

# CSS Architecture

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A high level view of the common css approaches. This work was inspired by the book Enduring CSS by Ben Frien.

## Specificity Problem for large scale applications

As developers we are often faced with the challenge of trying to design our system in a way which is easy to read and reason about. The cascading nature of css can create a number of headaches because of how specificity is assigned. The different problems outlined below attempt to solve the specificity issue through a conscious design of the css naming convention.

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This table summarizes problem of name clashing

selector	inline	ID	class	type
.widget	0	0	1	0
aside#sidebar .widget	0	1	1	1
.class-on-sidebar .widget	0	0	2	0

1. different weights of selectors are confusing to learn and understand
2. can lead to the use of !important when specificity is not understood, effectively creating a specificity war
3. leads to css styling that is hard to reason about, and bloated selectors which obfuscate the relationship between the DOM element and the actual style applied to it

Low specificity: If specificity battles start between selectors, the code quality starts to nosedive. Having a low specificity will help maintain the integrity of a large project's CSS for a lot longer.

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## Limitations of IDs as selectors

In summary, they are far more specific than a class selector – therefore making overrides more difficult. Plus they can only be used once in the page anyway so their efficacy is limited.

However, to keep specificity lower you can do the following:

```
[id="Thing"] {  
  /* Property/Values Here */  
}
```

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# Object Oriented CSS

The best example of this approach is [Atomic CSS](#) where the class name is composed of different features which make up or compose the overall styling. The philosophy behind atomic css is to break the css into a variety of building blocks which can be declared inside the element. In this way, the component retains control of the styling, and the user can create variables and customize the stylistic building blocks for the application.

Here is an example:

```
<div class="Bgc(#0280ae.5) C(#fff) P(20px)">A big callout section</div>
```

In this case, Bgc would be background color and the element inside the () is the value for that background color. Taking this one step further, you could even write **Bgc(grey-color)** and abstract the grey-color into a variable which can be used throughout your application.

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Using the shorthand nomenclature for Atomic css, the grid system can be vastly shortened. Here is an example of an atomic css grid system for inline blocks:

```
<div>
```

```
<div class="IbBox W(1/3) P(20px) Bgc(#0280ae.5)">Box 1</div>
  <div class="IbBox W(1/3) P(20px) Bgc(#0280ae.8)">Box 2</div>
  <div class="IbBox W(1/3) P(20px) Bgc(#0280ae)">Box 3</div>
</div>
```

Above, the IbBox determines the type to be an inline-block, the width is 1/3, P(20px) = padding 20px, and Bgc is background color and the .5 is opacity 50%.

## Pros

- Variables can be passed along in a more intuitive manner, closer to the DOM structure.
- Grid system is more obvious than a standard bootstrap row approach which abstracts the underlying CSS.
- Is more composable and reduces the effort needed to override using stylesheets

## Cons

- Responsive Web design is still a pain because you need to add a media breakpoint name to an atomic class in order to apply specific styling. So you end up with something like this:

```
<div class="D(ib)--sm W(50%)--sm W(25%)--lg P(20px) Bgc(#0280ae.5)">1</div>
<div class="D(ib)--sm W(50%)--sm W(25%)--lg P(20px) Bgc(#0280ae.6)">2</div>
<div class="D(ib)--sm W(50%)--sm W(25%)--lg P(20px) Bgc(#0280ae.8)">3</div>
```

```
<div class="D(ib)--sm W(50%)--sm W(25%)--lg P(20px) Bgc(#0280ae)">4</div>
```

(In which case it is almost better to use media queries in CSS style sheets.)

- sometimes you really don't want this level of detail when composing an element, but a more general component style will suffice such as `label`

## Scalable Modular CSS

The idea behind this approach is really to organize your code or group the CSS into flexible elements which also promote long term maintainability. [SMCSS](#) uses the following categorizations for CSS:

- Base
- Layout
- Module
- State
- Theme

## Base

A rule applied to an element using an element selector, doesn't include classes or ID selectors.

```
body, form {
```

```
    margin: 0;
    padding: 0;
}

a {
    color: #039;
}

a:hover {
    color: #03F;
}
```

## Layout

Major layouts which affect larger elements would be such as header or footer. Traditional Larger areas of the page. Layout is composed of modules.

```
#header, #article, #footer {
    width: 960px;
    margin: auto;
}

#article {
```

```
border: solid #CCC;  
border-width: 1px 0 0;  
}
```

## Modules

Discrete component of the page. It is your navigation bars and your carousels and your dialogs and your widgets and so on. This is the meat of the page. Modules sit inside Layout components. Use class names when defining modules. Example: `.module > h2 { padding: 5px }`

## State

A state is something that augments and overrides all other styles. Message may be in a success or errored state. Applied to same element as base or module class. Indicate a JS dependency

```
<div id="header" class="is-collapsed">  
  <form>  
    <div class="msg is-error">  
      There is an error!  
    </div>  
    <label for="searchbox" class="is-hidden">Search</label>  
    <input type="search" id="searchbox">  
  </form>
```

```
</div>
```

