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
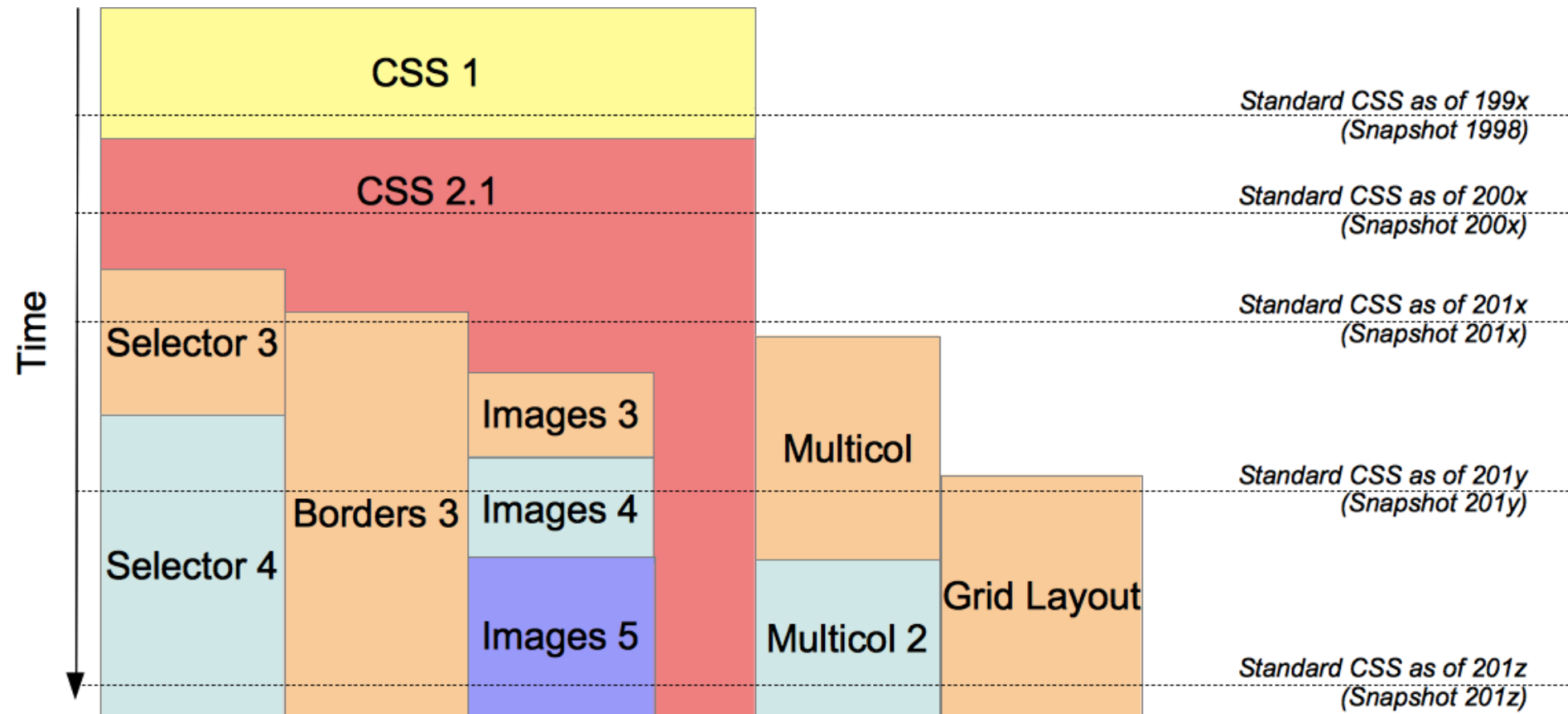- Responsive layouts
- Libraries

Outline

- CSS syntax
- CSS selectors
- CSS cascading
- CSS box model
- Page layout with grid
- CSS Flexbox
- Responsive layout
- The Bootstrap Library

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

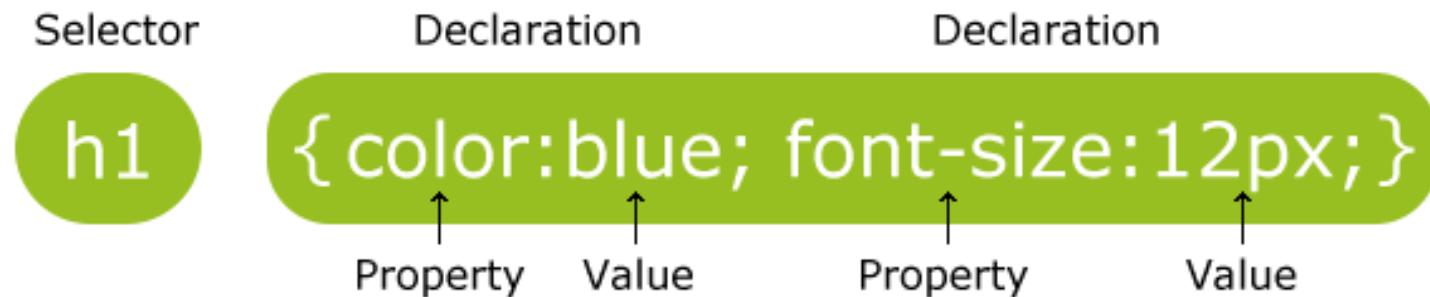https://developer.mozilla.org/en-US/docs/Web/CSS/CSS3
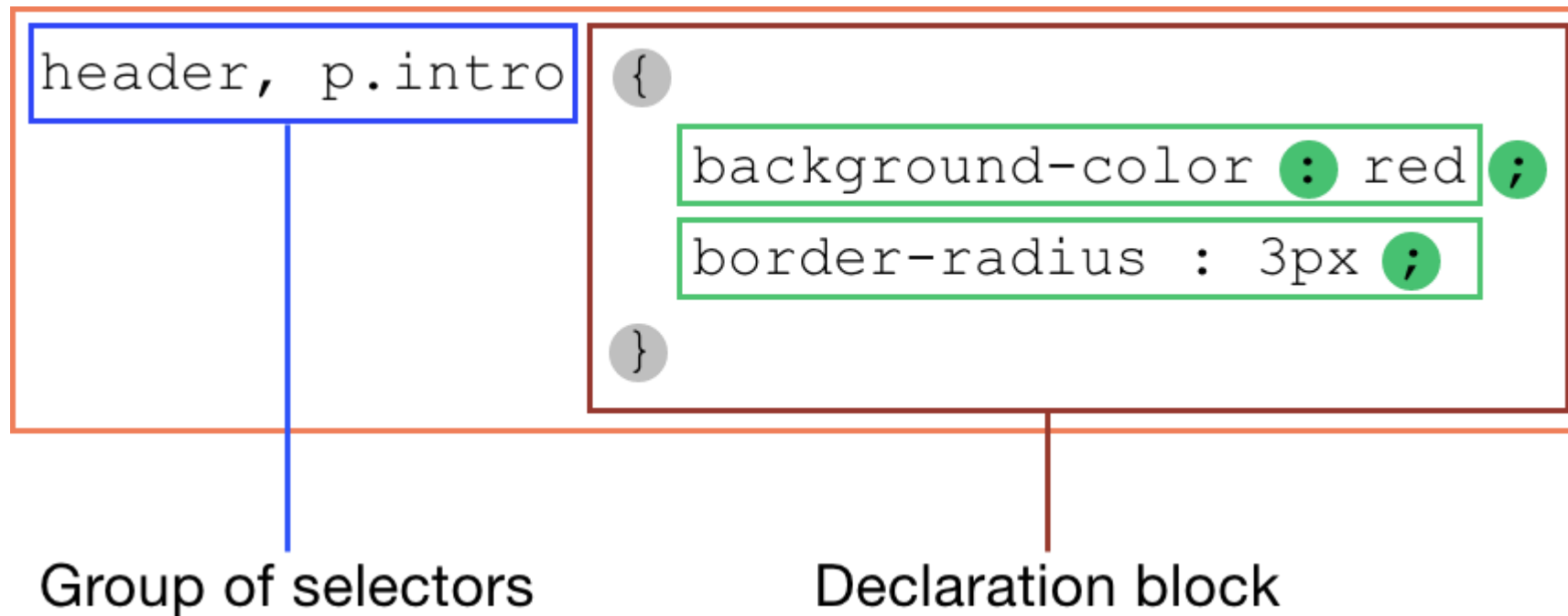
Cascading Style Sheets

