

# Cascading Style Sheets (CSS)

Styling the Web

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Photo by [Marcus Ganahl](#) on [Unsplash](#)

# Goal

- Styling web content
  - Definitions of the Cascading Style Sheets (CSS)
  - Basic concepts
  - How to use CSS in a web page

# Outline

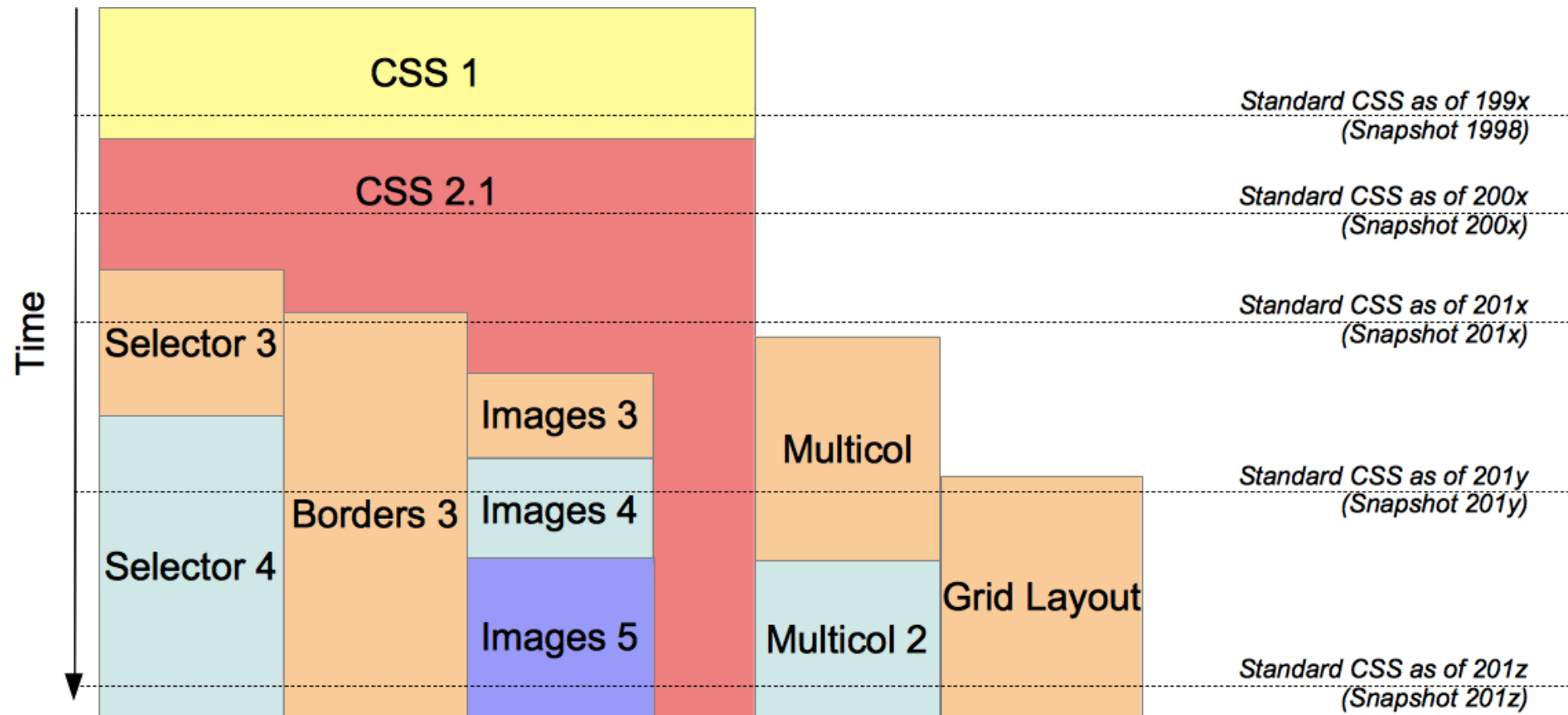
- CSS syntax
- CSS selectors
- CSS cascading
- CSS box model
- CSS positioning schemes



# 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



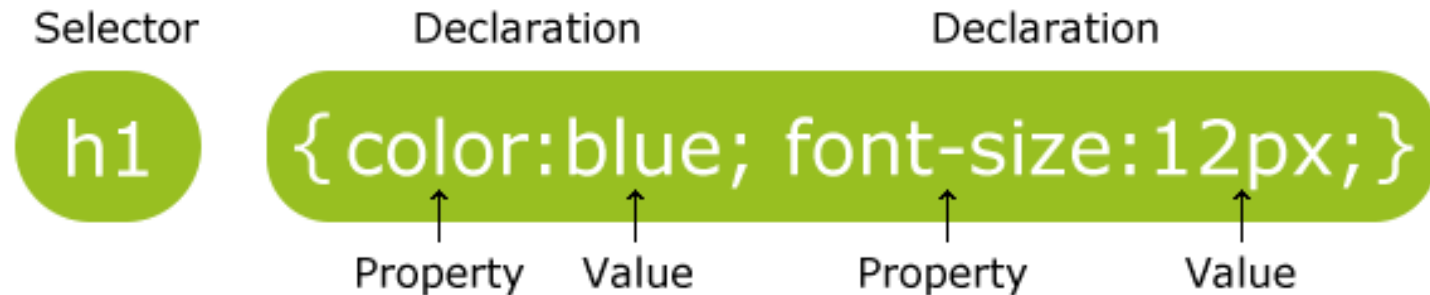
<https://developer.mozilla.org/en-US/docs/Web/CSS/CSS3>

