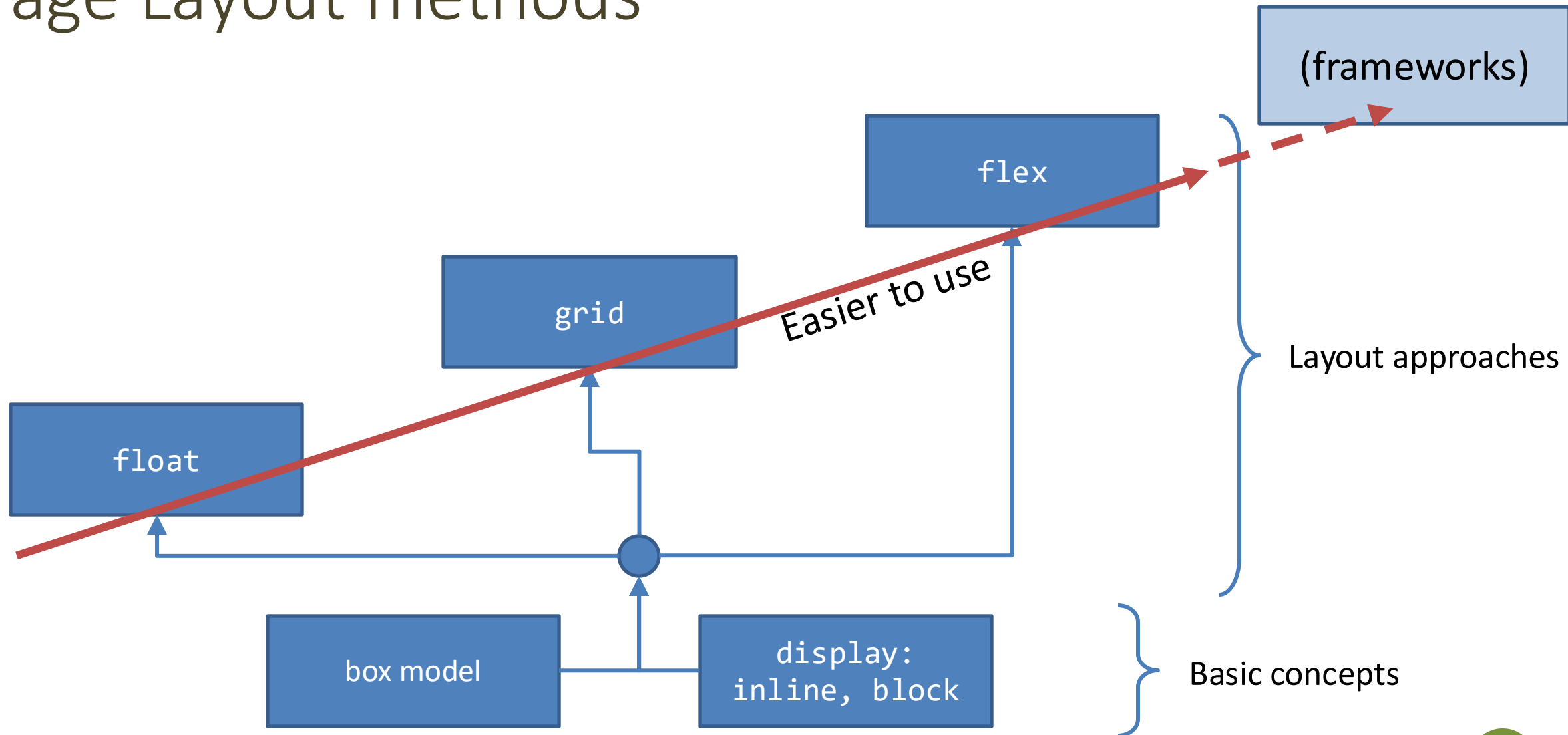
See Element > Computed in Chrome,  
Inspector > Layout > Box model in Firefox

# The box model

- Total element width =  
width + left padding + right padding +  
left border + right border + left margin  
+ right margin
- Total element height =  
height + top padding +  
bottom padding + top border +  
bottom border + top margin + bottom  
margin
- You can set any of these  
properties, independently



# Page Layout methods

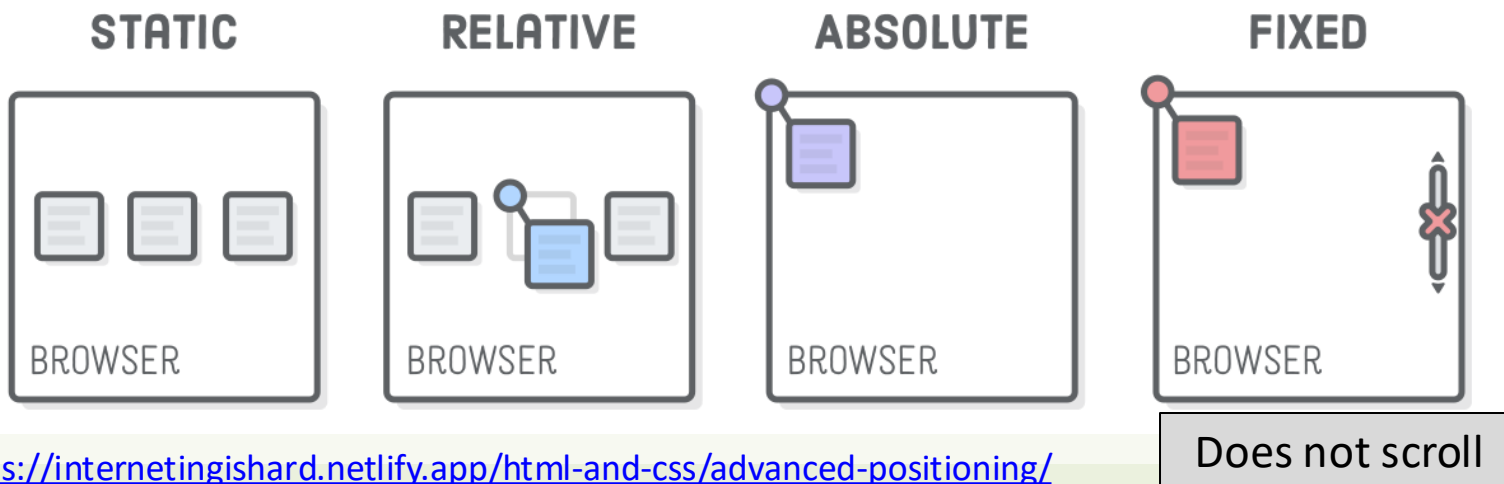


Cascading Style Sheets

# **CSS POSITIONING SCHEMES**

# Positioning schemes

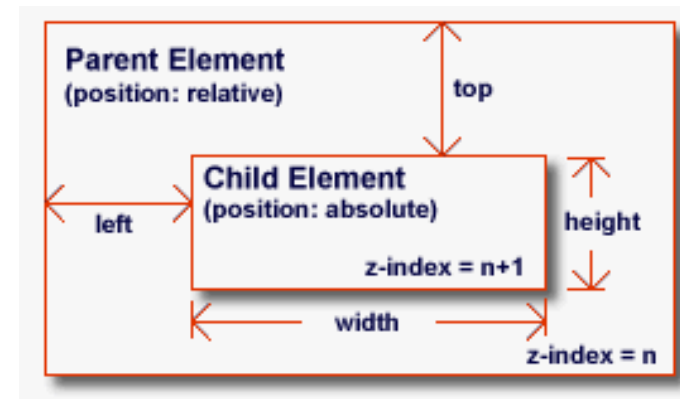
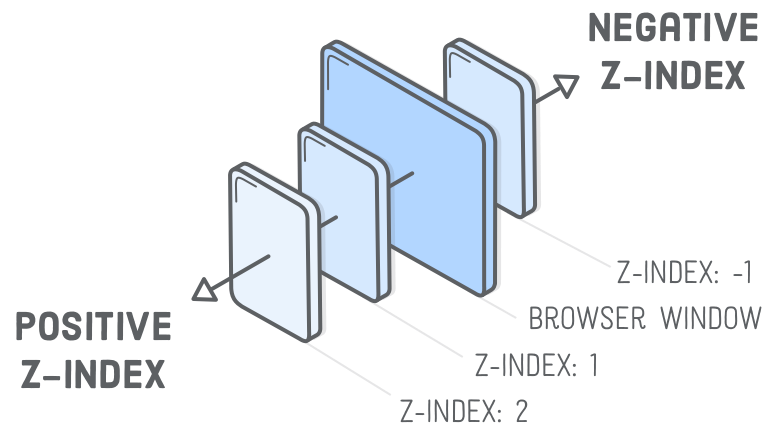
- **Static:** normal flow
- **Relative:** offset relative to the block position in the normal flow
- **Absolute:** the box position is determined by the top, left, right, bottom properties, relative to the containing block
- **Fixed:** fixed with respect to some reference point (the viewport)



```
.item {  
  position: static | relative  
  | absolute | fixed;  
  left: 20px;  
  top: 20px;  
}
```