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

header, p.intro

{
  background-color : red ;
  border-radius : 3px ;
}

Group of selectors

Declaration block

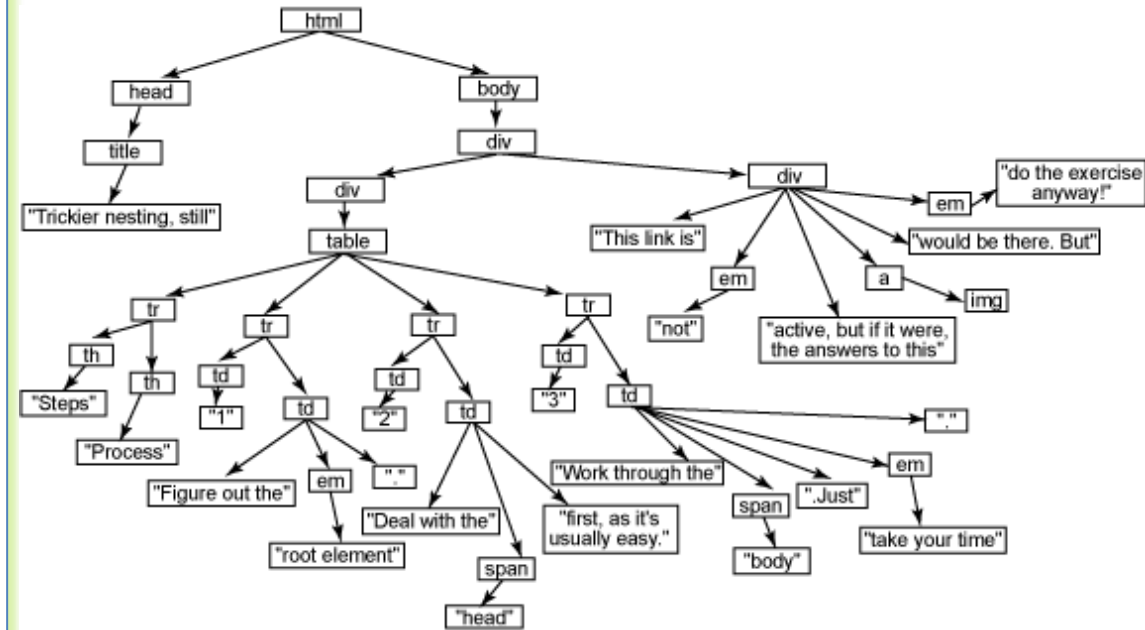# HTML nested structure

```
<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 it it were, the  answer to this
<a><img src="exercise.jpg"></a> would be there. But <em>do the exercise
anyway!</em>
    </div>
  </div>
</body>
</html>
```
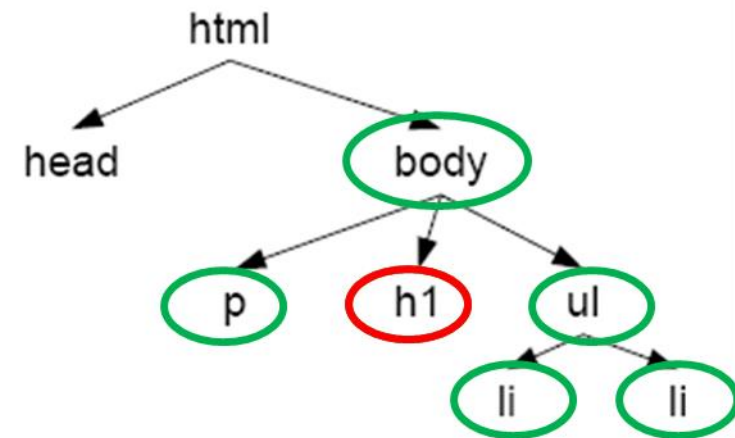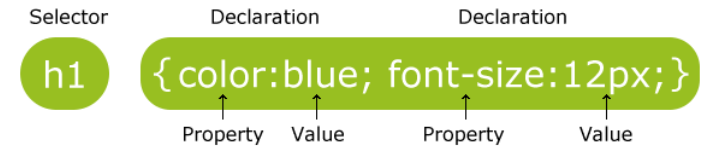
Tree structure and inheritance

- HTML documents are trees

- Styles are inherited along trees

- When two rules are in conflict the most specific wins
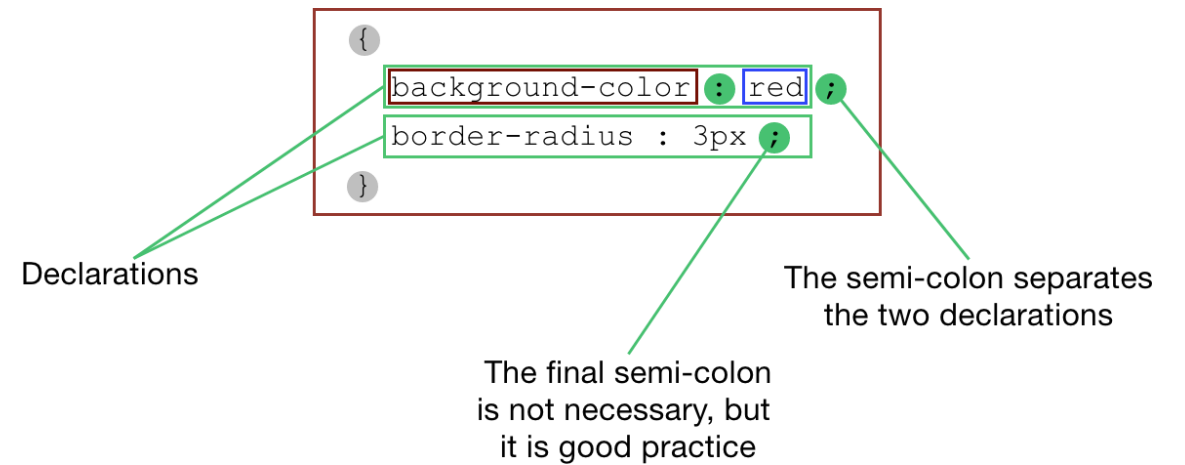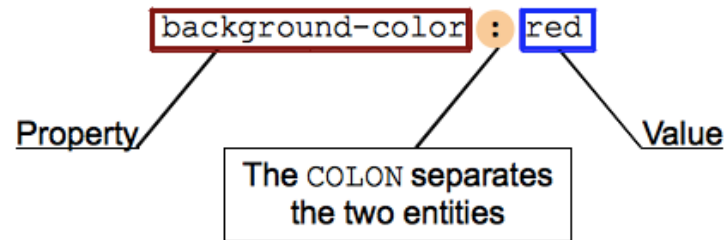
- Example
    - body {color: green}
    - h1 {color: red}

Declaration Syntax

A CSS declaration :

background-color : red

Property

The COLON separates the two entities

Value

{

background-color : red ;

border-radius : 3px ;

}

Declarations

The semi-colon separates the two declarations

The final semi-colon is not necessary, but it is good practice

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

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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

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CSS Units: Most Used

- CSS has several different **units** for expressing a length
  - format: a number followed by a unit (e.g., 10px)
  - width, font-size, margin, padding, ...
- 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)

CSS Units: Most Used

- The most common relative units, instead:

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

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

Cascading Style Sheets

CSS SELECTORS

CSS selectors

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

```
                          ┌─────────────┐
                          │    CSS      │
                          │  selector   │
                          └─────────────┘
        ┌──────────┬───────────┼───────────┬──────────┐
   ┌─────────┐ ┌─────────┐ ┌──────────┐ ┌──────────┐ ┌─────────┐
   │ Element │ │  Class  │ │    Id    │ │ Attribute│ │ Pseudo  │
   │selector │ │selector │ │ selector │ │ selector │ │selector │
   └─────────┘ └─────────┘ └──────────┘ └──────────┘ └─────────┘
   ┌─────────┐ ┌─────────┐ ┌──────────┐ ┌──────────┐ ┌───────────┐
   │ element │ │ .class  │ │   #id    │ │[name=val]│ │:something │
   └─────────┘ └─────────┘ └──────────┘ └──────────┘ └───────────┘
```
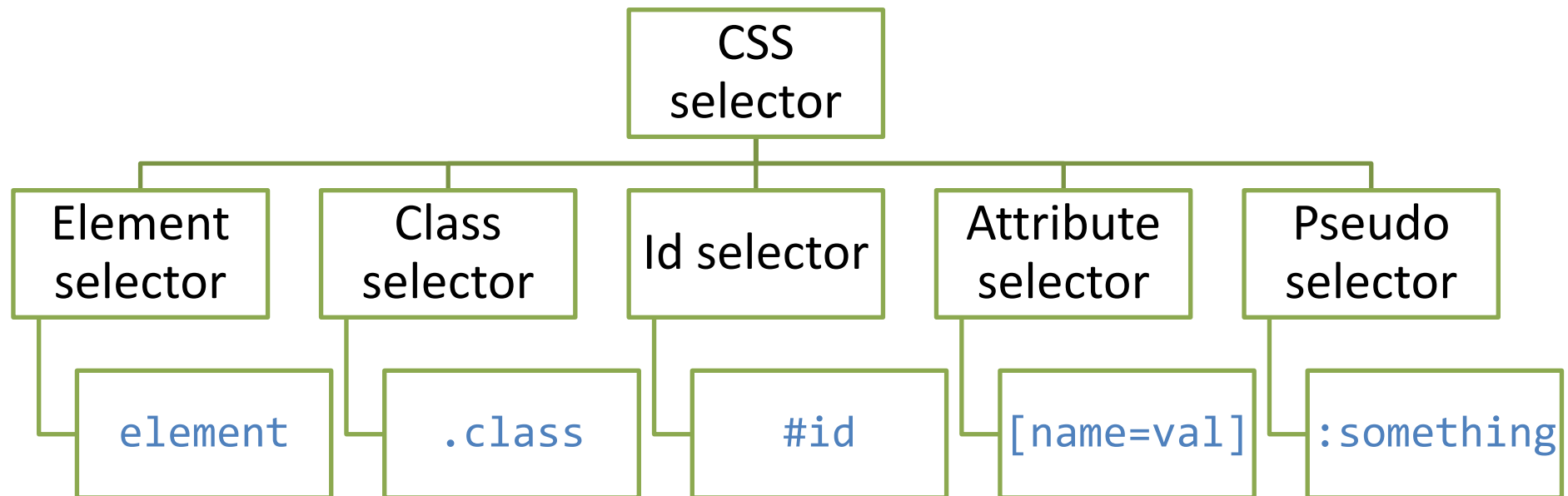
Element selector