Cascading Style Sheets

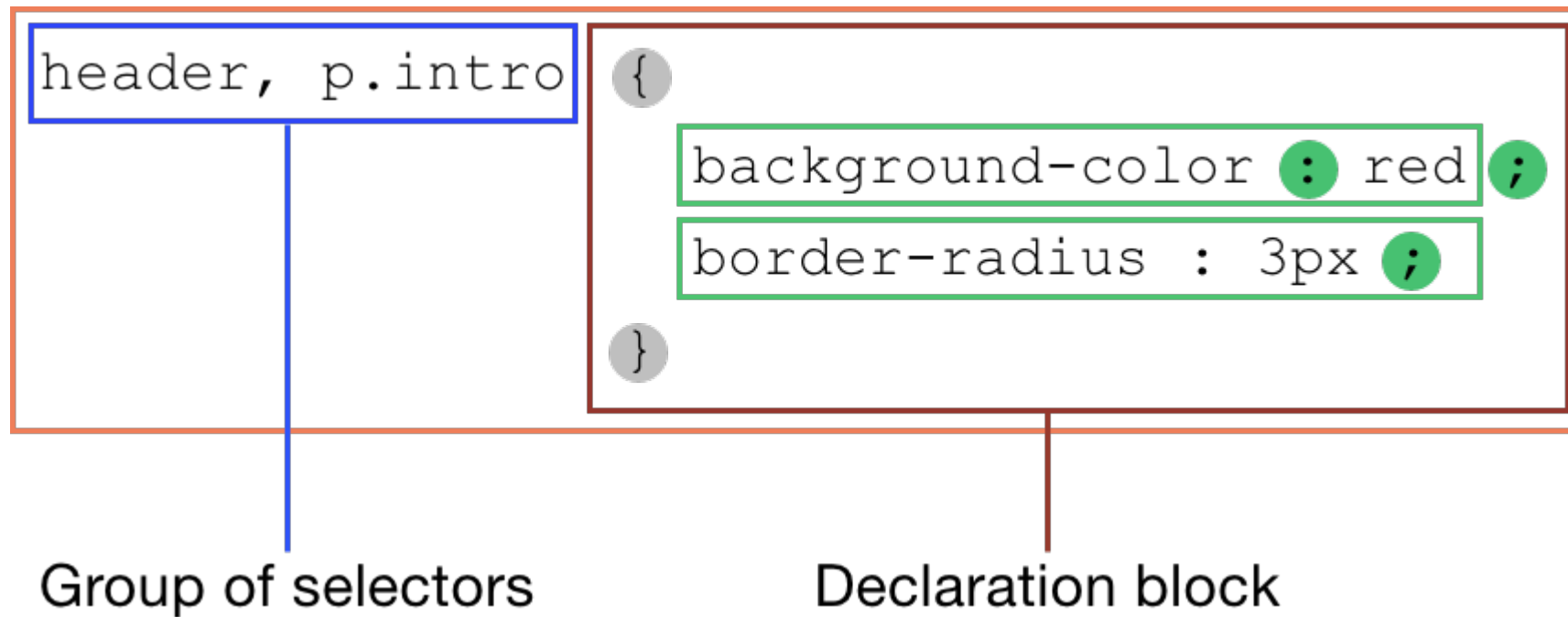
# CSS SYNTAX

# 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



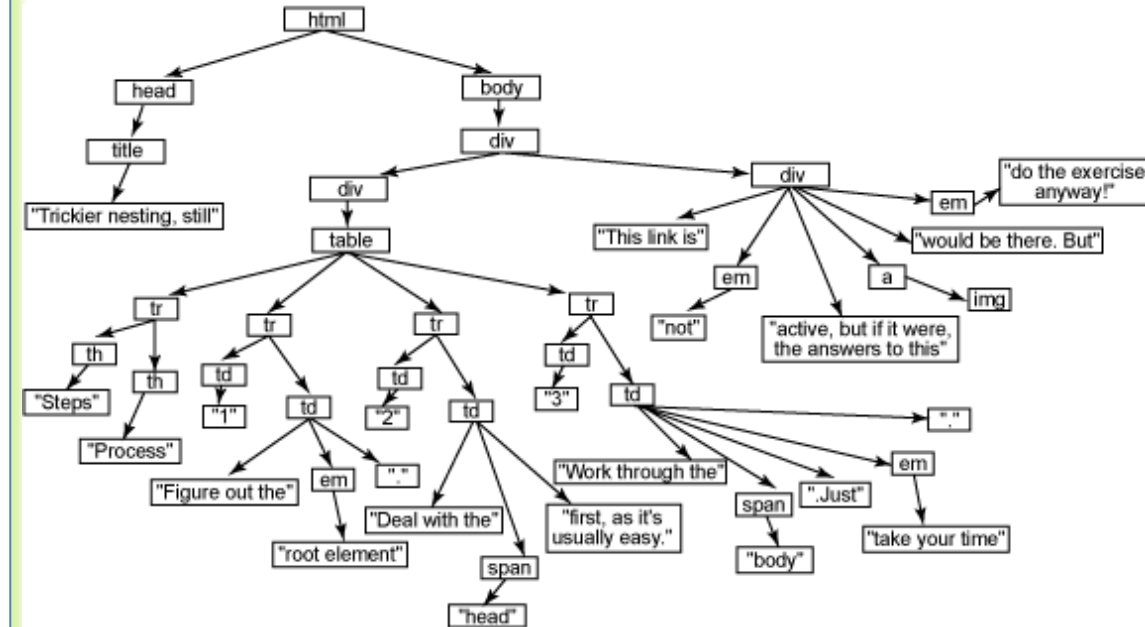
# General syntax





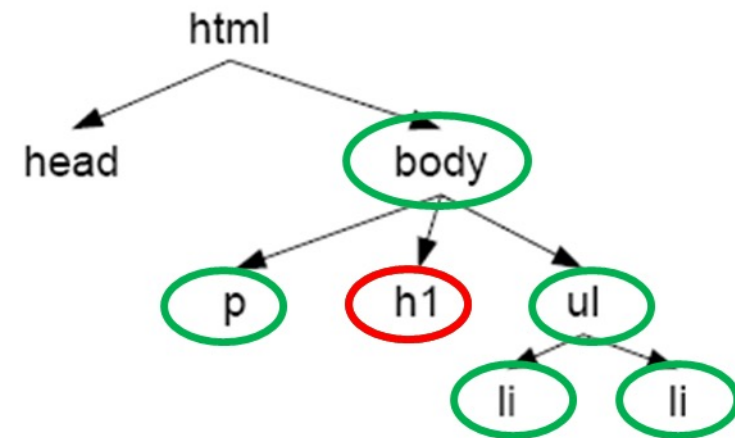
# HTML nested structure

```
<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>
```