# z-index

- In case of overlaps the z-index property specifies the stack order of an element (which element should be placed in front of, or behind, the others)





Cascading Style Sheets

# LAYOUT WITH FLOATS

Just for completeness. Difficult to use,  
not recommended for labs and exam

# Floating

- The CSS **float** property gives control over the horizontal position of an element



**LEFT ALIGN**

FLOAT: LEFT;



**CENTER ALIGN**

MARGIN: 0 AUTO;



**RIGHT ALIGN**

FLOAT: RIGHT;

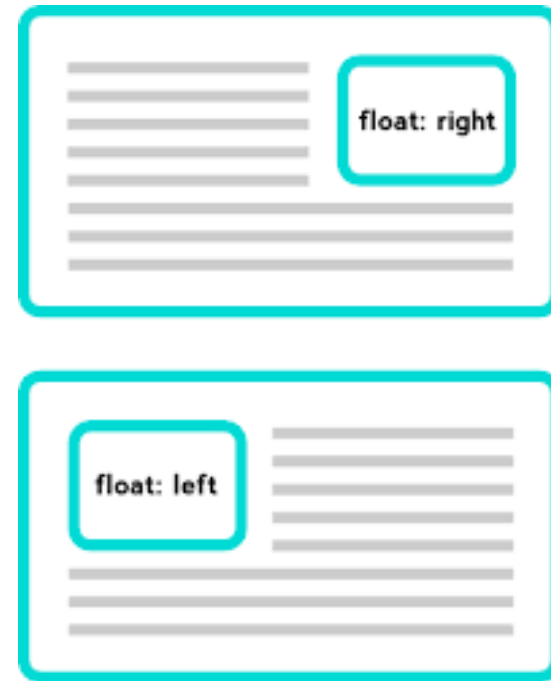
<https://internetingishard.com/html-and-css/floats/>

# Floating

- A floated box can either be shifted to the left or the right until its outer edge touches the edge of its containing box, or another floated box
- **Often used for images** and when working with layouts

```
img
{
  float: right;
}
```

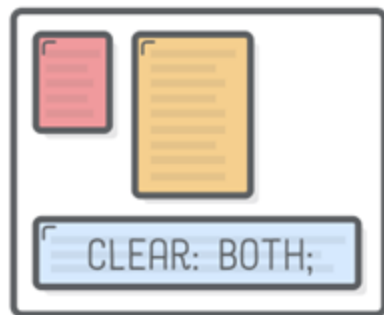
[http://www.w3schools.com/Css/css\\_float.asp](http://www.w3schools.com/Css/css_float.asp)



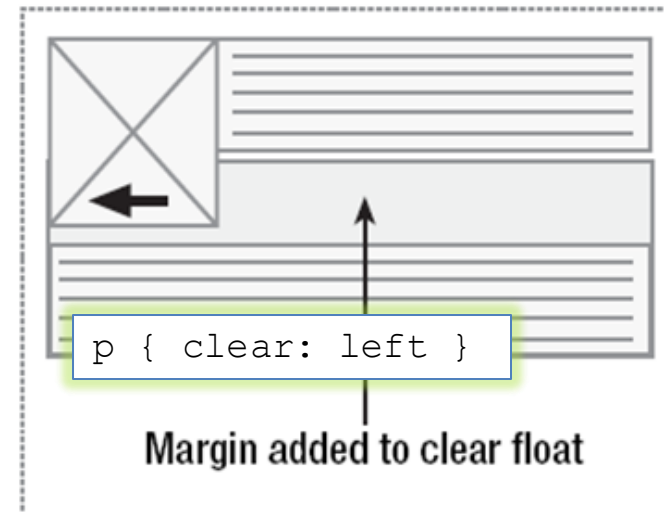
# Clearing floats

- “Clearing” a float: tell a block to ignore any floats that appear before it
  - Instead of flowing around, a cleared element appears after any floats
  - It’s like forcing a box back into the default vertical flow of the page

## CLEARING WITH CHILD ELEMENT

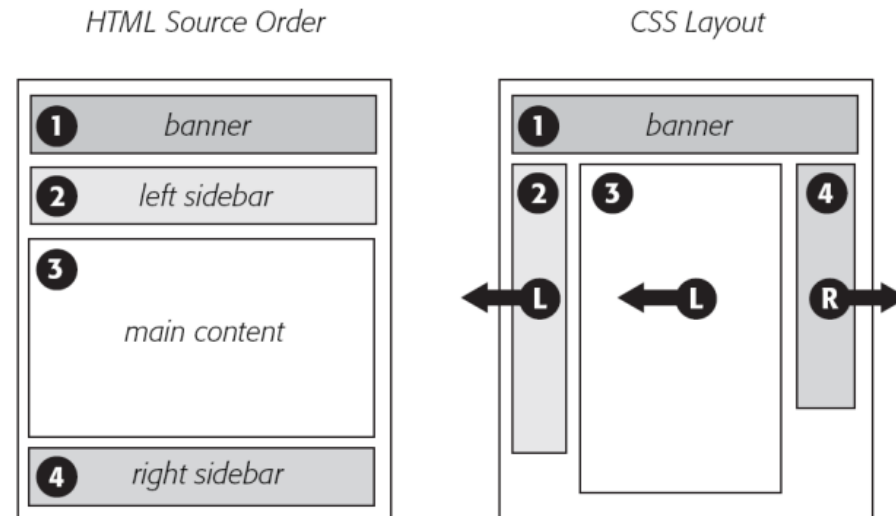


## Second paragraph cleared



# Float-based layouts

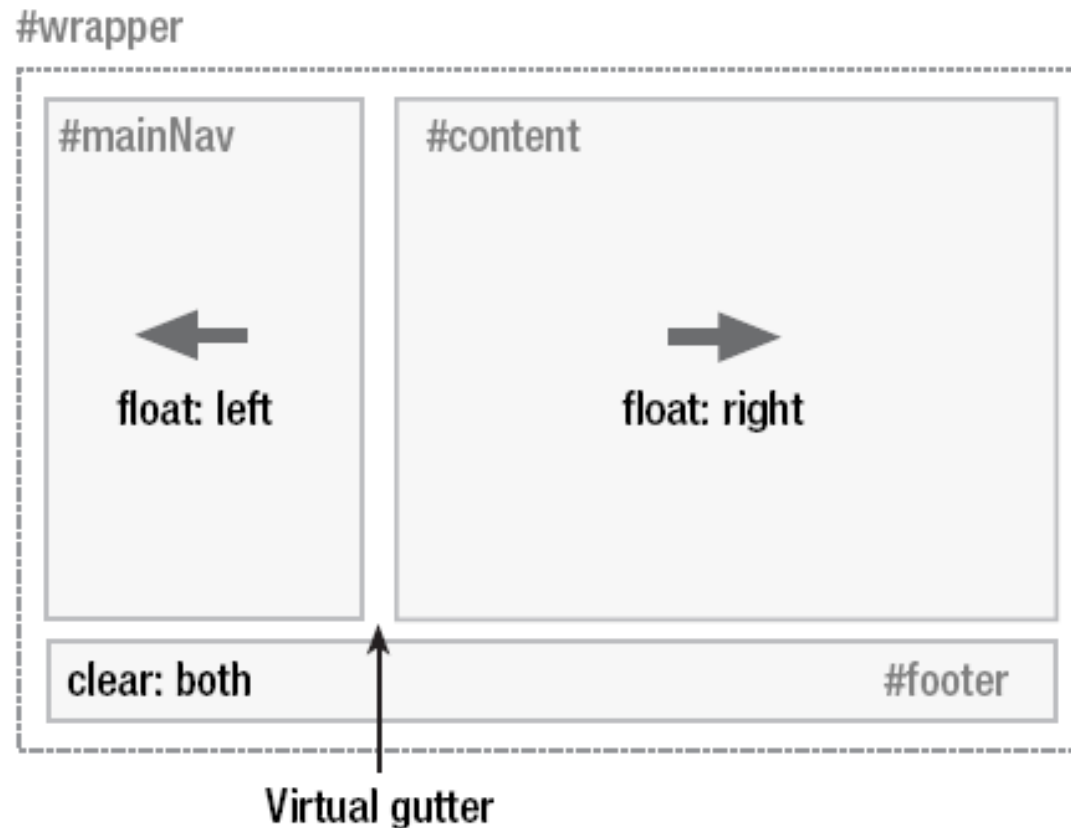
- Set the width of the elements you want to position, and then float them left or right
  - Two-column floated layout
  - Three-column floated layout