- 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

style.css

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

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

```
<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
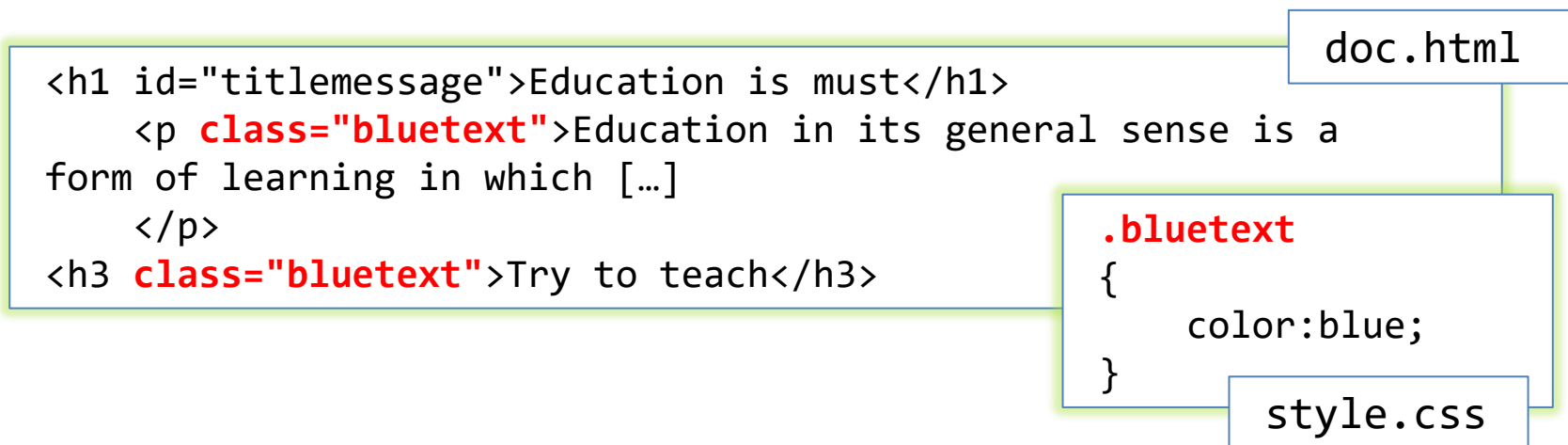
Id selector

- 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)

doc.html

```
<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>
```

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

style.css
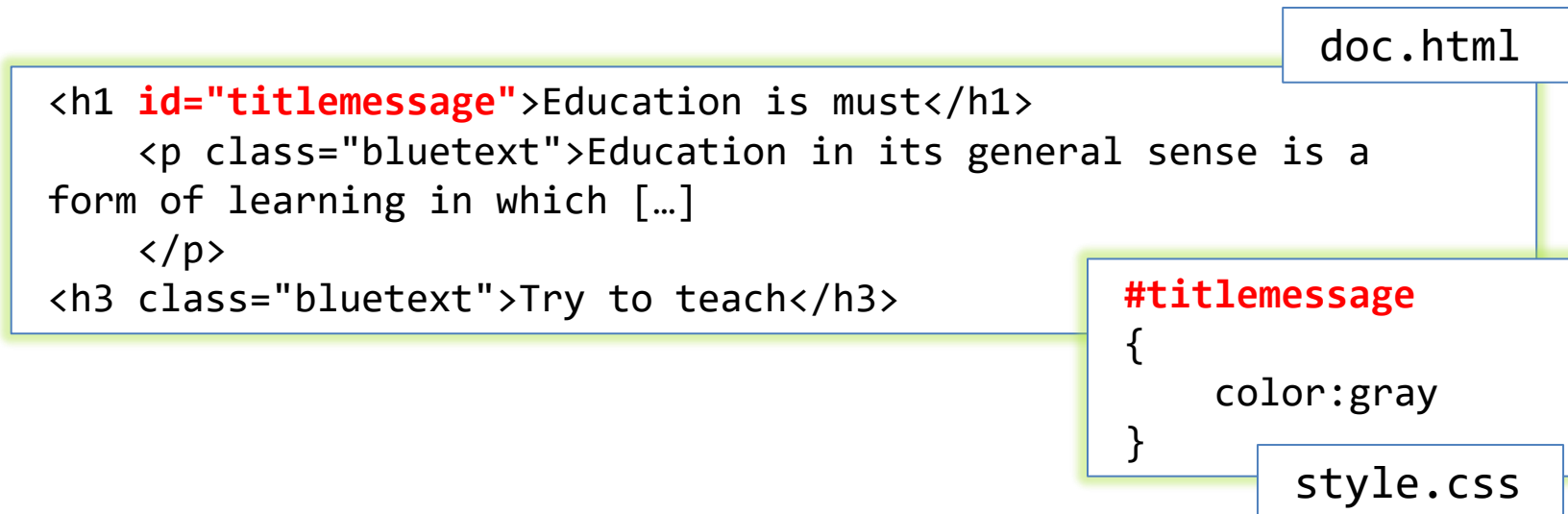
Attribute selectors

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

```css
/* 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
- `S1 S2` → S2 nested within S1
- `S1 > S2` → S2 if a child of S1
- `S1 + S2` → S2 if it comes after a S1
- `S1 ~ S2` → S2 if it comes later than S1

CSS selectors

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

http://www.w3schools.com/cssref/css_selectors.asp

Display property

- 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;}
```

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, and 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

```
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(*language*)	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

CSS pseudo-class selectors

Selector	Example	Example description	CSS
:not(*selector*)	:not(p)	Selects every element that is not a <p> element	3
:nth-child(*n*)	p:nth-child(2)	Selects every <p> element that is the second child of its parent	3
:nth-last-child(*n*)	p:nth-last-child(2)	Selects every <p> element that is the second child of its parent, counting from the last child	3
:nth-last-of-type(*n*)	p:nth-last-of-type(2)	Selects every <p> element that is the second <p> element of its parent, counting from the last child	3
:nth-of-type(*n*)	p:nth-of-type(2)	Selects every <p> element that is the second <p> element of its parent	3
:only-of-type	p:only-of-type	Selects every <p> element that is the only <p> element of its parent	3
:only-child	p:only-child	Selects every <p> element that is the only child of its parent	3
:optional	input:optional	Selects input elements with no "required" attribute	3
:out-of-range	input:out-of-range	Selects input elements with a value outside a specified range	3

Selector	Example	Example description	CSS
:read-only	input:read-only	Selects input elements with the "readonly" attribute specified	3
:read-write	input:read-write	Selects input elements with the "readonly" attribute NOT specified	3
:required	input:required	Selects input elements with the "required" attribute specified	3
:root	:root	Selects the document's root element	3
::selection	::selection	Selects the portion of an element that is selected by a user	3
:target	#news:target	Selects the current active #news element (clicked on a URL containing that anchor name)	3
:valid	input:valid	Selects all input elements with a valid value	3
:visited	a:visited	Selects all visited links	1

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
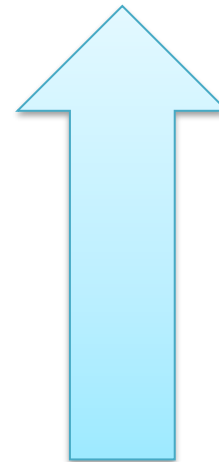
External style

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

```
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>Questo testo e' di colore verde, e utilizza il
      font verdana a 17 pixel</h1>
  <h2>Questo testo e' di colore rosso, e utilizza il
      font arial a 18 pixel</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

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

```
<h1 style="font-size:17px;
   font-family:verdana; color:green; "> Questo
   testo e' di colore verde, e utilizza il
   font verdana a 17 pixel </h1>
```

Priority rules

- Rules can be marked as "important"

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

Browser Styles

⬇

User Styles

⬇

Author Styles

External & Embedded Styles

if rules have **different** specificity:	if rules have **the same** specificity:
more general	declared earlier
⬇	⬇
more specific	declared later

⬇

Inline Styles

⬇

Author !important Styles

⬇

User !important Styles
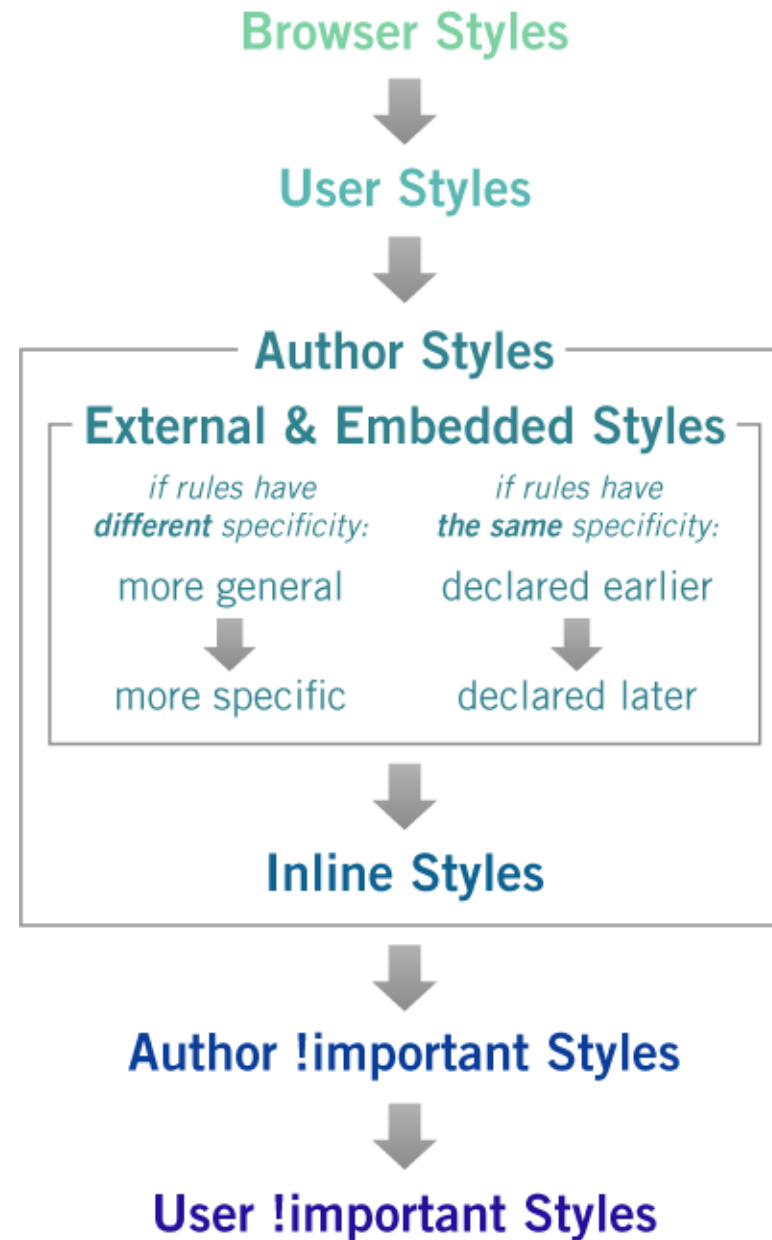
The definitive guide to CSS styling order

Includes CSS stylings for SVG

Styling methods

Inheritance

Styling inherited from nearest parent element

Child styling (if exist) has higher priority even though inherited parent styling contains important keyword

Inherited styles has the lowest priority among styling methods

Inline attributes (for SVG)

Ordering, selectors or specificity and important keyword does not apply to SVG inline attributes

Style sheet

Embedded / External styles

Specificity

Specificity has higher priority than ordering, with tags, classes and ID in ascending priority.