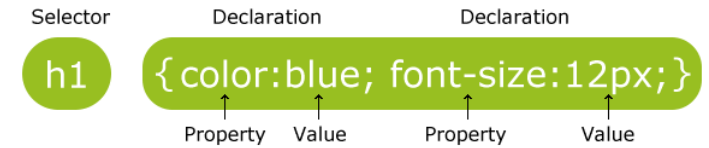


# Tree structure and inheritance

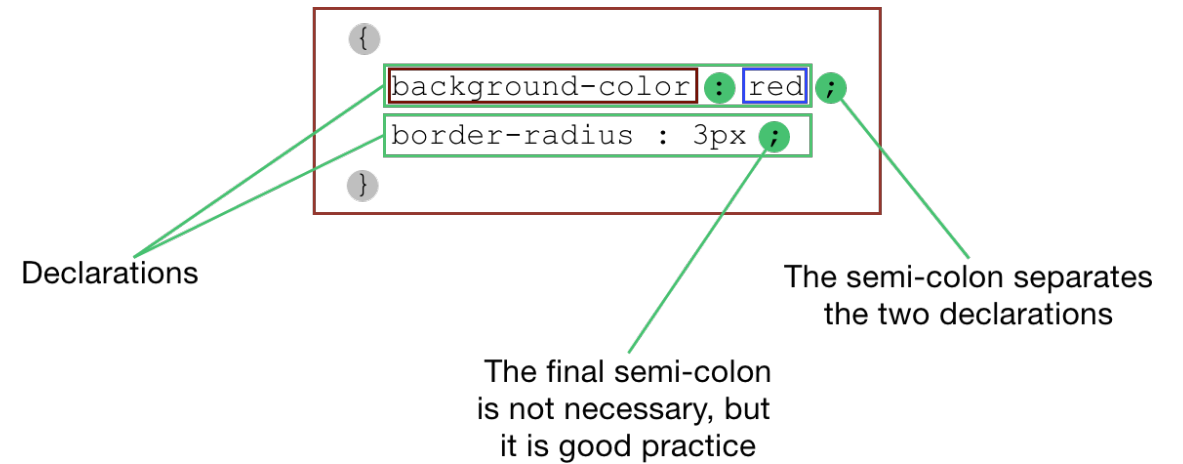
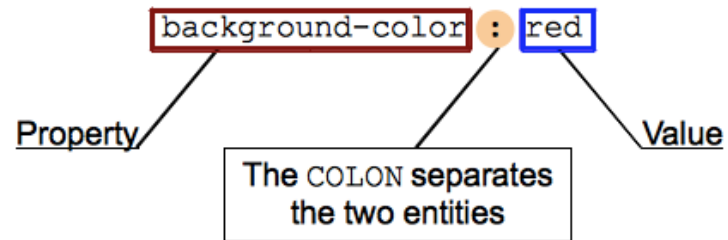
- HTML documents are trees
- Styles are inherited along trees
- When two rules are in conflict the most specific wins
- Example
  - `body {color: green}`
  - `h1 {color: red}`



# Declaration Syntax



A CSS declaration :



# 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)
  - 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 (<html>) 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

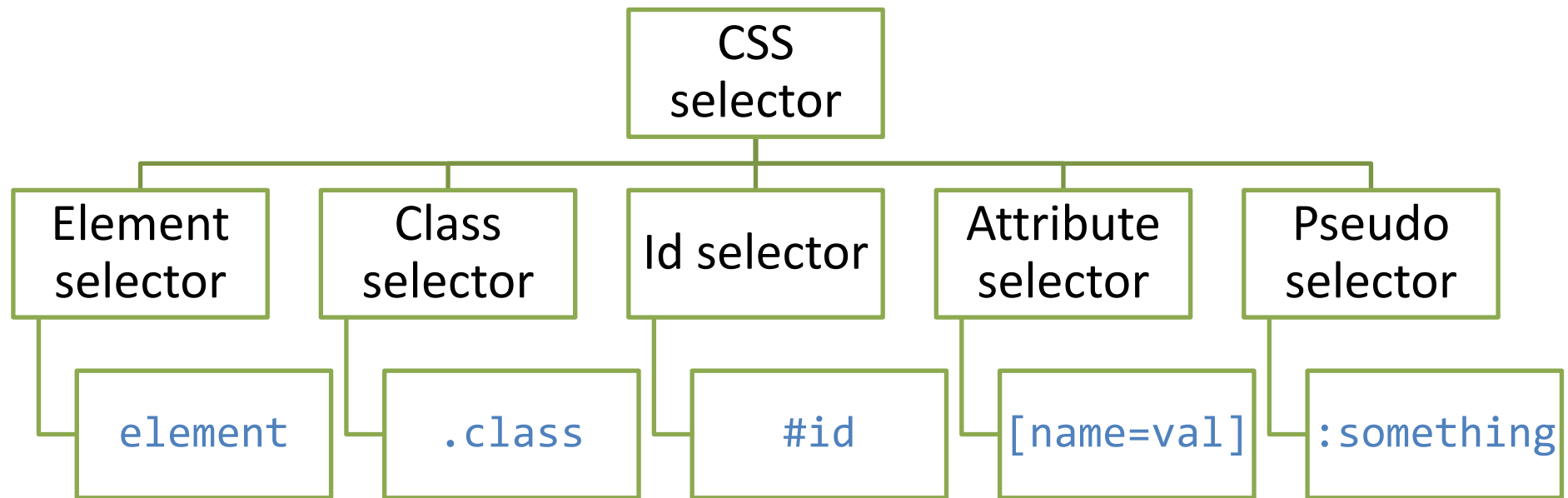
Cascading Style Sheets

# CSS SELECTORS



# CSS selectors

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



# Element selector

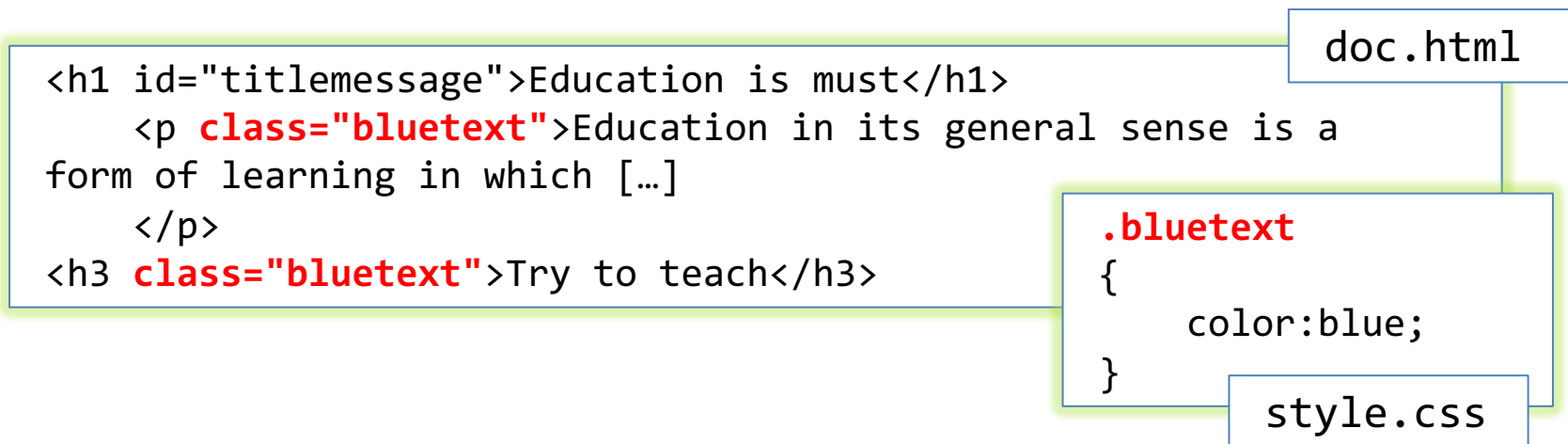
- Used to apply the same style to all instances of a specific element in a document
- Example: apply the color red to all h1 elements that appear in the document