# Two-column floated layout

- Create a virtual gutter by floating one element left and one element right

```
<div id="wrapper">  
  <div id="branding">  
    ...  
  </div>  
  <div id="content">  
    ...  
  </div>  
  <div id="mainNav">  
    ...  
  </div>  
  <div id="footer">  
    ...  
  </div>  
</div>
```



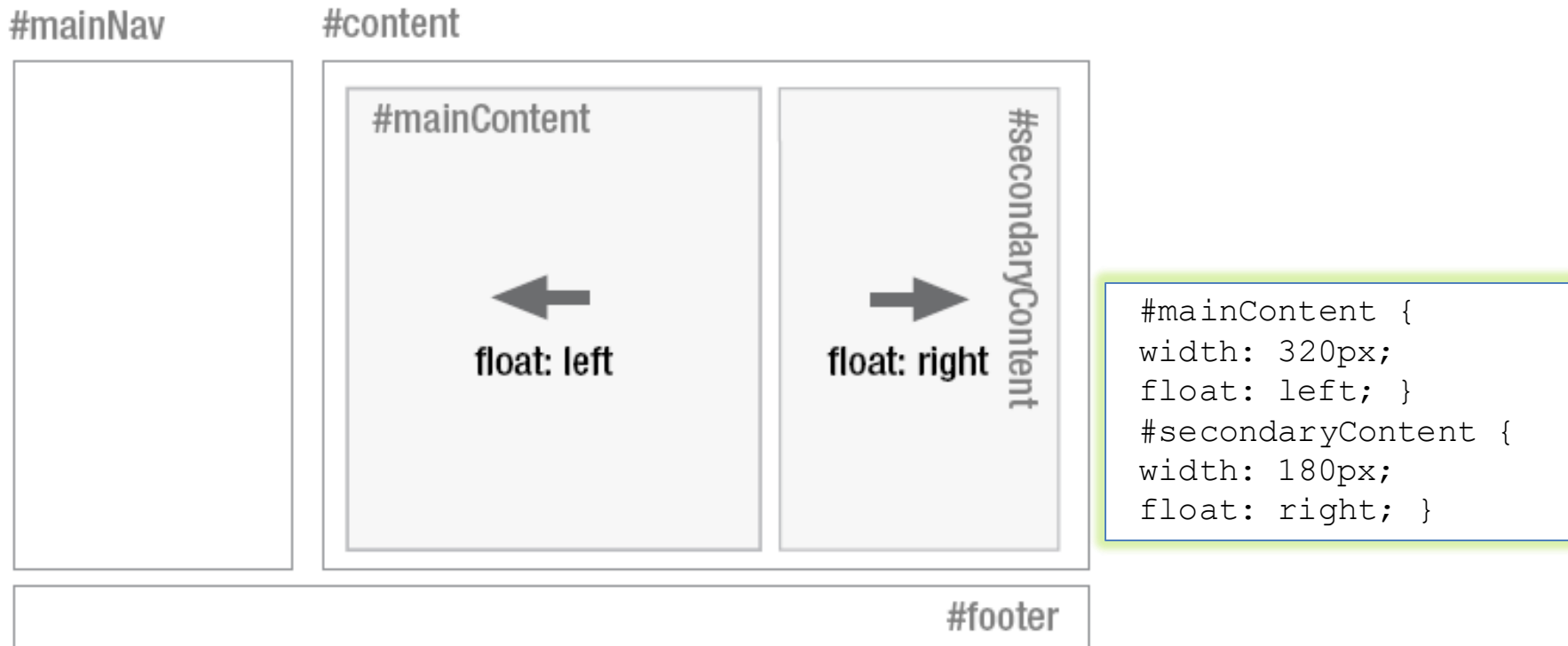
# Two-column floated layout

```
#content {  
width: 520px;  
float: right;  
}  
#mainNav {  
width: 180px;  
float: left;  
}  
#footer {  
clear: both;  
}
```

```
#mainNav {  
padding-top: 20px;  
padding-bottom: 20px;  
}  
#mainNav li {  
padding-left: 20px;  
padding-right: 20px;  
}  
#content h1, #content h2,  
    #content p {  
padding-right: 20px;  
}
```

<https://blog.html.it/layoutgala/index.html>

# Three-column floated layout



```
#secondaryContent h1, #secondaryContent h2,  
    #secondaryContent p {  
padding-left: 20px;  
padding-right: 20px; }
```



# References for CSS box model and positioning

- Learn CSS layout
  - <http://learnlayout.com/>
- Floatutorial
  - <http://css.maxdesign.com.au/floatutorial/>
- All about floats
  - <https://css-tricks.com/all-about-floats/>

Cascading Style Sheets

# PAGE LAYOUT WITH GRIDS

Just for completeness. Somehow difficult to use, not recommended for labs and exam

# Advanced layout: grid

## Maki-zushi



The rice and seaweed rolls with fish and/or vegetables. There are also more specific terms for the rolls depending on the style.

## Nigiri-zushi



The little fingers of rice topped with wasabi and a filet of raw or cooked fish or shellfish. Generally the most common form of sushi you will see.

## Temaki-zushi



Also called a hand-roll. Cones of sushi rice, fish and vegetables wrapped in seaweed. It is very similar to maki.

## WHAT IS SUSHI?

Beginning as a method of preserving fish centuries ago, sushi has evolved into an artful, unique dining experience. In its earliest form, dried fish was placed between two pieces of vinegared rice as a way of making it last. The nori (seaweed) was added later as a way to keep one's fingers from getting sticky.

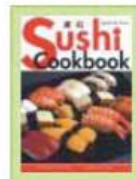
Technically, the word 'sushi' refers to the rice, but colloquially, the term is used to describe a finger-size piece of raw fish or shellfish on a bed of vinegared rice or simply the consumption of raw fish in the Japanese style (while sushi is not solely a Japanese invention, these days, the Japanese style is considered the de facto serving standard).

## Sashimi



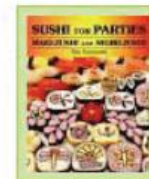
Sashimi is raw fish served sliced, but as-is. That means no rice bed or roll, but it is often served

alongside daikon and/or shiso. This is my favorite style as you really get the flavor of the fish..



### QUICK & EASY SUSHI COOKBOOK

This book has great pictures, however it is not as complete as Sushi Made Easy.



### SUSHI FOR PARTIES: MAKI-ZUSHI AND NIGIRI-ZUSHI

This book also has great pictures, with advanced maki (cut roll) making techniques.



### SUSHI MADE EASY

A very decent all-around book for the money.