```
#myID { color: green; }
.MyClass { color: blue; }
p { color: red; }

Element will be styled with
green because ID specificity
has the highest priority,
superceding ordering rules.
```

Tags (eg: p, div)

Ordering

Classes (eg: .MyClass)

Ordering

Within specificity, ordering rules still applies.

```
#myID { color: red; }
#myID { color: blue; }

Blue will be applied.
```

ID: (eg: #myID)

Ordering

CSS codes to the right or bottom has higher priority and will be applied.

```
p { color: red; color: blue; }

Blue will be applied
```

```
p {
 color: red;
 color: blue;
}

Blue will be applied
```

```
p { color: red; }
p { color: blue; }

Blue will be applied
```

For each style, ordering rules continue to apply, from left to right and top to bottom.

```
<style>
 #myID { color: red }
</style>
<style>
 #myID { color: blue }
</style>

Blue will be applied
```

Inline styles

Inline styles has higher priority than style sheets, and within inline styles, ordering rules applies.

```
<p style="color: red" style="
color: blue">

Blue will be applied
```

Important keyword

Style sheet

Inline styles

Important keyword in inline styles has higher priority than the same keyword in style sheets.

vecta.io

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
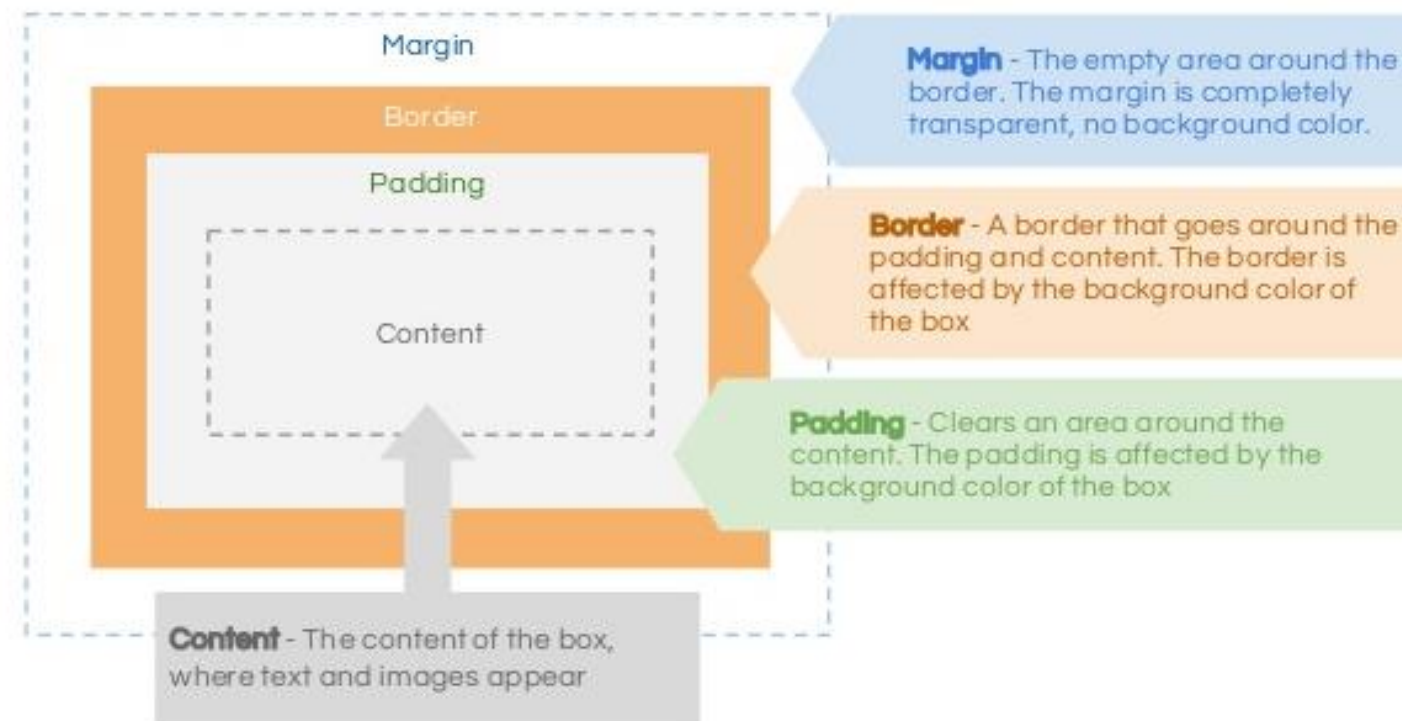
The box model

- 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
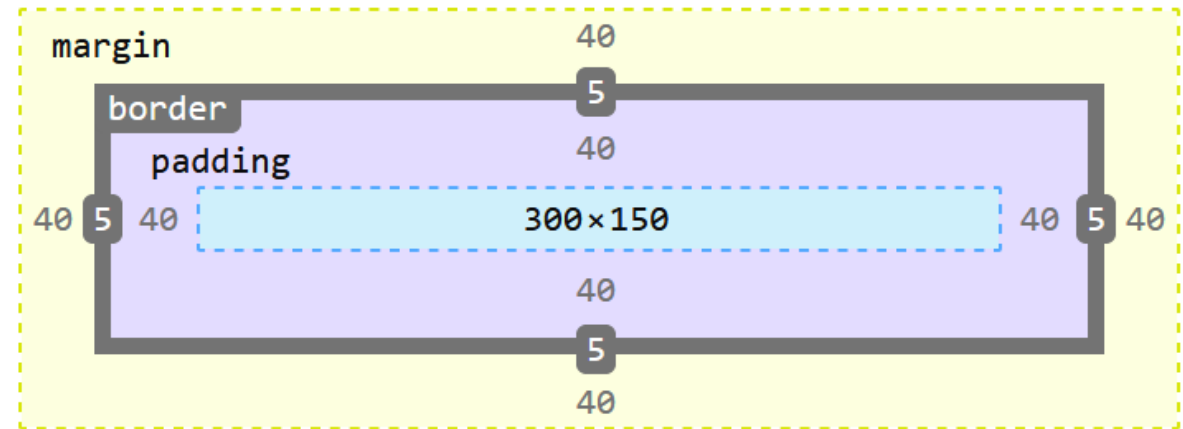
Cascading Style Sheets

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)
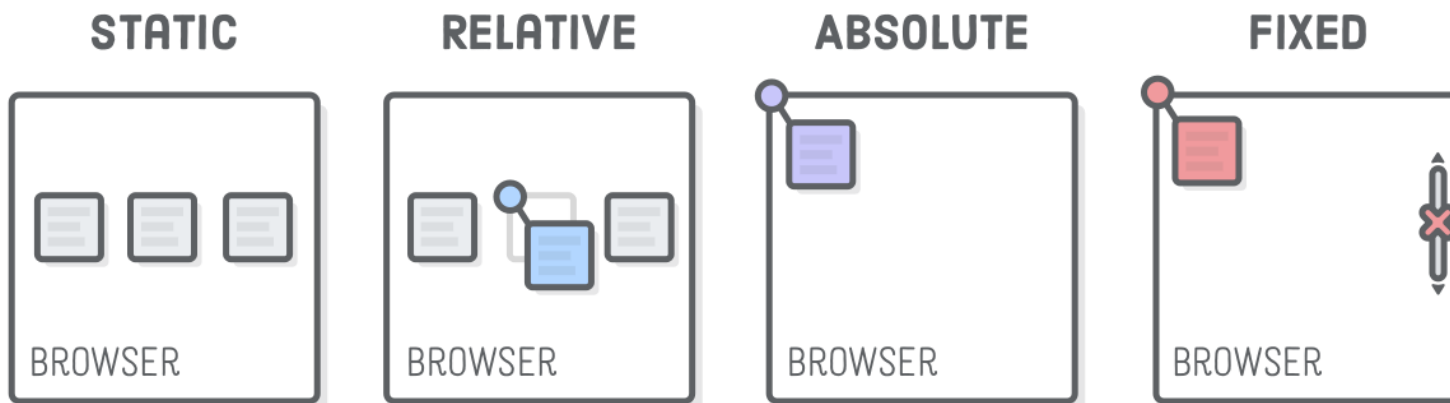