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

style.css

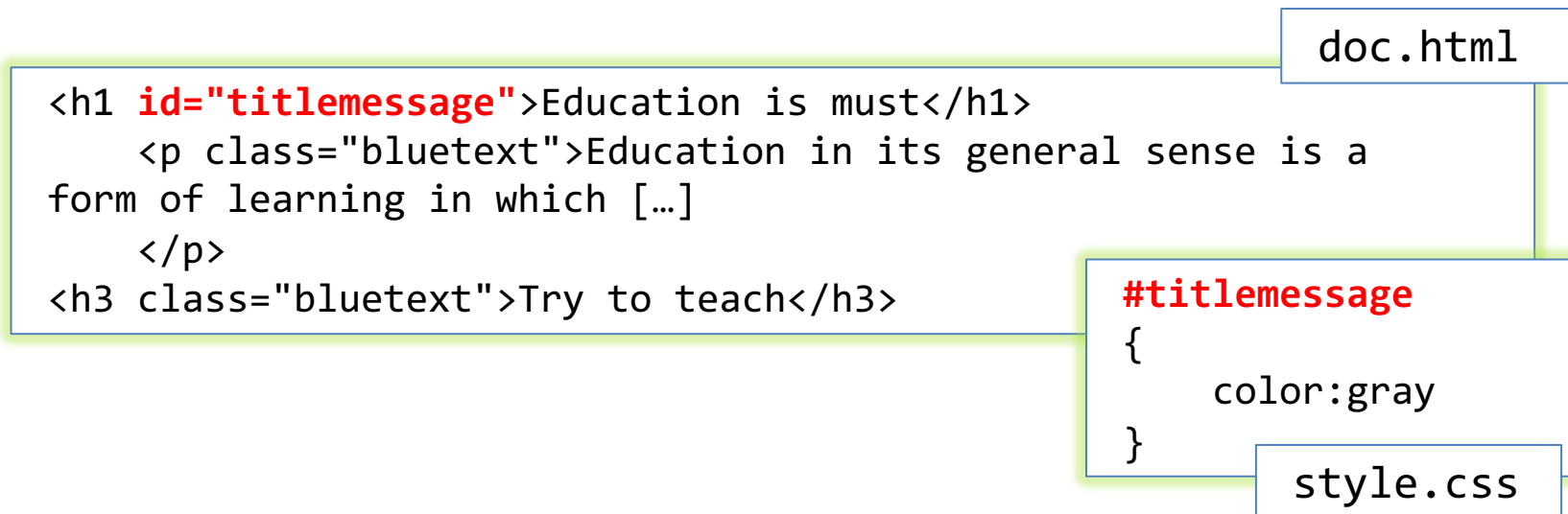
# Class selector

- 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



# 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)



# 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
- `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
<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

- 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](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( <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

# 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

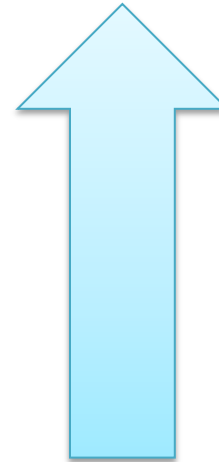
Selector	Example	Example description	CSS
:read-only	input:read-only	Selects input elements with the "readonly" attribute specified	3
:read-write	input:read-write	Selects input elements with the "readonly" attribute NOT specified	3
:required	input:required	Selects input elements with the "required" attribute 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	
: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

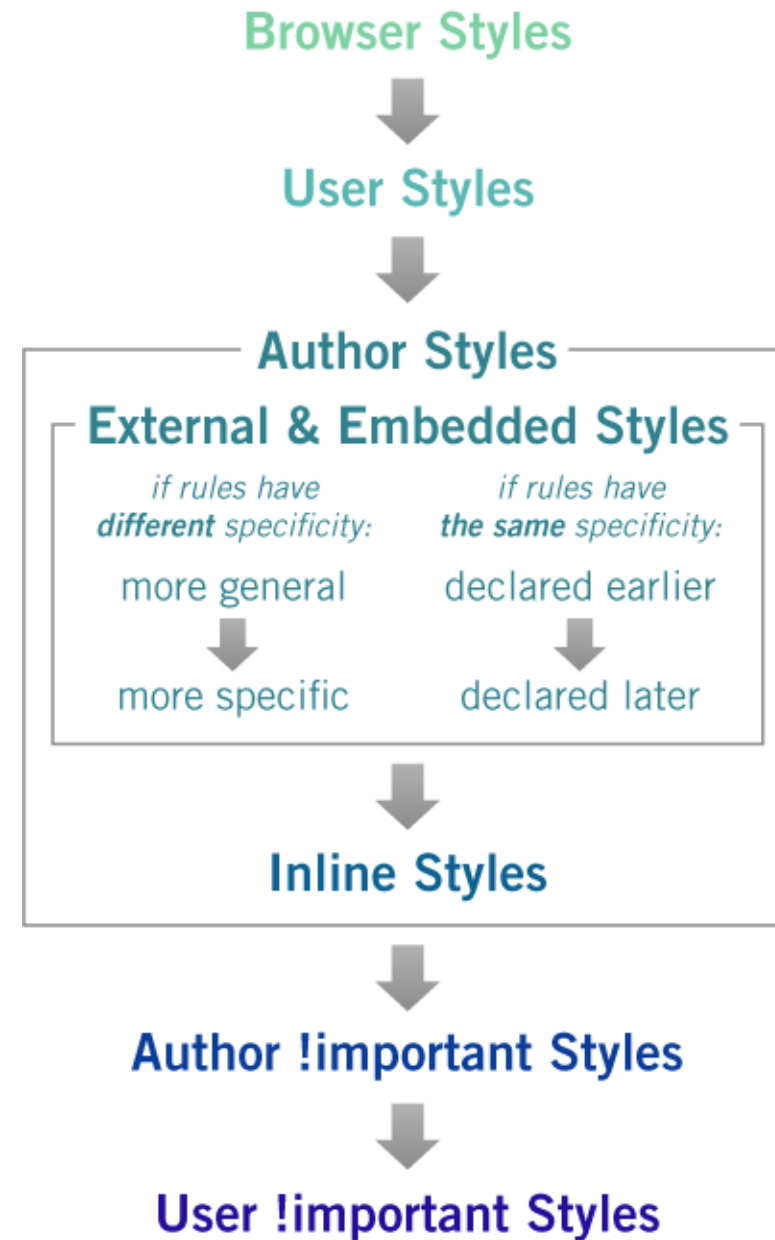
- `<style>` attribute within an HTML element
- Last resort, just for local (very local) changes

```
<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  
}
```