# Advanced layout: grid

<p><b>Maki-zushi</b></p>  <p>The rice and seaweed rolls with fish and/or vegetables. There are also more specific terms for the rolls depending on the style.</p>		<p><b>Nigiri-zushi</b></p>  <p>The little fingers of rice topped with wasabi and a filet of raw or cooked fish or shellfish. Generally the most common form of sushi you will see.</p>	<p><b>Temaki-zushi</b></p>  <p>Also called a hand-roll. Cones of sushi rice, fish and vegetables wrapped in seaweed. It is very similar to maki.</p>
<p><b>WHAT IS SUSHI?</b></p>  <p>Beginning as a method of preserving fish centuries ago, sushi has evolved into an artful, unique dining experience. In its earliest form, dried fish was placed between two pieces of vinegared rice as a way of making it last. The nori (seaweed) was added later as a way to keep one's fingers from getting sticky.</p>		<p>Technically, the word "sushi" refers to the rice, but colloquially, the term is used to describe a finger-size piece of raw fish or shellfish on a bed of vinegared rice or simply the consumption of raw fish in the Japanese style (while sushi is solely a Japanese invention, these days, the Japanese style is considered the de facto serving standard).</p>	
<p><b>Sashimi</b></p>  <p>Sashimi is raw fish served sliced, but as-is. That means no rice bed or roll, but it is often served alongside daikon and/or shiso. This is my favorite style as you really get the flavor of the fish..</p>	 <p><b>QUICK &amp; EASY SUSHI COOKBOOK</b></p> <p>This book has great pictures, however it is not as complete as Sushi Made Easy.</p>	 <p><b>SUSHI FOR PARTIES</b></p> <p>This book also has great pictures, with advanced maki (cut roll) making techniques.</p>	 <p><b>SUSHI MADE EASY</b></p> <p>A very decent all-around book for the money.</p>

# Advanced layout: grid

- It is possible to define a grid in which content can flow or be placed, or that remain empty
- There are 3 ways to define a grid
  - Explicit grid: defined with `'grid-columns'` and `'grid-rows'` properties
  - Natural grid: automatically created by elements with a natural grid structure (multi-column elements and tables)
  - Default grid: all other block elements define a single-cell grid

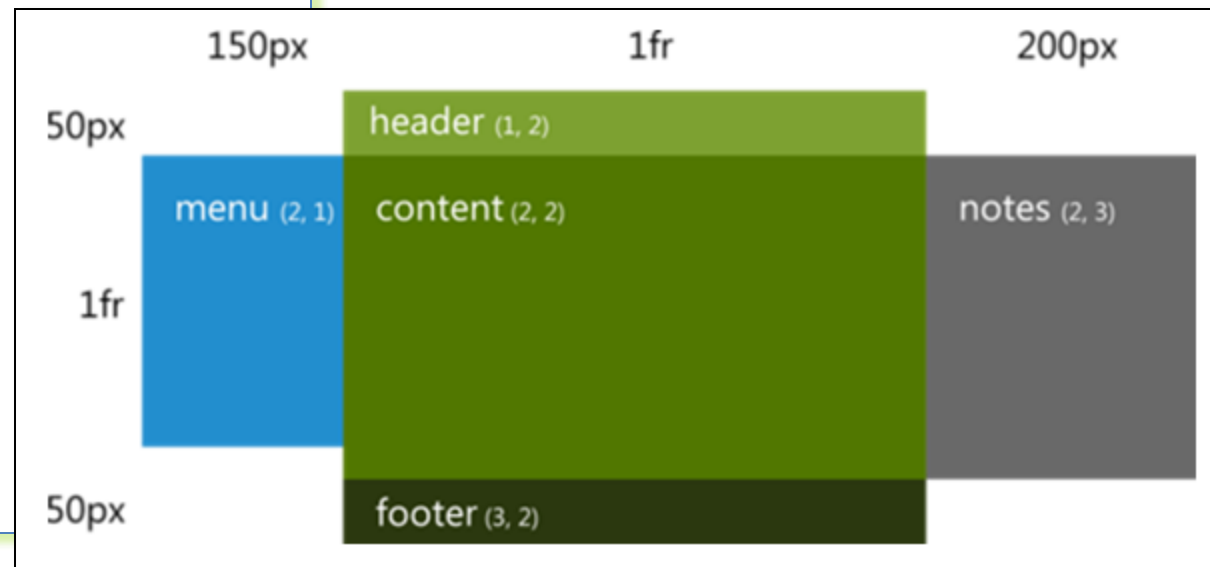
# Example

```
section {  
  display: grid;  
  grid-columns: 150px 1fr 200px;  
  grid-rows: 50px 1fr 50px; }  
section header {  
  grid-column: 2;  
  grid-row: 1; }  
section nav {  
  grid-column: 1;  
  grid-row: 2; }  
section article {  
  grid-column: 2;  
  grid-row: 2; }  
section aside {  
  grid-column: 3;  
  grid-row: 2; }  
section footer {  
  grid-column: 2;  
  grid-row: 3; }
```

```
<section>  
  <header>Title</header>  
  <nav>Menu</nav>  
  <article>Content</article>  
  <aside>Notes</aside>  
  <footer>Footer</footer>  
</section>
```

- fr = fraction values
  - new unit applicable to grid-rows and grid-columns properties

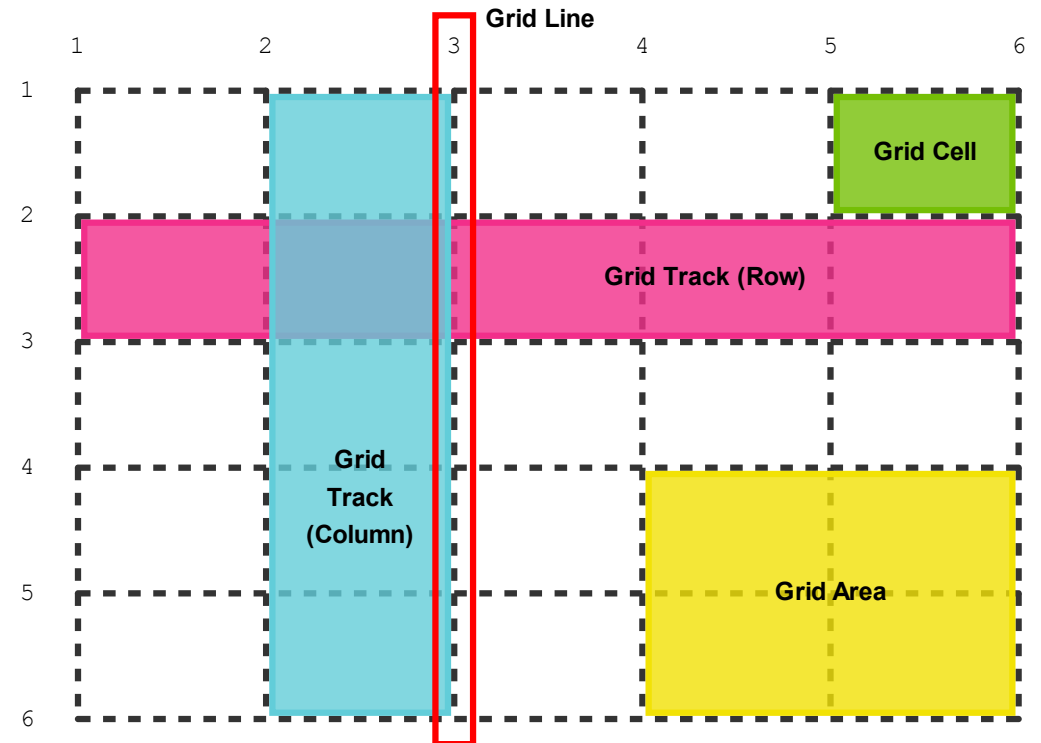
1fr is for 1 part of the available space



Span syntax (see next reference)

# Suggested reference for Grid Layout

- <https://webkit.org/blog/7434/css-grid-layout-a-new-layout-module-for-the-web/>



Cascading Style Sheets

# CSS FLEXBOX

Suggested for labs and exam, ONLY in case the CSS framework is not enough



# Flexbox

- Flexbox uses two types of boxes
  - **Flex containers**: group a set of flex items and define how they're positioned
  - **Flex items**
- Every HTML element that's a **direct** child of a flex container is an item

To turn one HTML elements into a flex container:

```
div { display: flex ; }
```



“FLEX CONTAINER”