```
.item {
  position: static | relative
| absolute | fixed;
  left: 20px;
  top: 20px;
}
```

https://internetingishard.com/html-and-css/advanced-positioning/

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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)
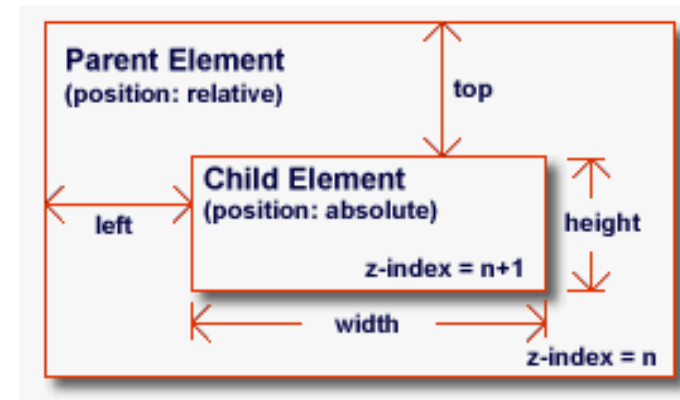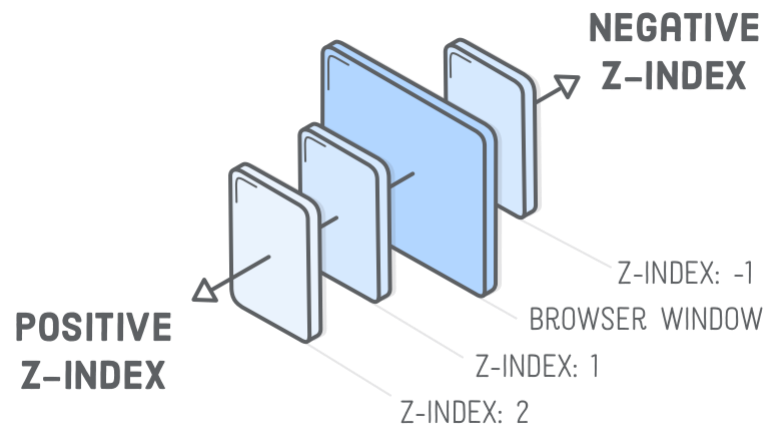
Floating

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

LEFT ALIGN
FLOAT: LEFT;
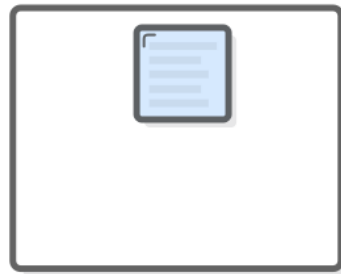
CENTER ALIGN
MARGIN: 0 AUTO;

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
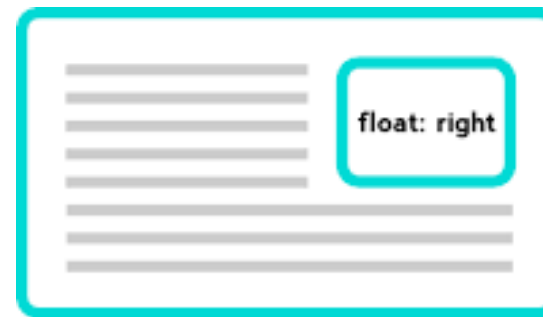
Clearing floats

- "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

CLEAR: BOTH;

Second paragraph cleared

`p { clear: left }`

Margin added to clear float
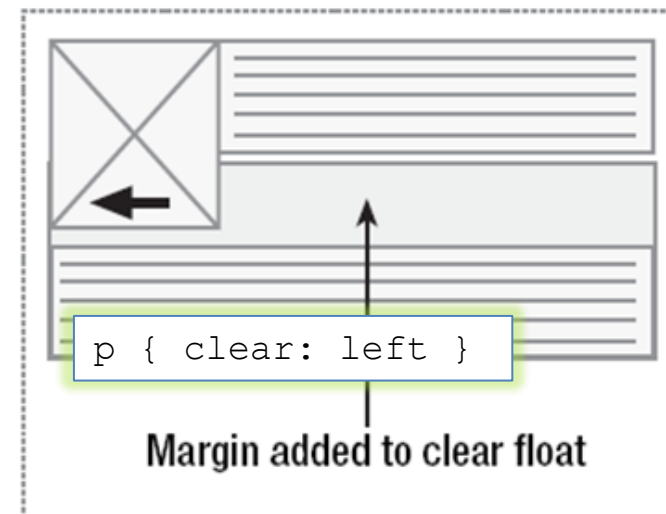
Float-based layouts

- 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
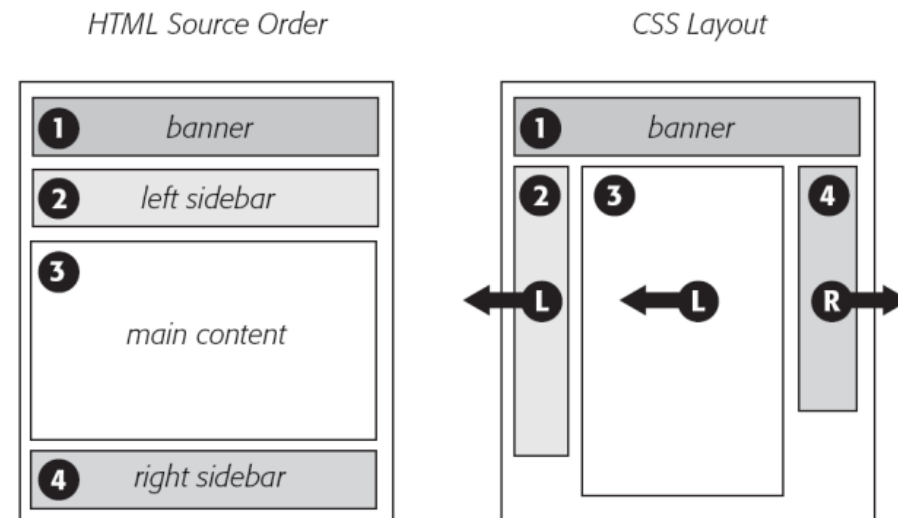
Two-column floated layout

- 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>
```


#wrapper

#mainNav   #content

float: left   float: right

clear: both   #footer

Virtual gutter
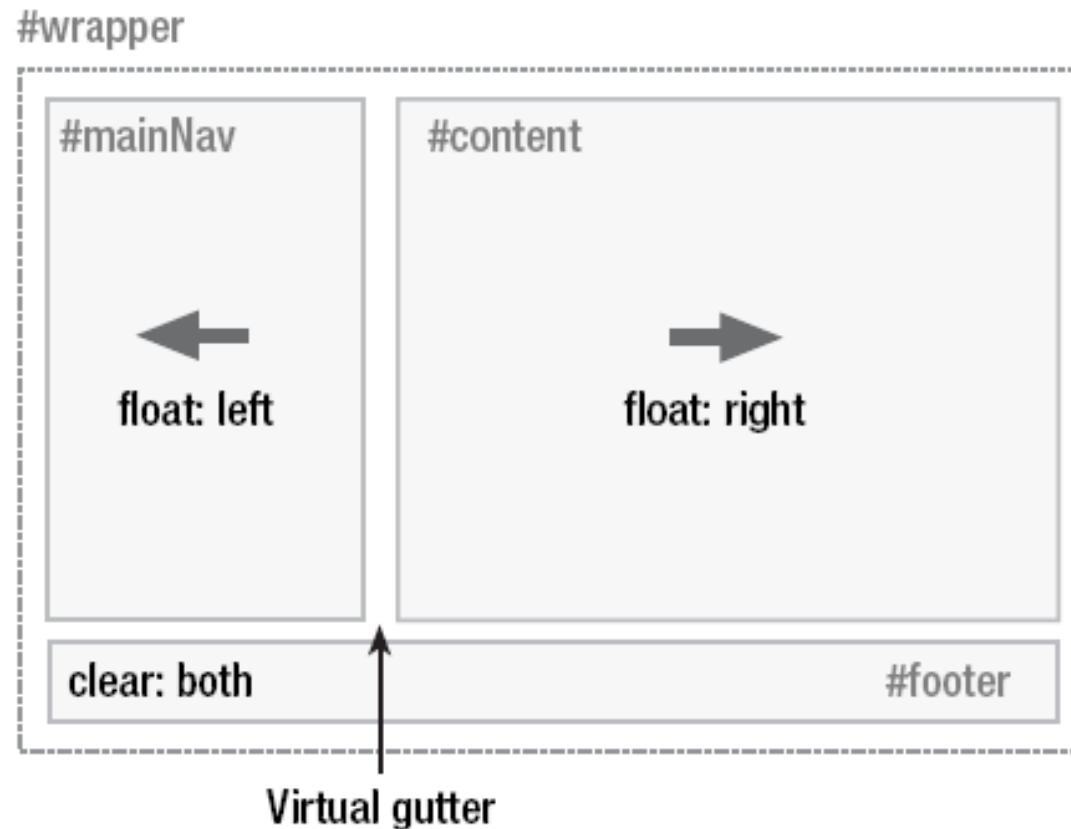
Two-column floated layout

```
#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

#mainNav

#content

#mainContent

#secondaryContent

← float: left
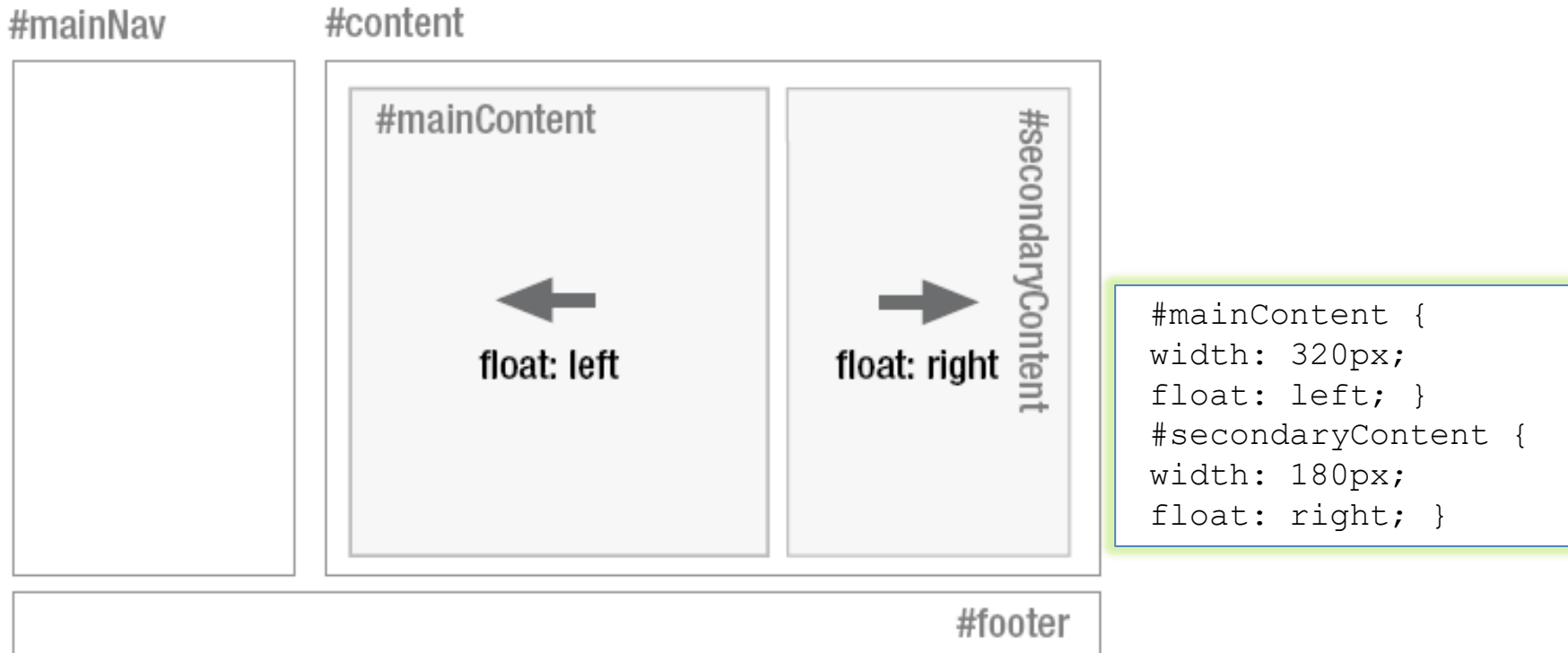
→ float: right