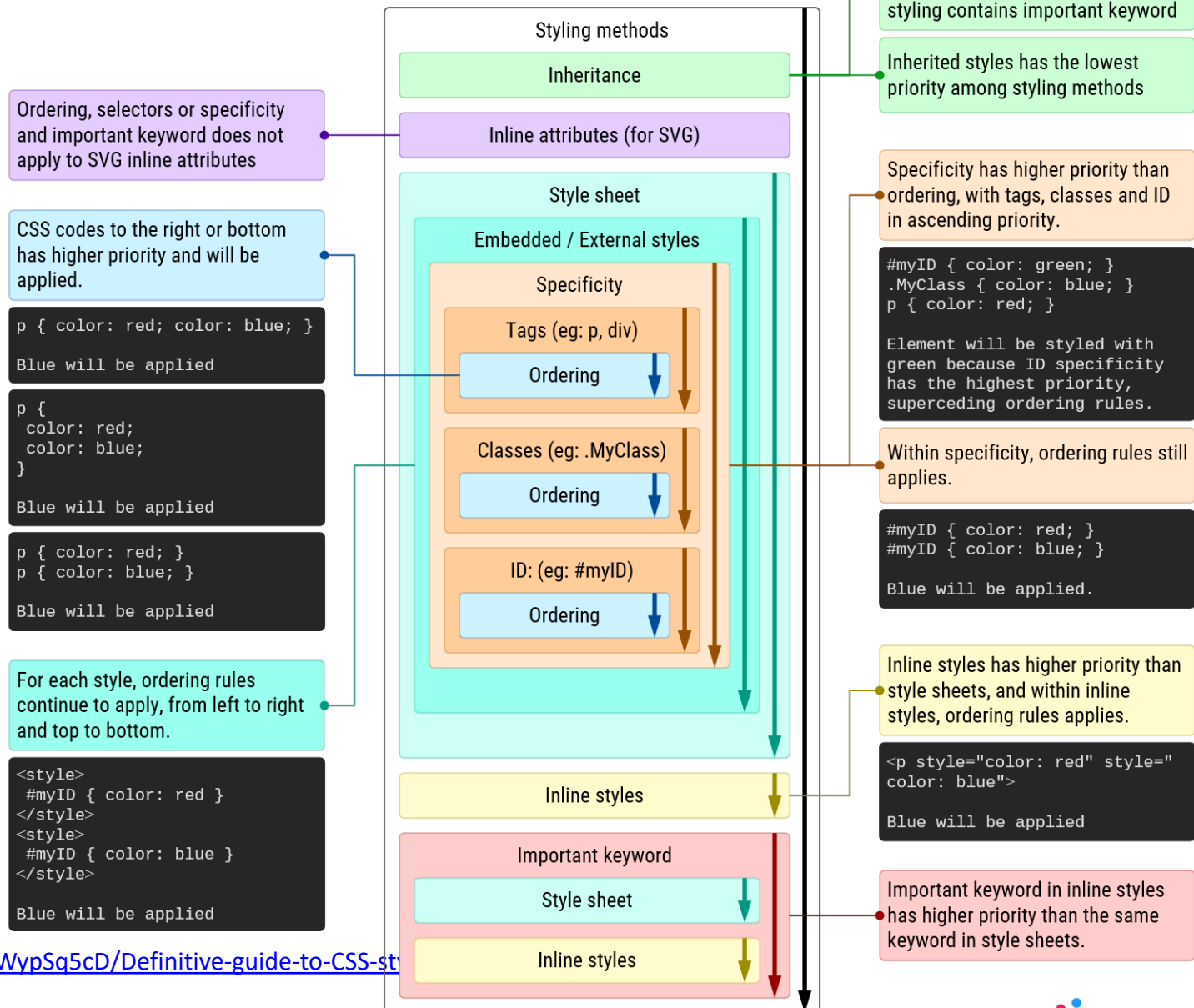


# CSS specificity

- Specificity determines which CSS rule is applied by the browser
  - Every selector has its place in the specificity hierarchy
1. Type selectors (h1) and pseudo-elements (::before)
  2. Class selectors (.cls), attributes selector ([n=v]) and pseudo-classes (:hover)
  3. ID selectors (#menu)