“FLEX ITEMS”

<https://internetingishard.netlify.app/html-and-css/flexbox/>

# Flexbox



**ALIGNMENT**



**DIRECTION**



**ORDER**



**SIZE**

<https://internetingishard.com/html-and-css/flexbox/>

[https://www.w3schools.com/css/css3\\_flexbox.asp](https://www.w3schools.com/css/css3_flexbox.asp)

# Horizontal alignment

- “justify-content” property defines the horizontal alignment of its items
  - center, flex-start, flex-end
  - space-around, space-between

```
<div class='container'>  
  <div class='item'>A</div>  
  <div class='item'>B</div>  
  <div class='item'>C</div>  
</div>
```

```
.menu-container {  
  /* ... */  
  display: flex;  
  justify-content: center;  
}
```

div behaves as inline



FLEX-START



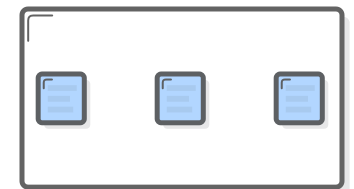
CENTER



FLEX-END



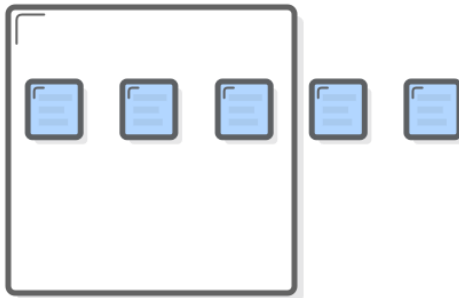
SPACE-AROUND



SPACE-BETWEEN

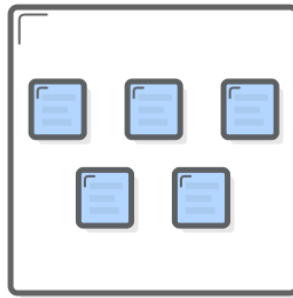
# Wrapping

- The **flex-wrap** property creates a grid
  - Then, you can change alignment, direction, order, and size of items



**NO WRAPPING**

FLEX-WRAP: NOWRAP;



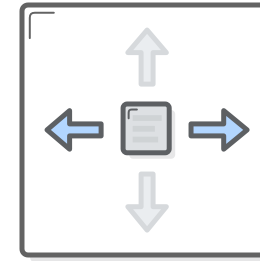
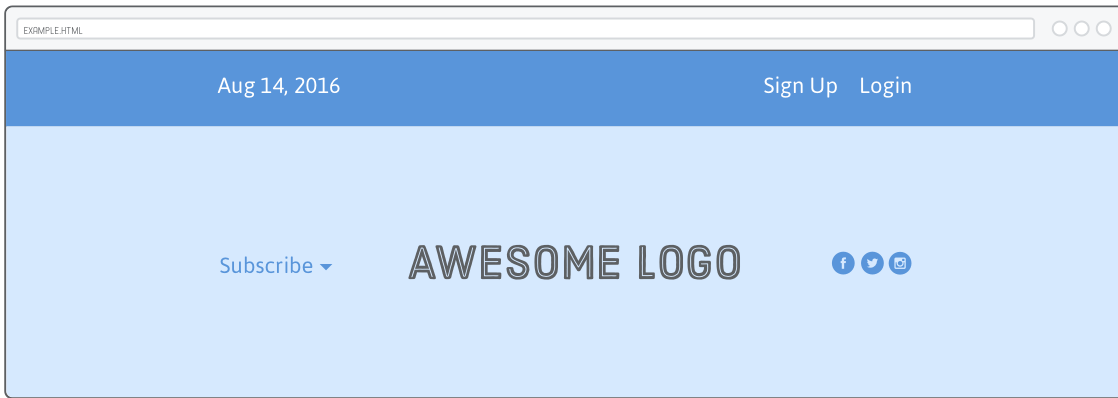
**WITH WRAPPING**

FLEX-WRAP: WRAP;

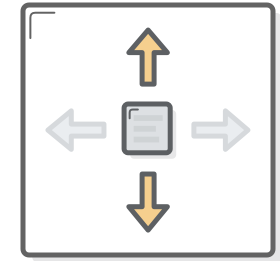
```
.photo-grid {  
  width: 900px;  
  display: flex;  
  justify-content: center;  
  flex-wrap: wrap;  
}
```

# Vertical alignment

- Flex containers can also define the vertical alignment of their items



**JUSTIFY-CONTENT**

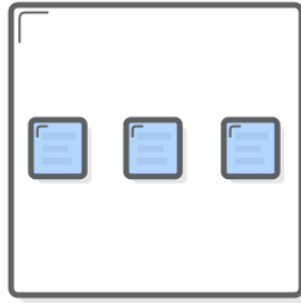


**ALIGN-ITEMS**

```
.header {  
  width: 900px;  
  height: 300px;  
  display: flex;  
  justify-content: space-between;  
  align-items: center;  
}
```

# Direction

- Refers to whether a container renders its items horizontally or vertically



**ROW**

FLEX-DIRECTION: ROW;

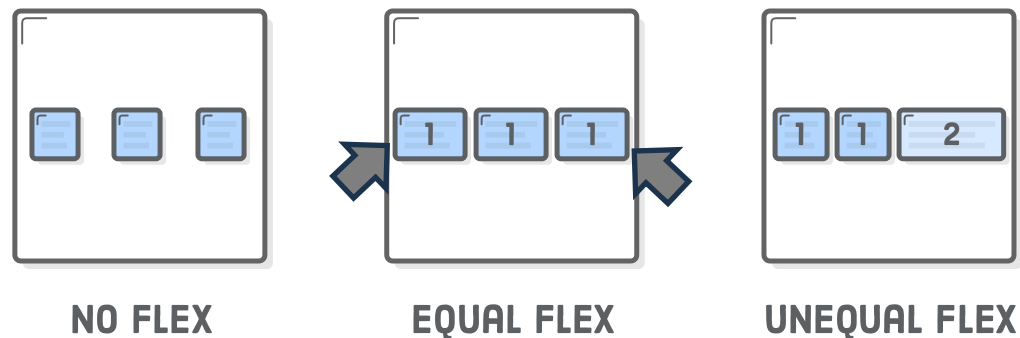


**COLUMN**

FLEX-DIRECTION: COLUMN;

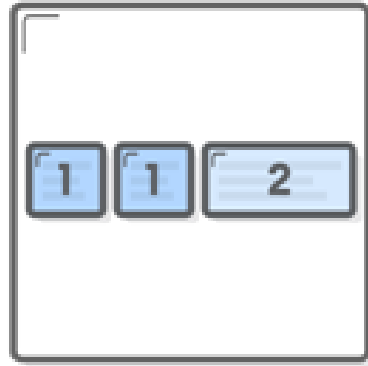
# Flexible items

- Flex items are flexible: they can shrink and stretch **to match the width of their containers**
- The `flex` property defines the width of individual items in a flex container
  - a **weight** that tells the flex container how to distribute extra space to each item
  - E.g., an item with a flex value of 2 will grow twice as fast as items with the default value of 1



# Flexible items

## Example



```
.footer {  
  display: flex;  
  justify-content: space-between;  
}
```

```
.footer-item {  
  border: 1px solid #fff;  
  background-color: #D6E9FE;  
  height: 200px;  
  flex: 1; }
```

```
.footer-three { flex: 2; }
```

```
<div class='footer'>  
  <div class='footer-item footer-one'></div>  
  <div class='footer-item footer-two'></div>  
  <div class='footer-item footer-three'></div>  
</div>
```





# Grouping

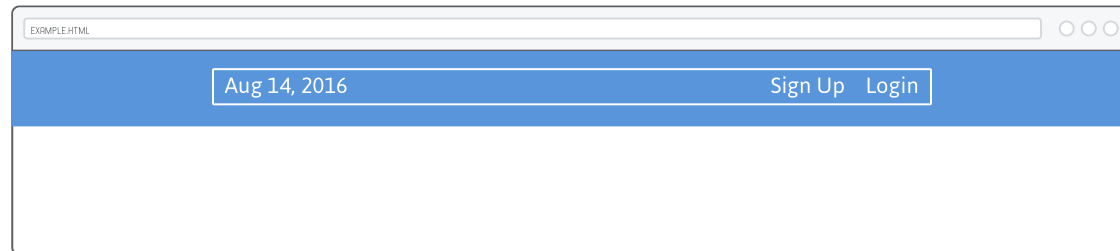
- Flex containers only know how to position elements that are **one level deep** (i.e., their child elements)
  - You can **group flex items using <div>**