```
#mainContent {
width: 320px;
float: left; }
#secondaryContent {
width: 180px;
float: right; }
```

#footer

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

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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

Advanced layout: grid

Advanced layout: grid

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

- Classic three-column layout

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

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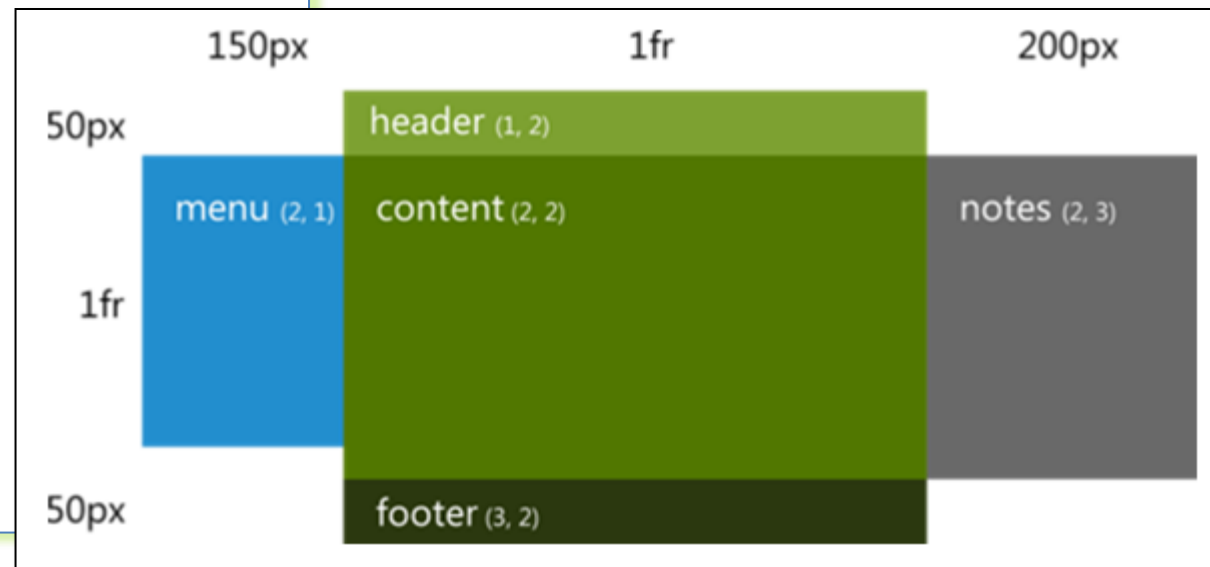
- fr = fraction values
  - new unit applicable to grid-rows and grid-columns properties

Suggested reference for Grid Layout

- https://webkit.org/blog/7434/css-grid-layout-a-new-layout-module-for-the-web/
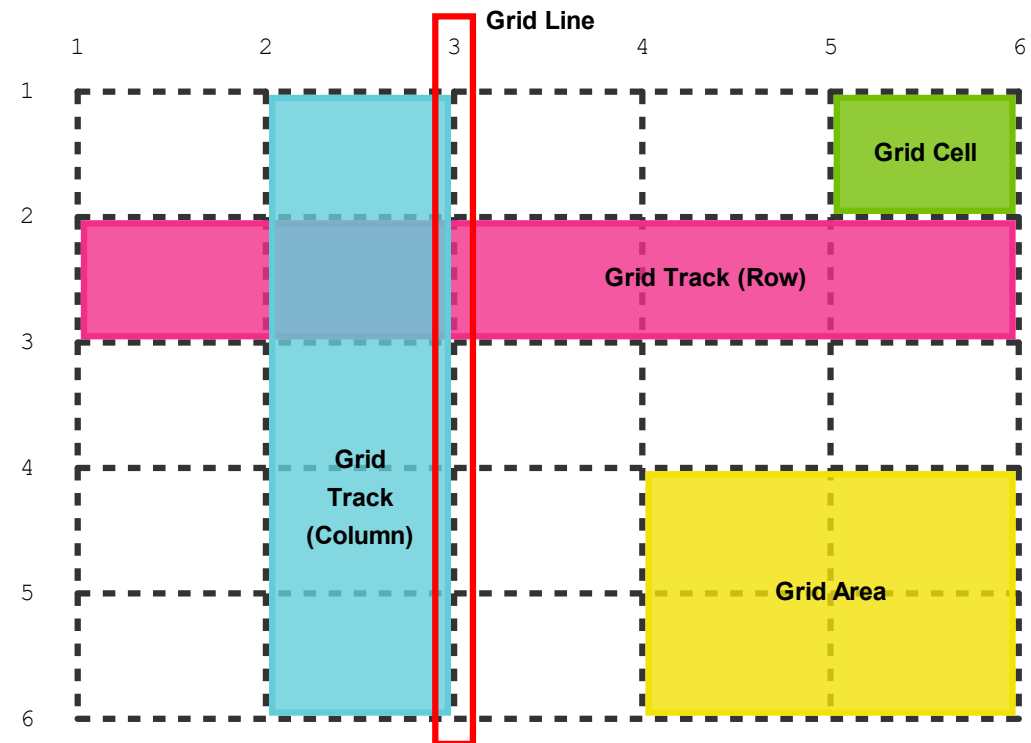
Cascading Style Sheets

CSS FLEXBOX

Flexbox

- Alternative to floats/grids for defining the overall appearance of a web page
- Flexbox gives complete control over the alignment, direction, order, and size of boxes

FLOATS

(MAGAZINE-STYLE LAYOUTS)
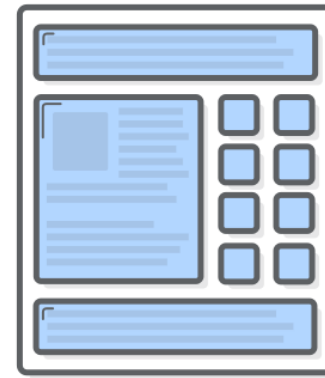
FLEXBOX

(OVERALL PAGE STRUCTURE)

Flexbox

ALIGNMENT

DIRECTION

ORDER

SIZE

- https://internetingishard.com/html-and-css/flexbox/
- https://www.w3schools.com/css/css3_flexbox.asp

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

"FLEX CONTAINER"   "FLEX ITEMS"

Horizontal alignment

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

- To turn one HTML elements into a flex container:

  { `display:flex ; }`

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

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
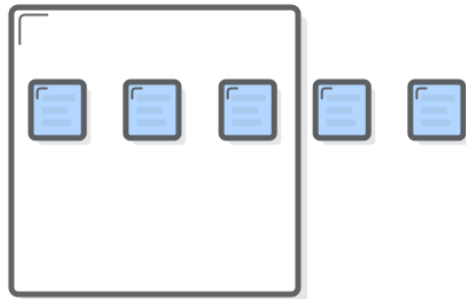
NO WRAPPING

FLEX-WRAP: NOWRAP;
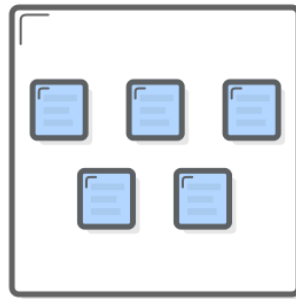
WITH WRAPPING

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
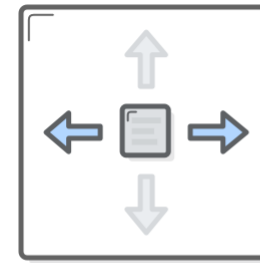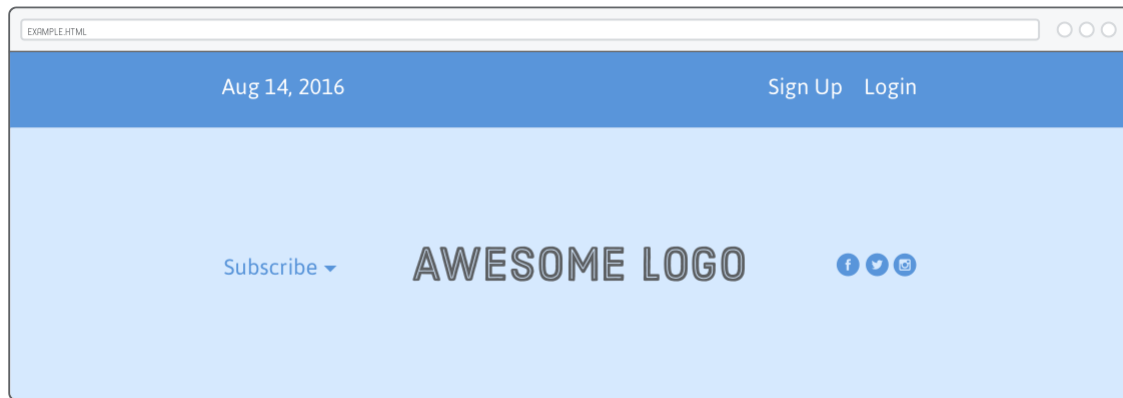
JUSTIFY-CONTENT
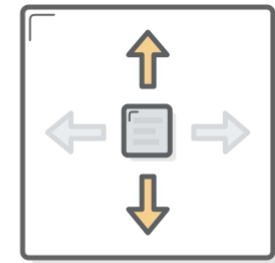
ALIGN-ITEMS