# The definitive guide to CSS styling order

Includes CSS stylings for SVG

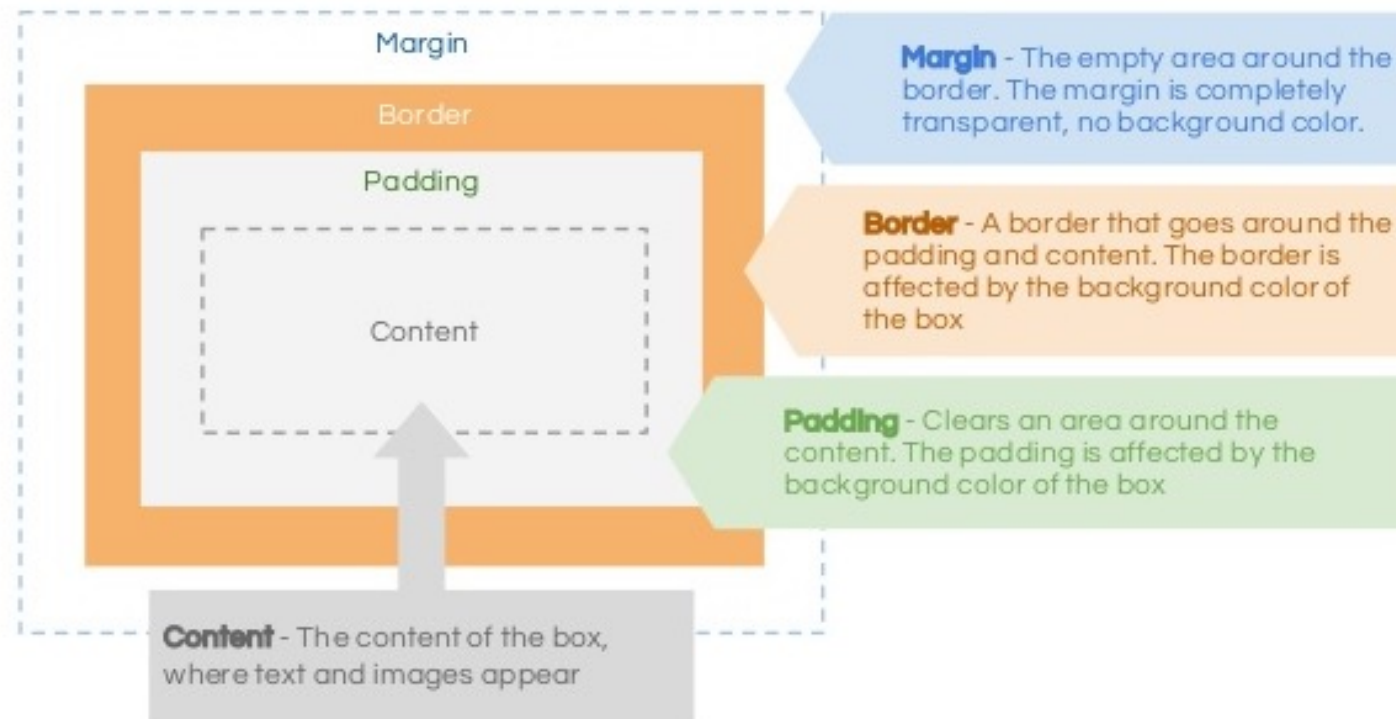


Cascading Style Sheets

# CSS BOX MODEL

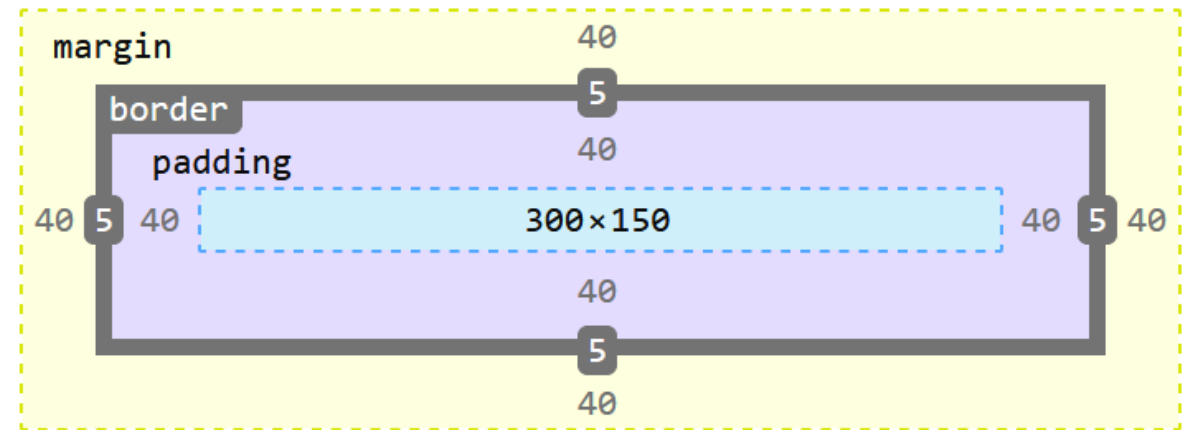
# The box model

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



# 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



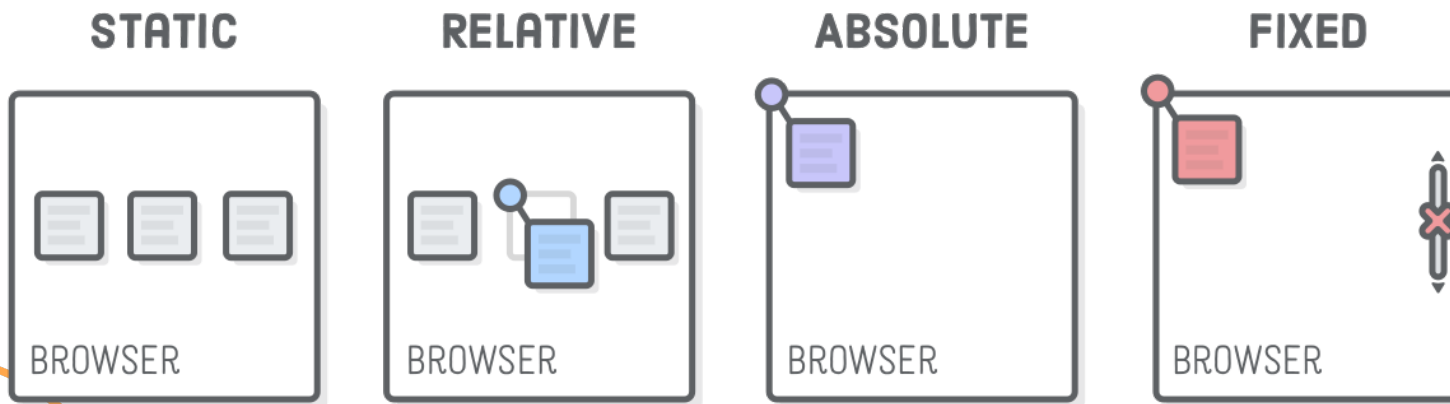
Cascading Style Sheets

# CSS POSITIONING SCHEMES



# Positioning schemes

- **Static:** normal flow (default)
- **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)