**NO GROUPING**  
(3 FLEX ITEMS)



**GROUPED ITEMS**  
(2 FLEX ITEMS)

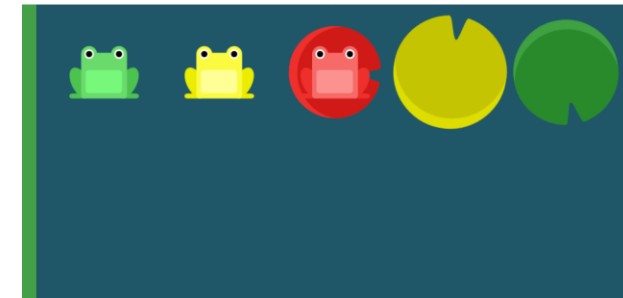


# Summary of CSS flexbox

- `display: flex` to create a flex container
- `justify-content` to define the horizontal alignment of items
- `align-items` to define the vertical alignment of items
- `flex-direction` if you need columns instead of rows
- `row-reverse` or `column-reverse` values to flip item order
- `order` to customize the order of individual elements
- `align-self` to vertically align individual items
- `flex` to create flexible boxes that can stretch and shrink

# References for CSS flexbox

- Interneting is hard flexbox tutorial
  - <https://internetingishard.com/html-and-css/flexbox/>
- A complete guide to flexbox
  - <https://css-tricks.com/snippets/css/a-guide-to-flexbox/>
- W3schools
  - [https://www.w3schools.com/css/css3\\_flexbox.asp](https://www.w3schools.com/css/css3_flexbox.asp)
- Flexbox, practical guide (in Italian)
  - <http://www.html.it/guide/flexbox-guida-pratica/>
- Flexbox Froggy (a game-like tutorial)
  - <http://flexboxfroggy.com/>

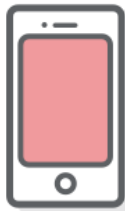


Cascading Style Sheets

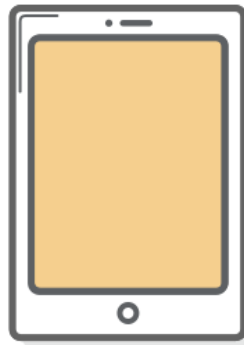
# RESPONSIVE LAYOUT

# Responsive design

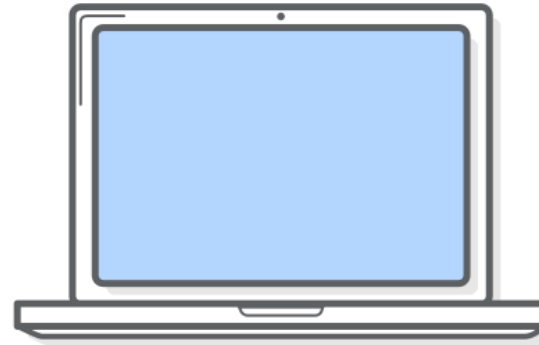
- Display well in everything from widescreen monitors to mobile phones
- Approach to web design to eliminate the distinction between the mobile-friendly version of your website and its desktop counterpart



**MOBILE**



**TABLET**



**DESKTOP**

<https://internetingishard.com/html-and-css/responsive-design/>

# Responsive design

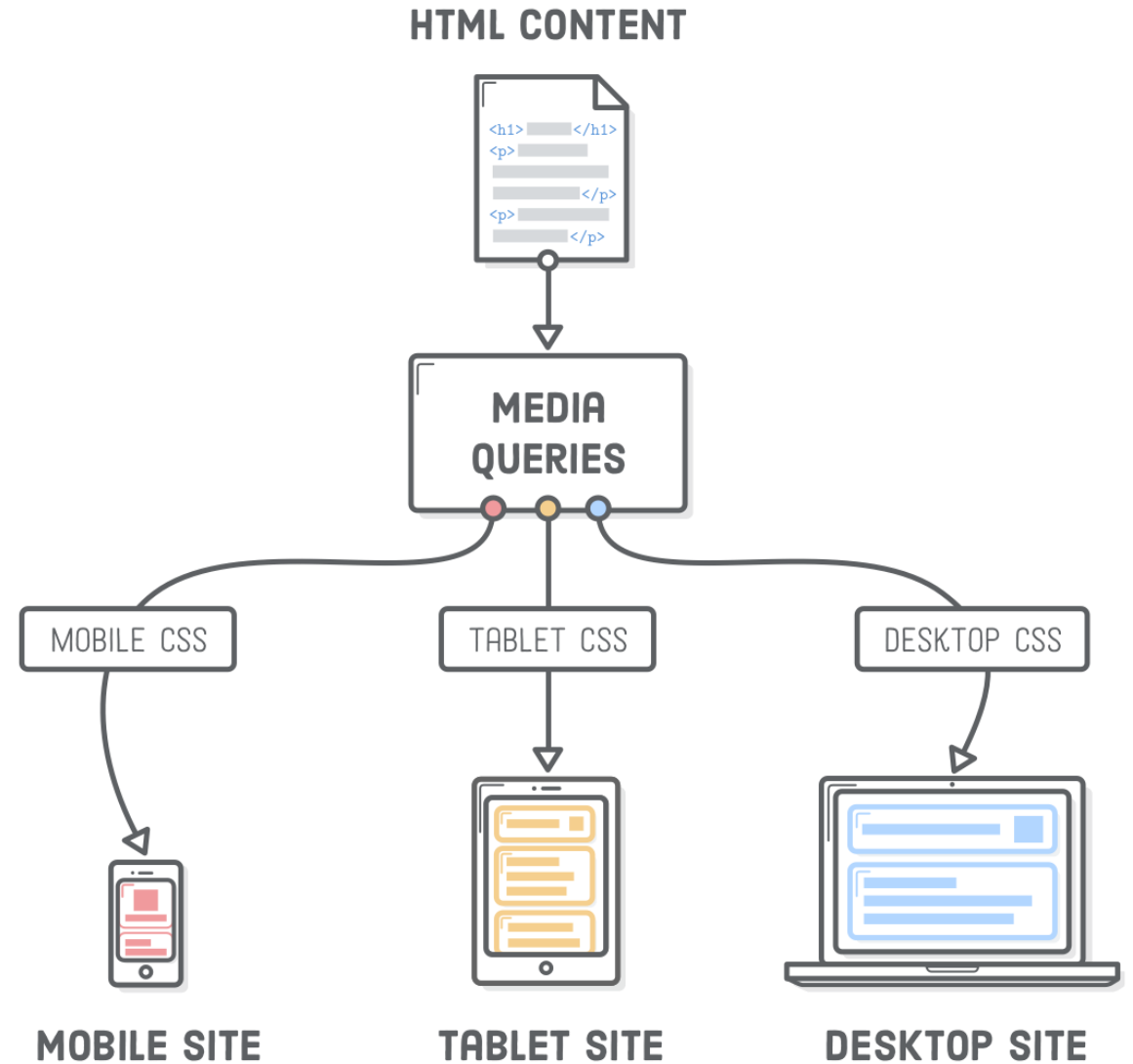
- Responsive design is accomplished through CSS “media queries”
  - A way to conditionally apply CSS rules

```
@media(min-width:900px){p{color:red;}}
```

Media query announcement

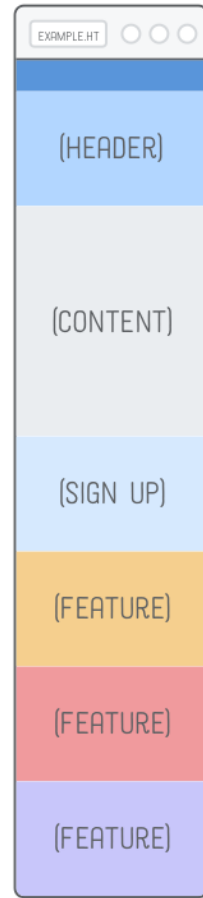
What circumstance should this query be “turned on” or applied

