Cascading Style Sheets (CSS)

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Driving problem behind CSS

What font type and size does `<h1>Introduction</h1>` generate?

Answer: Some default from the browser (HTML tells **what** browser **how**)

Early HTML - Override defaults with attributes

```
<table border="2" bordercolor="black">
```

Style sheets were added to address this:

Specify style to use rather than browser default

Not have to code styling on every element

Key concept: Separate style from content

Content (what to display) is in HTML files

Formatting information (how to display it) is in separate style sheets (.css files).

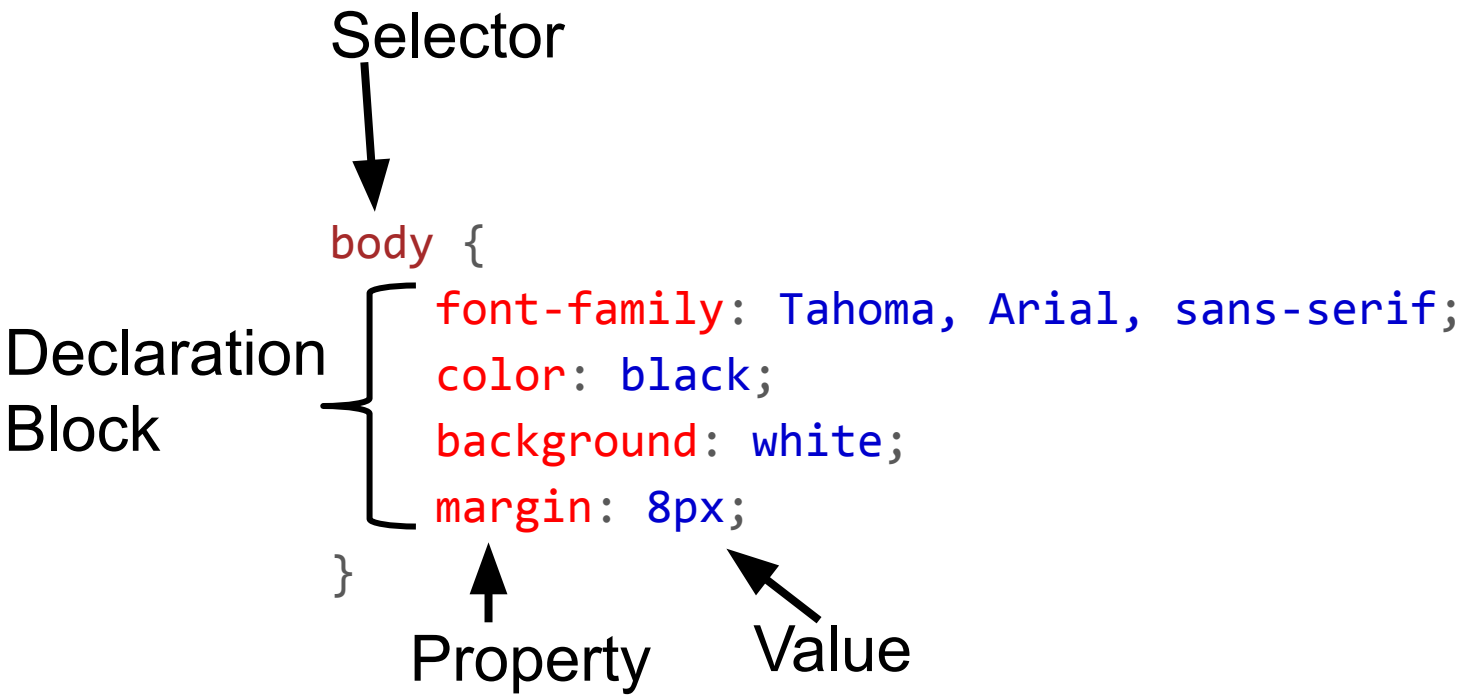
Use an element attribute named **class** to link (e.g. `<span class="test">`)

Result: define style information once, use in many places

> Consider can you make all the text in the app slightly bigger?
> Or purple is our new company color.

DRY principle: Don't Repeat Yourself

Style sheet contain one or more **CSS Rules**



CSS Selector	CSS	HTML
Tag name	`h1 { color: red; }`	`<h1>Today's Specials</h1>`
Class attribute	`.large { font-size: 16pt; }`	`<p class="large">...`
Tag and Class	`p.large {...}`	`<p class="large">...`
Element id	`#p20 { font-weight: bold; }`	`<p id="p20">...`

CSS Pseudo Selectors

hover - Apply rule when mouse is over element (e.g. tooltip)

```
p:hover, a:hover {
  background-color: yellow;
}
```

a:link, a:visited - Apply rule when link has been visited or not visited (link)

```
a:visited {
  color: green;
}
```

```
a:link {
  color: blue;
}
```