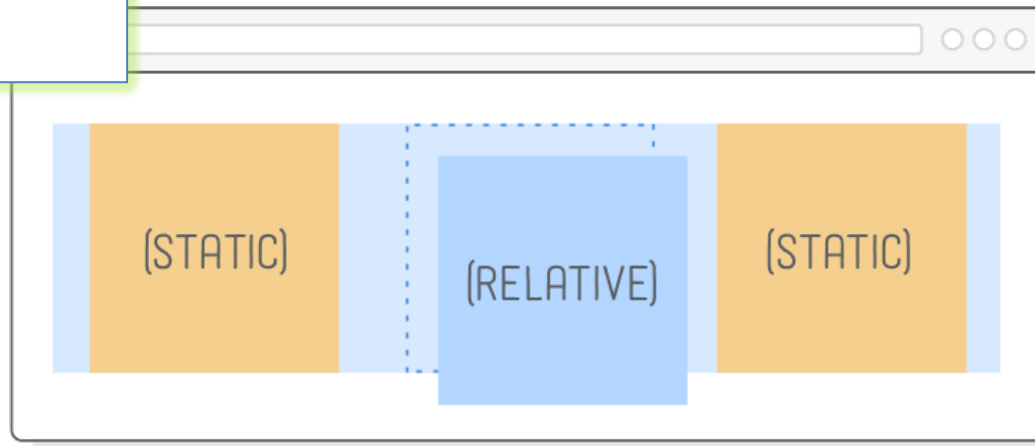
<https://internetingishard.com/html-and-css/advanced-positioning/>

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

# Relative positioning

- One element can be shifted “relative” to its normal flow position by setting a vertical and/or horizontal offset

```
.item-relative {  
  position: relative;  
  left: 20px;  
  top: 20px;  
}
```

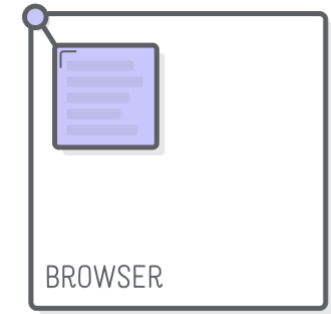


**RELATIVE POSITIONING**

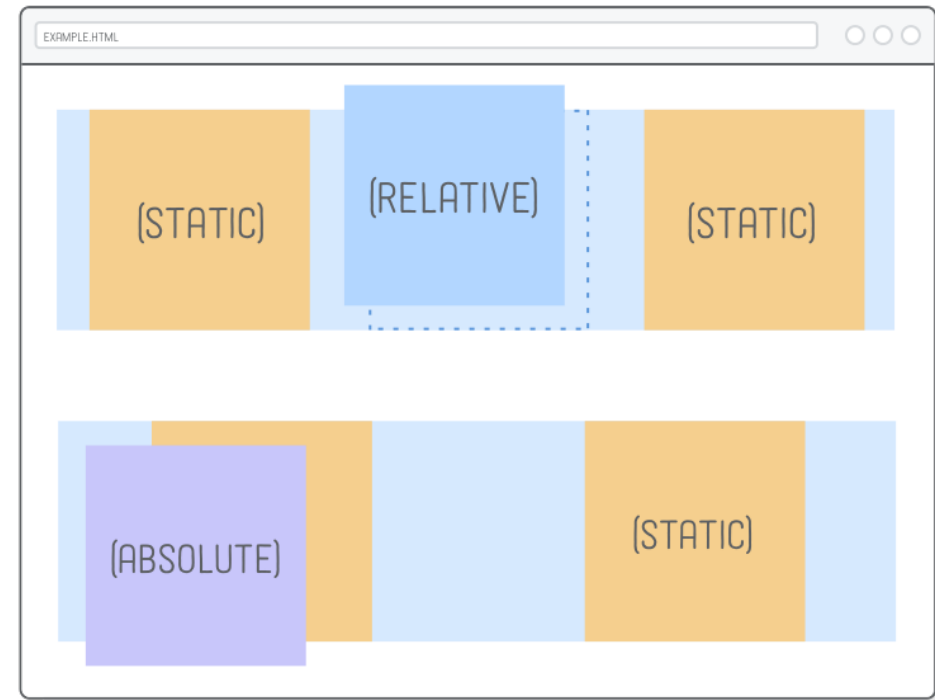
# Absolute positioning

- Takes the element out of the flow of the document, thus taking up no space
- Other elements in the normal flow of the document will act as though the absolutely positioned element was never there

```
.item-absolute {  
  position: absolute;  
  left: 30px;  
  top: 350px;  
}
```