What it should do if the circumstance happens

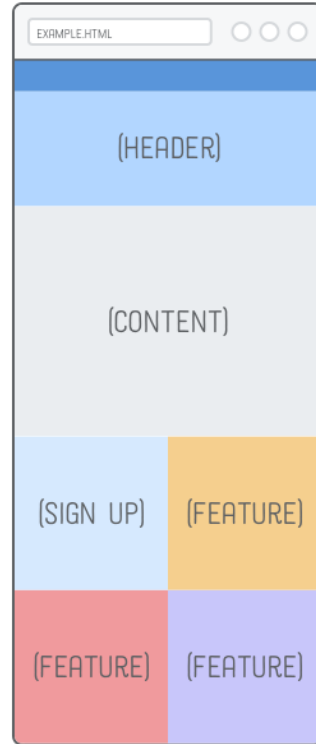


# Layout for responsive design

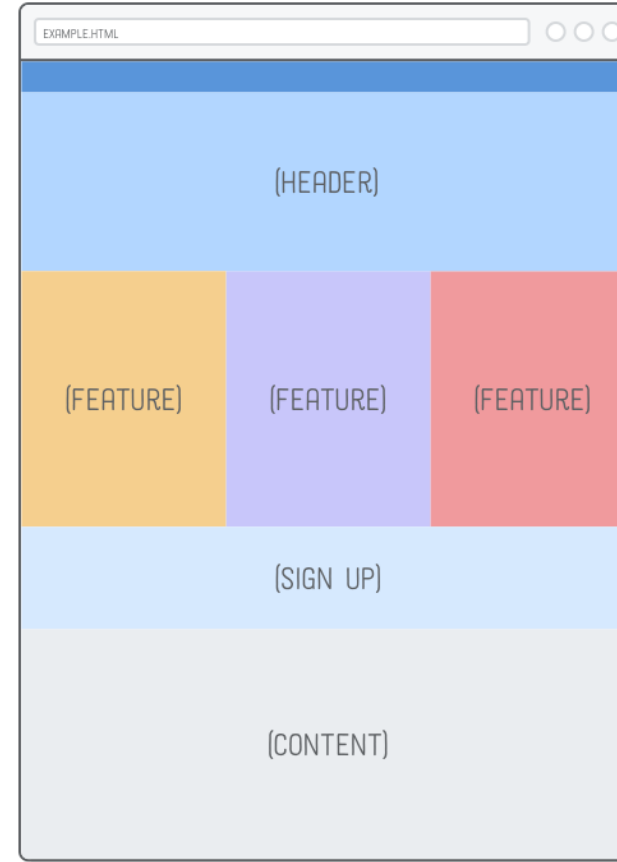
**MOBILE**



**TABLET**



**DESKTOP**



# CSS Frameworks

- CSS is difficult! Simplify usage by means of a set of templates, i.e., CSS rules (+some JS) that makes web development easier → CSS framework
- Example: **Bootstrap** framework
  - Open Source CSS (and Javascript) framework
  - Allows applying “modern” styles with sensible and nice-looking defaults
    - Many ready-to-use UI elements (e.g., buttons, menus, tabs, collapsible items, ecc.)
  - Takes care of cross-browser issues
  - Simplified layout model
  - Originally developed by Twitter
    - <https://getbootstrap.com/docs/5.3/getting-started/introduction/>



# Bootstrap - Intro

- Front-end framework that provides a collection of HTML, CSS and (optionally) JavaScript-based design templates that enable developers to build responsive, mobile-first websites with ease
  - Class Nomenclature
    - Base (common styles)
      - `class="accordion", class="btn"`
    - + Modifier (additional styles)
      - `class="accordion accordion-flush"`
      - `class="btn btn-primary"`
- Can handle:  
Layout  
Content  
Forms  
Components  
Helpers/Utilities

# Bootstrap - Quickstart

<https://getbootstrap.com/docs/5.3/getting-started/introduction/>

- Include additional CSS and JS
  - `<link rel="stylesheet" href="...">`
  - `<script src="..."></script>`



```
<!doctype html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <title>Bootstrap demo</title>
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min"
  </head>
  <body>
    <h1>Hello, world!</h1>
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle"
  </body>
</html>
```

# Importing CSS Frameworks: Security Issues

- CSS frameworks often comprise both CSS and Javascript code
  - Same considerations apply as for code packages: **security, availability**, etc.
- CSS rules and Javascript code are loaded and run into the web application
  - Make sure they are either served by a trusted web server or
  - Loaded from an external source (CDN) but verified for integrity before execution

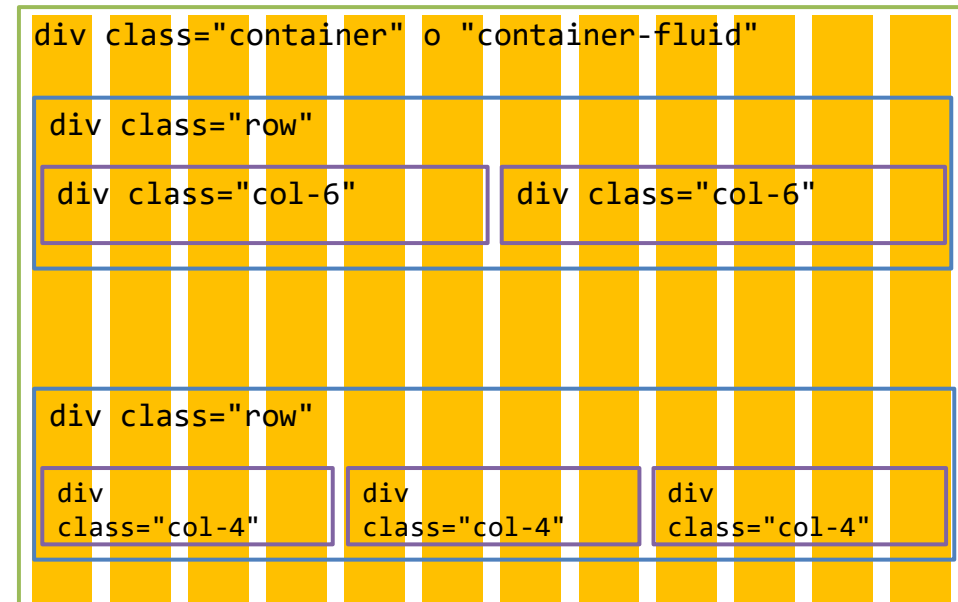
```
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
      integrity="sha384-QWTKZyjpPEjISv5WaRU90FeRpok6YctnYmDr5pNlyT2bRjXh0JMhY6hW+ALEwIH"
      rel="stylesheet" crossorigin="anonymous">
```

- NOTE: This is exactly the same issue as seen for the JS packages

Computing integrity: [https://developer.mozilla.org/en-US/docs/Web/Security/Subresource\\_Integrity](https://developer.mozilla.org/en-US/docs/Web/Security/Subresource_Integrity)

# Bootstrap – Grid-system

- Many web pages are based on a **grid-system**, i.e., the page is divided into columns
- Bootstrap **grid-system** has 12 columns, which is applied to element with class "container" that contains
  - Rows as class "row"
  - Columns as class "col-Y"
    - The sum of Ys is 12



# Bootstrap – Spacing

- A wide range of shorthand class names for margin, padding, and gap
- Notation: {property}{sides}-{size}, e.g., **mx-1** , **p-2**
  - Properties: **m** for margin, **p** for padding
  - Sides: **t** for top, **b** for bottom, **s** (start) for left LTR (right RTL), **e** (end), **x** both start-end, **y** both top-bottom, or **blank** for all 4 sides
  - Sizes

size	value
0	0 rem
1	0.25 rem
2	0.5 rem
3	1 rem
4	1.5 rem
5	3 rem
auto	Margin-auto

# Bootstrap – Table

- Customize tables with `table-*` classes

e.g.