CSS Properties

Control many style properties of an element:

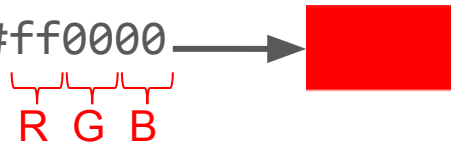
- Coloring
- Size
- Position
- Visibility
- Many more: (e.g. `p: { text-decoration: line-through; }`)

- Also used in animation

Color - Properties: `color` & `background_color`

Must ultimately turn into red, green, and blue intensities between 0 and 255:

- Predefined names: `red`, `blue`, `green`, `white`, etc.
- 8-bit hexadecimal numbers for red, green, blue: `#ff0000`

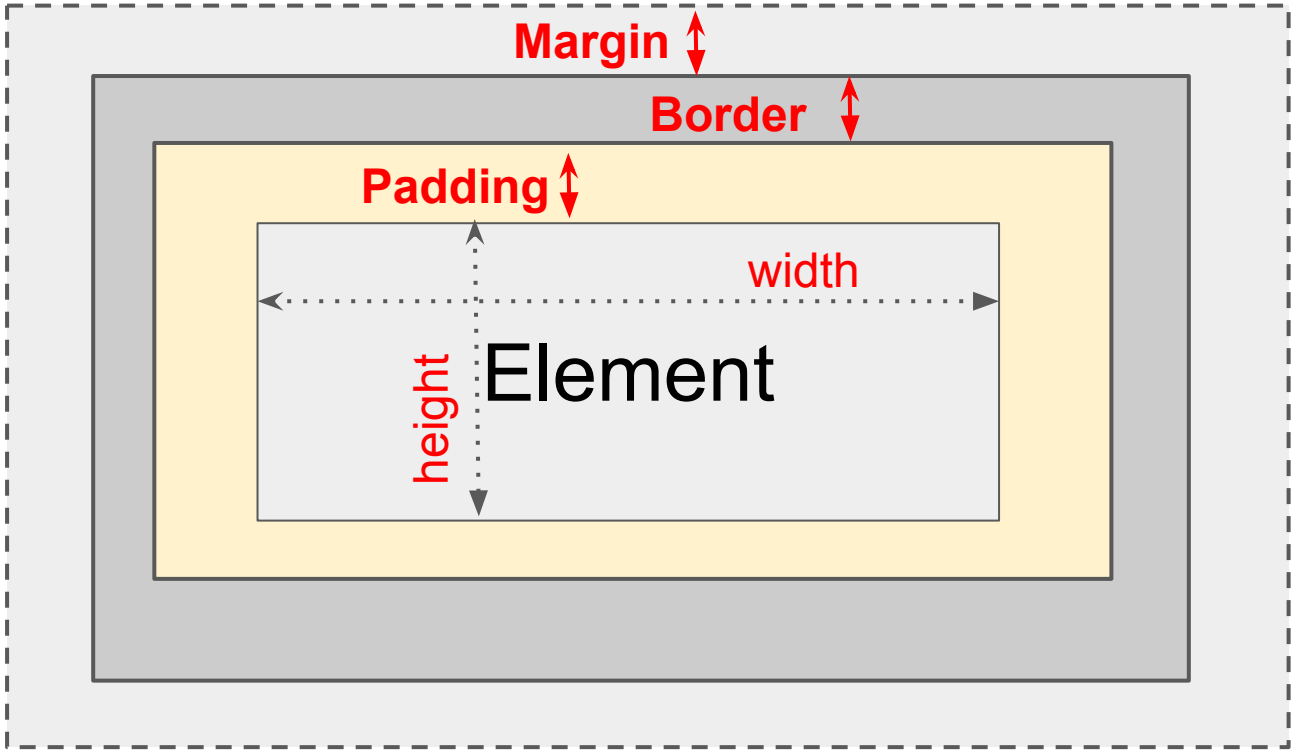


- 0-255 decimal intensities: `rgb(255,255,0)`

- Percentage intensities: `rgb(80%,80%,100%)`

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

CSS Box Model



Total element width =
width +
left padding +
right padding +
left border +
right border +
left margin +
right margin

Margin & Padding
Transparent

CSS distance units

Absolute	
2px	pixels
1mm	millimeters
2cm	centimeters
0.2in	inches
3pt	printer point 1/72 inch
Relative	
2em	2 times the element's current font size
3rem	3 times the root element's current font size

Size Properties - Element, pad, margin, border

width - Override element defaults
height

padding-top
padding-right
padding-bottom
padding-left

margin-top
margin-right
margin-bottom
margin-left

```
border-bottom-color
border-bottom-style
border-bottom-width
border-left-color
border-left-style
border-left-width
border-right-color
border-right-style
border-right-width
```
etc.

```
p {
  border: 5px solid red;
}
```