```
.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
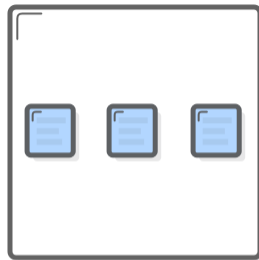
ROW

FLEX-DIRECTION: ROW;
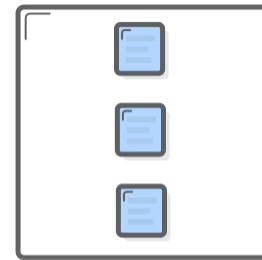
COLUMN

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
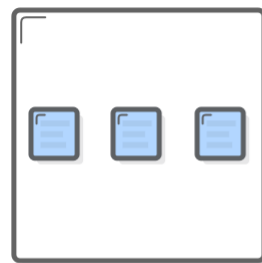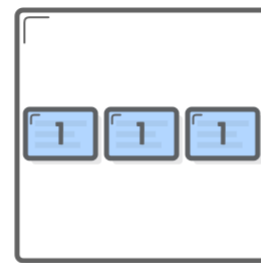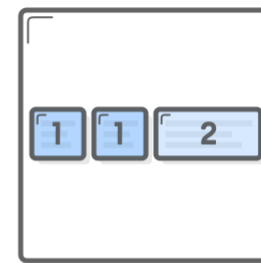
NO FLEX   EQUAL FLEX   UNEQUAL FLEX

Flexible items

- Example
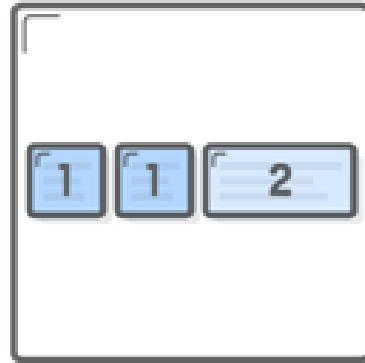

```
.footer {
  display: flex;
  justify-content: space-between;
}

.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)

EXAMPLE.HTML

Aug 14, 2016   Sign Up   Login

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
- Flexbox, guida pratica
    - http://www.html.it/guide/flexbox-guida-pratica/
- Flexbox Froggy (a game-like tutorial)
    - http://flexboxfroggy.com/
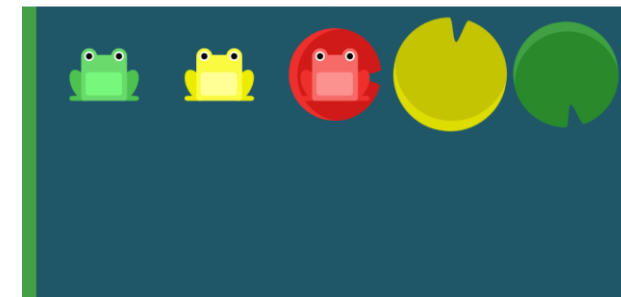
Cascading Style Sheets

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/

71
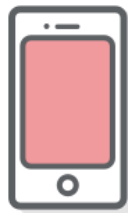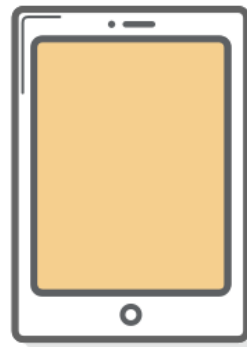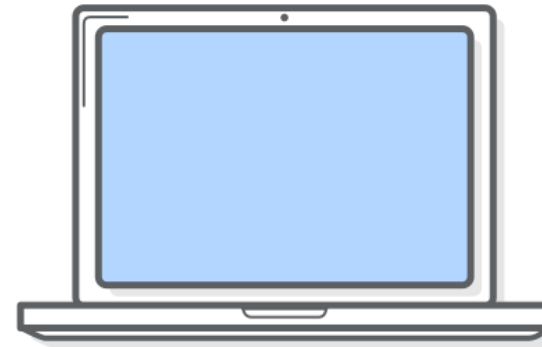
Responsive design

- 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

HTML CONTENT

MEDIA QUERIES

MOBILE CSS   TABLET CSS   DESKTOP CSS

MOBILE SITE   TABLET SITE   DESKTOP SITE
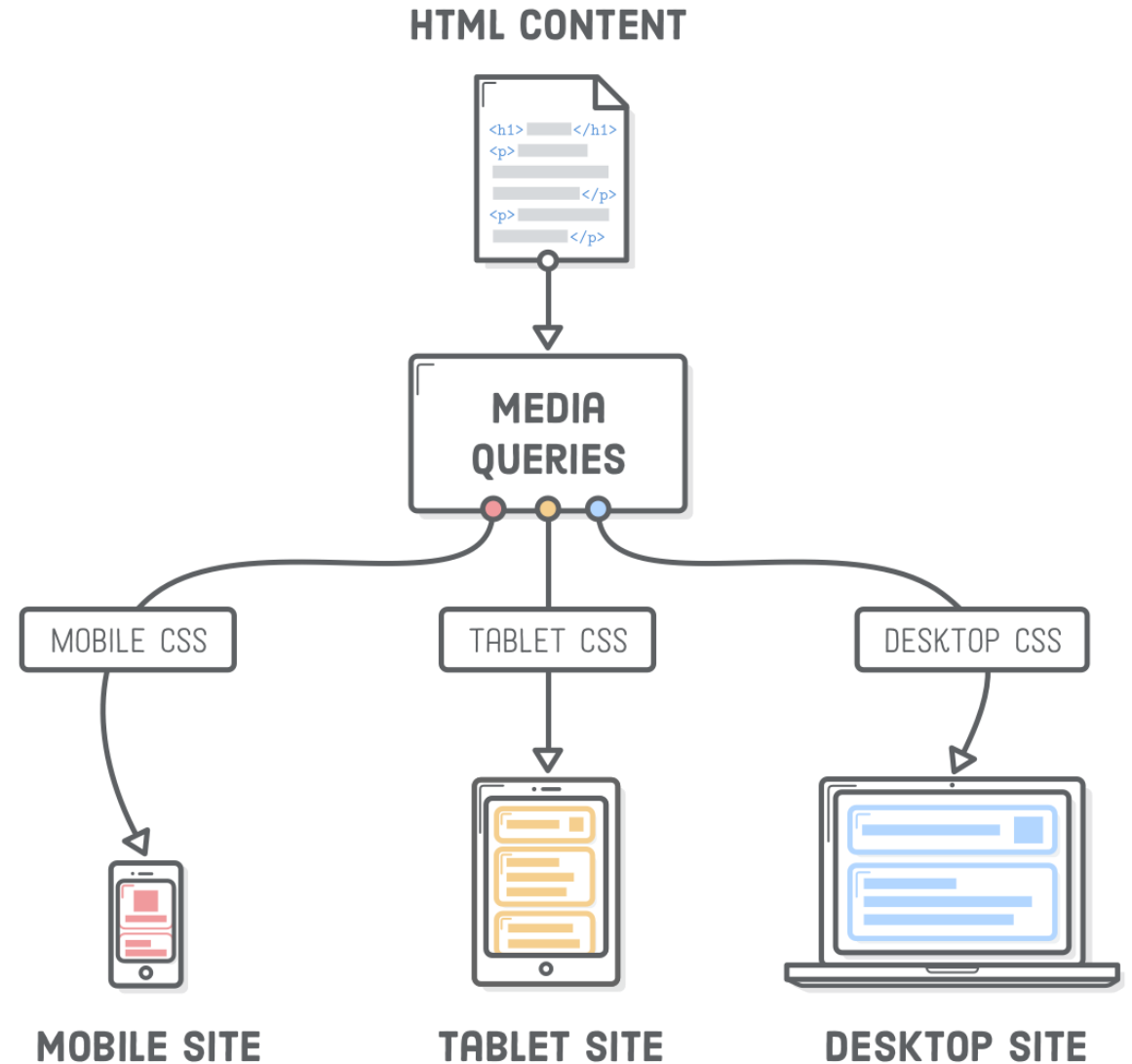
Layout for responsive design
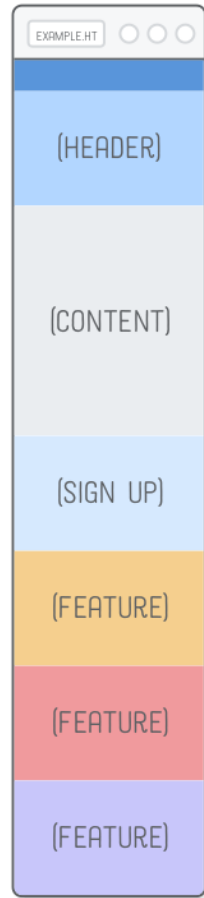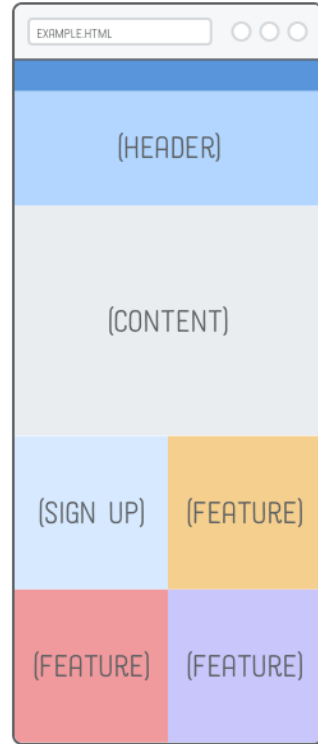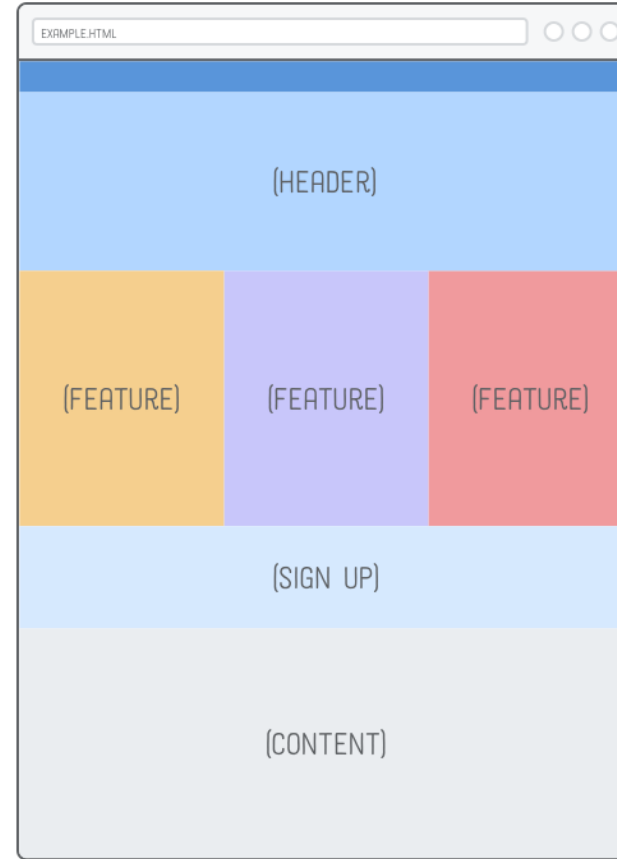
Grid-view

- Many web pages are based on a grid-view, i.e. the page is divided into columns

- A responsive grid-view often has 12 columns, a total width of 100%, and will shrink and expand as you resize the browser window
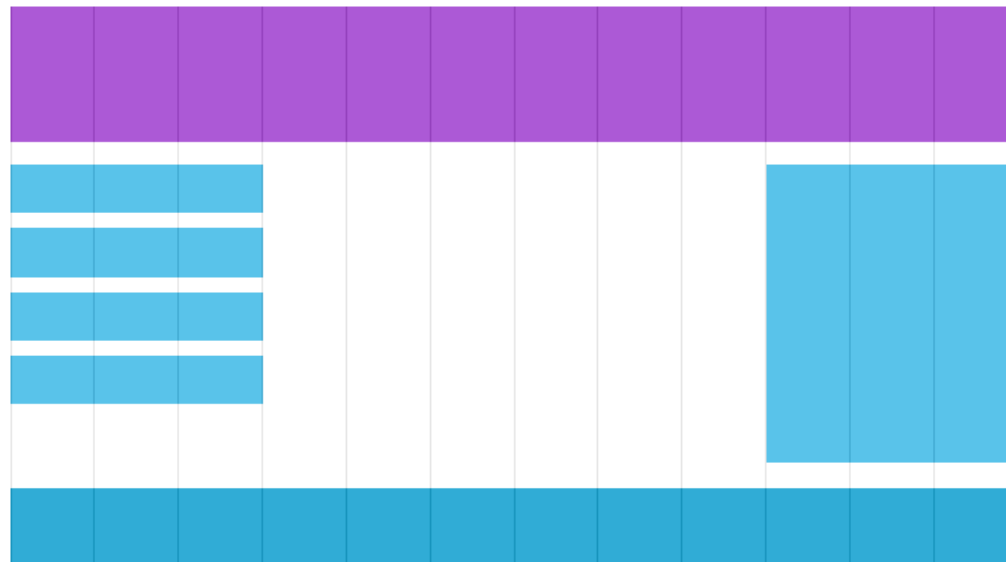
Cascading Style Sheets

THE BOOTSTRAP FRAMEWORK

Bootstrap

- Open Source CSS (and Javascript) framework
- Allows applying "modern" styles
  - Sensible and nice-looking defaults
  - Easy to apply custom themes
- Takes care of cross-browser issues
- Simplified layout model

- Developed by Twitter
  - http://getbootstrap.com/ -> go to version 4.6, because version 5 is still in beta
  - https://getbootstrap.com/docs/4.6/getting-started/introduction/

Bootstrap philosophy

- Based on CCS classes

- Each class applies one "effect"

- Various classes may be combined in the same element

- Wide range of "standard" classes

- Wide range of additional "components"
  - Ready-to use interactive elements or groups of elements

- Mobile-first
  - Responsive

Using Bootstrap

- Use Bootstrap CDN
  - Bootstrap CSS – in <head>
  - Javascript support – end of <body>
    - Used by Bootstrap (bootstrap.min.js)
    - Used by some components (jQuery and Popper.js)

- Or download locally
  - https://github.com/twbs/bootstrap/releases/download/v4.6.0/bootstrap-4.6.0-dist.zip
  - npm install bootstrap

Bootstrap CDN