`table table-striped`  
`/ table-hover`, ecc.

## Hoverable rows

Add `.table-hover` to enable a hover state on table rows within a `<tbody>`.

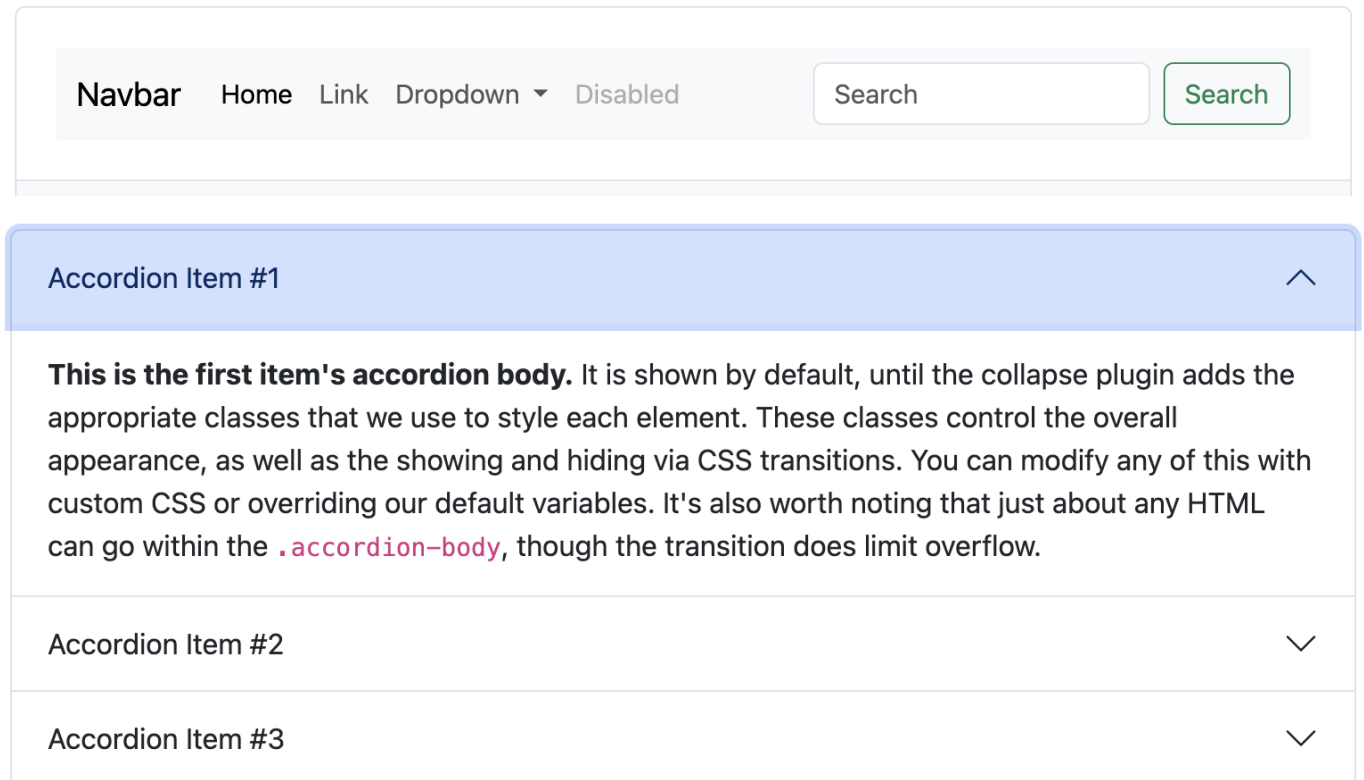
#	First	Last	Handle
1	Mark	Otto	@mdo
2	Jacob	Thornton	@fat
3	Larry the Bird		@twitter

```
<table class="table table-hover">  
  ...  
</table>
```



# Bootstrap – Components

- Component: enhanced HTML element
  - With style – custom CSS
  - With behavior – custom JS



[See Examples > Header](#)

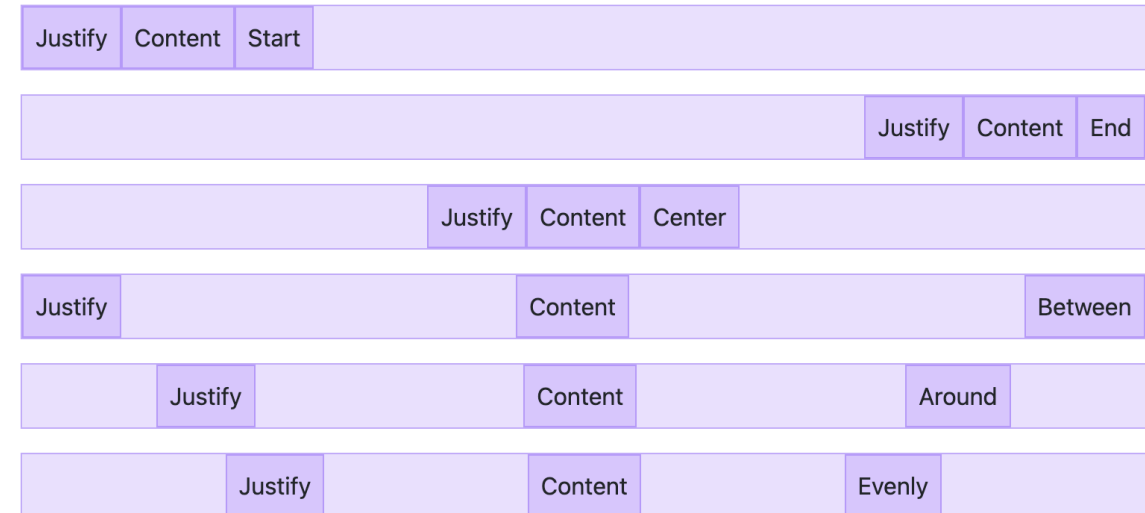
# Bootstrap – Utilities / Helpers

- Classes to quickly style elements without using any CSS code
- E.g. **enable flex behaviors**
  - Apply *display utilities* (**d-flex** class) to create a flexbox container and transform direct children elements into flex items.

```
<div class="d-flex justify-content-start">  
  <div class="p-2">Justify</div>  
  <div class="p-2">Content</div>  
  <div class="p-2">Start</div>  
</div>
```

## Justify content

Use `justify-content` utilities on flexbox containers to change the alignment of flex items on the main axis (the x-axis to start, y-axis if `flex-direction: column`). Choose from `start` (browser default), `end`, `center`, `between`, `around`, or `evenly`.





# Bootstrap – Icons

- Import them as “fonts”  
bootstrap-icons.min.css

```
<link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/  
bootstrap-icons@1.11.3/font/bootstrap-icons.min.css"  
integrity="sha384-XGjxtQfXaH2tnPFa9x+ruJTULE3Aa6LhHSWRr1XeTyhezb4abCG4ccI5AkVDxqC+ "  
crossorigin="anonymous">
```

## Icon font

Icon fonts with classes for every icon are also included for Bootstrap Icons. Include the icon web fonts in your page via CSS, then reference the class names as needed in your HTML (e.g., `<i class="bi-alarm-clock"></i>`).

Use `font-size` and `color` to change the icon appearance.



```
<i class="bi-alarm"></i>
```



```
<i class="bi-alarm" style="font-size: 2rem; color: cornflowerblue;"></i>
```



# Bootstrap – Final note

- When using a CSS framework, **try to avoid writing your own CSS rules** unless it is really necessary
  - Your CSS rules (especially about positioning/layouting) may interact in unexpected ways with the rules defined by the CSS framework
- Bootstrap styling/color/themes etc. are perfectly fine for this course, as well as basic UI elements (buttons, menus, input boxes, tables, etc.)
  - The focus is on correct web application design (API, JS coding, security checks, correct user interaction, etc.), not on graphical design

# References

- CSS First Steps:  
[https://developer.mozilla.org/en-US/docs/Learn/CSS/First\\_steps](https://developer.mozilla.org/en-US/docs/Learn/CSS/First_steps)
- Grid and Flexbox:  
<https://ishadeed.com/article/grid-layout-flexbox-components/>

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