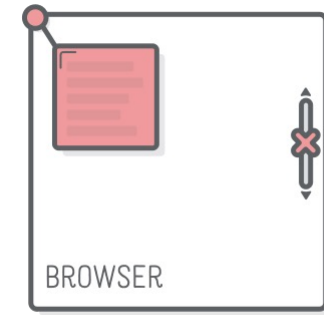


ABSOLUTE POSITIONING

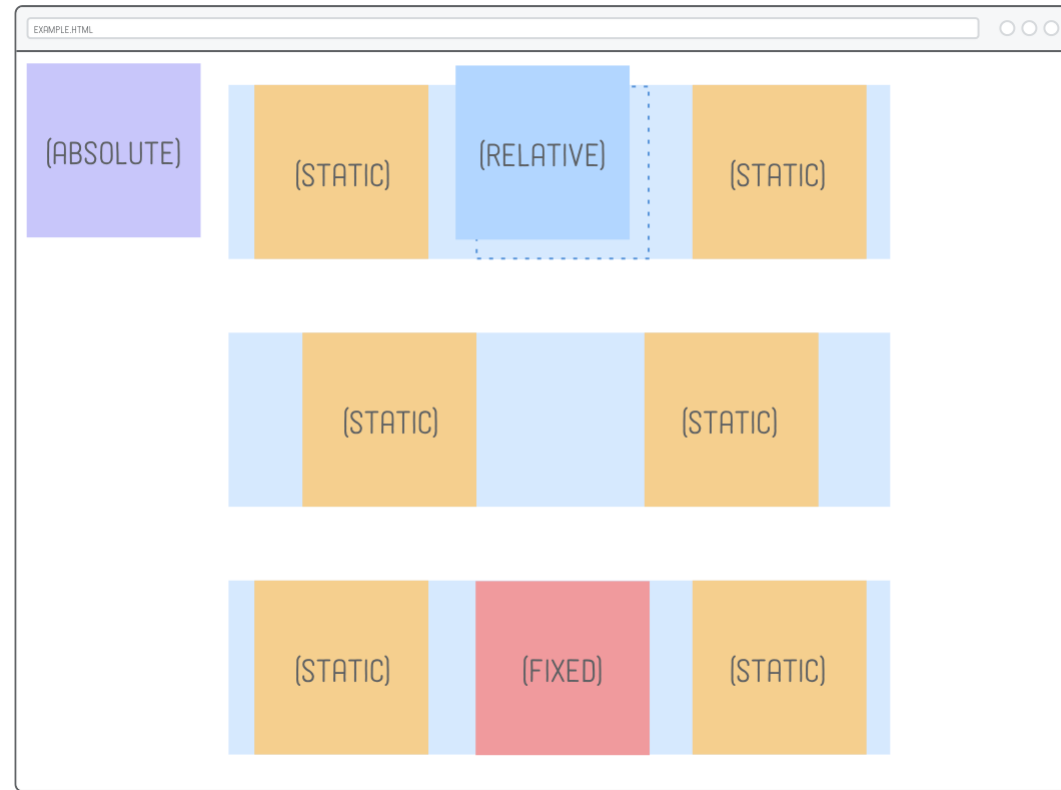


# Fixed positioning

- Has a lot in common with absolute positioning: the element is removed from the normal flow of the page, and the coordinate system is relative to the entire browser window
- The key difference is that fixed elements don't scroll with the rest of the page

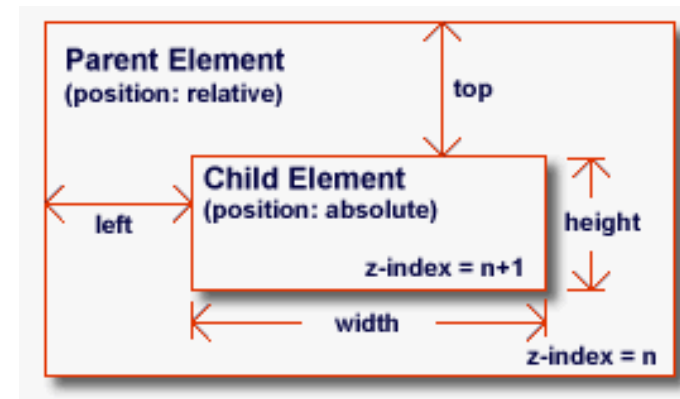
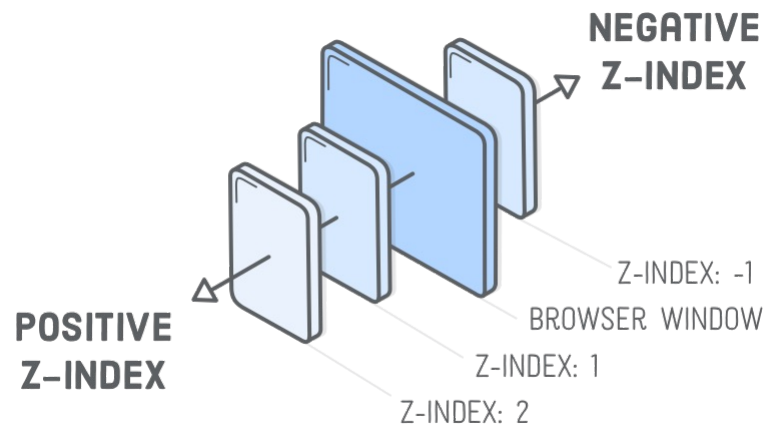


**FIXED POSITIONING**

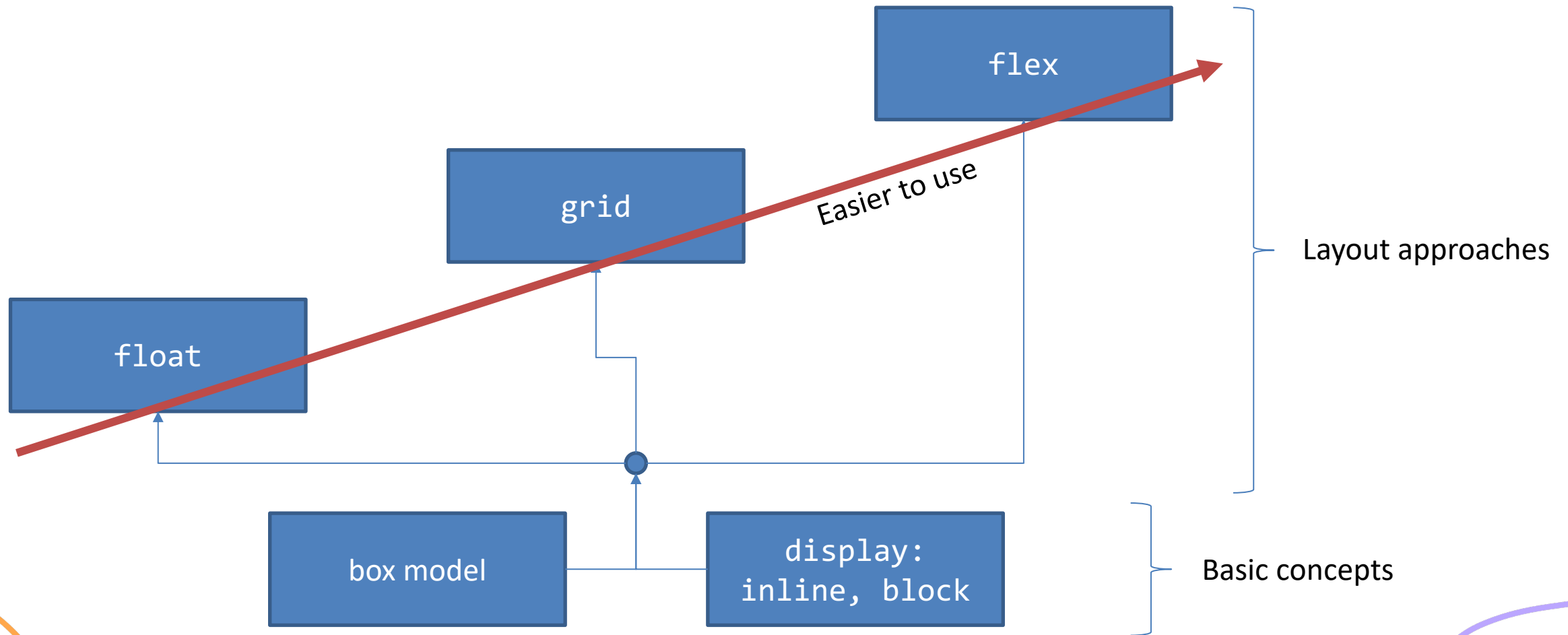


# z-index

- 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)



# Page Layout methods



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