```html
<link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.0/dist/css/bootstrap.min.css"
integrity="sha384-B0vP5xmATw1+K9KRQjQERJvTumQW0nPEzvF6L/Z6nronJ3oUOFUFpCjEUQouq2+l"
crossorigin="anonymous">
```

```html
<script src="https://code.jquery.com/jquery-3.5.1.slim.min.js"
integrity="sha384-DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCXaRkfj"
crossorigin="anonymous"></script>
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.0/dist/js/bootstrap.bundle.min.js"
integrity="sha384-Piv4xVNRyMGpqkS2by6br4gNJ7DXjqk09RmUpJ8jgGtD7zP9yug3goQfGII0yAns"
crossorigin="anonymous"></script>
```

Page structure

- Start with **Basic template**
  - https://getbootstrap.com/docs/4.6/getting-started/introduction/#starter-template
  - Notice the "responsive viewport"
    ```
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
    ```
- Or, choose from published **Examples**
  - https://getbootstrap.com/docs/4.6/examples/
- Remember to include your page content in a
  - `<div class="container">`

Starter Template

```html
<!doctype html>
<html lang="en">
  <head>
    <!-- Required meta tags -->
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">

    <!-- Bootstrap CSS -->
    <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/css/bootstrap.min.css" integrity="sha384-Vkoo8x4CGsO3+Hhxv8T/

    <title>Hello, world!</title>
  </head>
  <body>
    <h1>Hello, world!</h1>

    <!-- Optional JavaScript -->
    <!-- jQuery first, then Popper.js, then Bootstrap JS -->
    <script src="https://code.jquery.com/jquery-3.4.1.slim.min.js" integrity="sha384-J6qa4849blE2+poT4WnyKhv5vZF5SrPo0iEjwBvKU7imGFAV0wwj1yYfoRSJ
    <script src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.js" integrity="sha384-Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV
    <script src="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/js/bootstrap.min.js" integrity="sha384-wfSDF2E50Y2D1uUdj0O3uMBJnjuUD4Ih7YwaYd
  </body>
</html>
```

Copy

Adding your style

- Write your additional CSS rules in a file, and load it in the head section, after the bootstrap CSS

```
<head>
  ...
<link rel="stylesheet" href="... > // bootstrap css

<!-- Custom CSS for this document -->
<link rel="stylesheet" href="mystyle.css">
  ...
</head>
```

Containers (mandatory top-level element)

- All-in-one: responsive, fixed-width container: its max-width changes at each breakpoint

```
<div class="container">
  <!-- Content here -->
</div>
```

- Fluid: full width container, spanning the entire width of the viewport

```
<div class="container-fluid">
  ...
</div>
```

Grid system

- Based on flexbox

- Uses a 12-column virtual grid

- The container is divided in `.row` blocks

- Each Row contains columns `.col`
  - By default, all columns have equal width
  - May specify spanning over more columns (`.col-4`)
  - May specify a breakpoint for that column to be visualized (`.col-sm` or `.col-sm-4`)

- 5 Breakpoints

Breakpoints

	Extra small <576px	Small ≥576px	Medium ≥768px	Large ≥992px	Extra large ≥1200px
Max container width	None (auto)	540px	720px	960px	1140px
Class prefix	`.col-`	`.col-sm-`	`.col-md-`	`.col-lg-`	`.col-xl-`
# of columns	12				
Gutter width	30px (15px on each side of a column)				
Nestable	Yes				
Column ordering	Yes				

Example layouts

Page content

- Reboot – normalize and replace browser defaults
- Typography – heading and text styles
- Images and Figures – alignment and responsiveness
- Tables – rich visual styles, and responsive tables

- See: https://getbootstrap.com/docs/4.6/content/

Components

- Ready-to-use classes for creating common UI elements
- See: https://getbootstrap.com/docs/4.6/components/

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