`position` property

`position: static;`	(default) - Position in document flow
`position: relative;`	Position relative to default position via `top`, `right`, `bottom`, and `left` properties
`position: fixed;`	Position to a fixed location on the screen via `top`, `right`, `bottom`, and `left` properties
`position: absolute;`	Position relative to ancestor `absolute` element via `top`, `right`, `bottom`, and `left` properties

Fixed position (0,0) is top left corner

Some more common properties

`background-image`: image for element's background

`background-repeat`: should background image be displayed in a repeating pattern (versus once only)

`font, font-family, font-size, font-weight, font-style`: font information for text

`text-align, vertical-align: Alignment: center, left, right`

`cursor` - Set the cursor when over element (e.g. `help`)

Element visibility control properties

`display: none;` - Element is not displayed and takes no space in layout.
`display: inline;` - Element is treated as an inline element.
`display: block;` - Element is treated as a block element.
`display: flex;` - Element is treated as a flex container.
`display: grid;` - Element is treated as a grid container.

`visibility: hidden;` - Element is hidden but space still allocated.
`visibility: visible;` - Element is normally displayed

Flexbox and Grid layout

- `display: flex;` (Flexbox)
- `display: grid;` (Grid) new layout methods
  - Items flex to fill additional space and shrink to fit into smaller spaces.
  - Useful for web app layout:
    - Divide up the available space equally among a bunch of elements
    - Align of different sizes easily
    - Key to handling different window and display sizes
- Flexbox - Layout one dimension (row or column) of elements
- Grid - Layout in two dimensions (rows and columns) of elements
- Covered in discussion section

Some other CSS issues

- Inheritance
  - Some properties (e.g. `font-size`) are inherited from parent elements
  - Others (`border`, `background`) are not inherited.
- Multiple rule matches
  - General idea: most specific rule wins

```
<span>Text1</span>                  span.test { color: green }
<span class="test">Text2</span>     span { color: red }
```

Adding Styles to HTML

```
<head>
  <link rel="stylesheet" type="text/css" href="myStyles.css" />
  <style type="text/css">
    body {
        font-family: Tahoma, Arial, sans-serif;
    }
  </style>
</head>
<body>
  <div style="padding:2px; ... ">
</body>
```

Separate style sheet (best way)

Page-specific styles

Element-specific styles

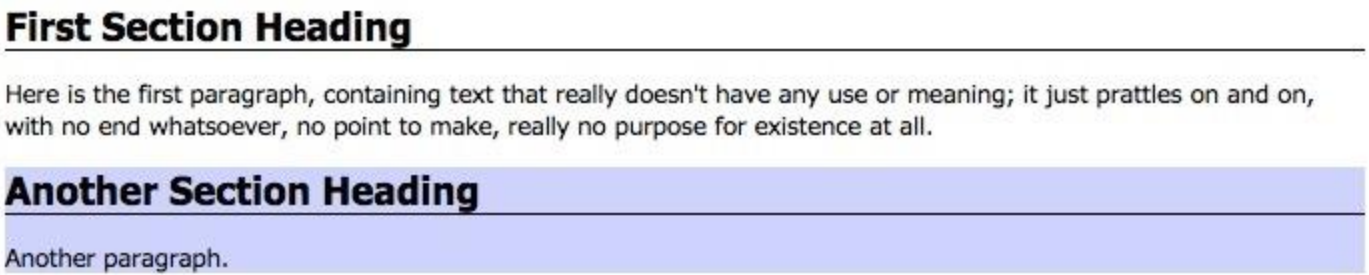
```css
body {
  font-family: Tahoma, Arial, sans-serif;
  font-size: 13px;
  color: black;
  background: white;
  margin: 8px;
}
h1 {
  font-size: 19px;
  margin-top: 0px;
  margin-bottom: 5px;
  border-bottom: 1px solid black
}
.shaded {
  background: #d0d0ff;
}
```

CSS:

```html
<body>
  <h1>First Section Heading</h1>
  <p>
    Here is the first paragraph, containing
    text that really doesn't have any use
    or meaning; it just prattles on and on,
    with no end whatsoever, no point to
    make, really no purpose for existence
    at all.
  </p>
  <div class="shaded">
    <h1>Another Section Heading</h1>
    <p>
      Another paragraph.
    </p>
  </div>
</body>
```

HTML:

Example Output



CSS in the real world

- CSS preprocessors (e.g. less) are commonly used
  - Add variable and functions to help in maintaining large collections of style sheets
  - Apply scoping using the naming conventions
- Composition is a problem
  - It can be really hard to figure out what rule from which stylesheet is messing things up