## Themes

Defines colours and images that give your application or site its look and feel. Separating the theme out into its own set of styles allows for those styles to be easily redefined for alternate themes.

```
/* Module Theming */  
/* in module-name.css */  
.mod {  
    border: 1px solid;  
}  
  
/* in theme.css */  
.mod {  
    border-color: blue;  
}
```

[Scalable Modular Css Website](#)

### Why Categorize?



The idea here is to codify patterns, which can lead to reusable code. The SMCSS approach is fairly agnostic to any particular class naming convention, however they do recommend that the different categories be condensed and used as prefixes for your styles. For example, one might use `layout-row-2` or `l-row-2` for a layout style. However, when it comes to modules and components it makes more sense to use the name of the component itself.

## BEM Naming Convention

Block Element Modifier or (BEM) is an approach to naming CSS classes in order to bypass the specificity problem and overriding hell in CSS.

```
.site-search {} /* Block */  
.site-search__field {} /* Element */  
.site-search--full {} /* Modifier */
```

## Pitfalls in BEM

1. Grandchildren selectors. Don't use `parent_grandparent_child` like `card_header_div_label`. Instead think of the block level element that this element belongs to. If it is in a React component, this would be the Component name. So `Header.jsx`, and you would follow up by naming the element inside the Header. So you would have `Header__text`.

## More examples of pitfalls

### Pros

- Easy naming system
- More intuitive about the relationship between styling and the component
- easy to write rules to evaluate

### Cons

- Modifiers can be confusing -- does it change state? Does it reflect a component attribute?
- Block level element makes sense in traditional HTML DOM structure, but what about in react context with components? Or what about when the block level element changes.

### Modifier Problem

With BEM, it can be confusing to reason about which to use:

```
<!-- standalone state hook -->  
<div class="c-card is-active">  
  [...]  
</div>  
  
<!-- or BEM modifier -->
```

```
<div class="c-card c-card--is-active">
  [...]
</div>
```

In this case it almost seems better to use is-active class to address simple state change since this indicate DOM element change, not a component modifier.

## BEM naming enhancements aka BEMIT

Hungarian Notation, you can use c-, for Components, o-, for Objects, u-, for Utilities, and is-/has- for States (there are plenty more detailed in the linked post).

Responsive suffixes using @ breakpoint.

```
<div class="o-media@md c-user c-user--premium">
  <img src="" alt="" class="o-media__img@md c-user__photo c-avatar" />
  <p class="o-media__body@md c-user__bio">...</p>
</div>
```

```
@media print {
  /* you must escape the @ character */
```

```
.u-hidden\@print {  
  display: none;  
}  
}
```

## Enduring CSS

Takes a lot from BEM styling but uses the idea of a context space as a prefix. However, the modifiers are removed and instead replaced with the idea of a variant. And instead of Block Element, we use instead Component\_Node-variant. So the class would follow this convention **ns-Component\_Node-variant**.

- ns : The micro-namespace (always lower-case)
- -Component: The Component name (always upper camel-case)
- \_Node: The child node of a component (always upper camel-case preceded by an underscore)
- -variant: The optional variant of a node (always lower-case and preceded by a hyphen)

If you have a cardlist label node inside a card, you would look to the containing component (works nicely with react class syntax). So you might have **sw-Card\_Label**.

## What would a variant be?

It is optional and only used when there are slight variations between two nodes. For example you might have two labels but they differ in terms of background color and text color. You might do **sw-Card\_Label-primary** and

sw-Card\_Label-secondary.

## The ten commandments of Enduring CSS

1. Thou shalt have a single source of truth for all key selectors
2. Thou shalt not nest, unless thou art nesting media queries or overrides
3. Thou shalt not use ID selectors, even if thou thinkest thou hast to
4. Thou shalt not write vendor prefixes in the authoring style sheets
5. Thou shalt use variables for sizing, colours and z-index
6. Thou shalt always write rules mobile first (avoid max-width)
7. Use mixins sparingly, and avoid @extend
8. Thou shalt comment all magic numbers and browser hacks
9. Thou shalt not inline images
10. Thou shalt not write complicated CSS when simple CSS will work just as well

## Global Styles?

When the need arises, the author of Enduring CSS advocates us a globalCSS file.

In that folder would be any variables, mixins, global image assets, any font or iconfont files, a basic CSS reset file and any global CSS needed.

Pros

- Reasoning about the Component architecture is more consistent with the actual js architecture
- The use of micro-namespacing helps declutter competing component styling in the app
- single class keeps specificity in check

## Cons

- like with BEM's modifiers, state changes don't fit easily into the concept of a variant
- animations? what if you wanted to signal the transitional states of a component (fly-in onload)
- It can be easy to overmodularize and make everything a component

## Inline Styles you say?

There's a general beef against using CSS. The main problems with CSS are that:

- everything is basically global, they are matched against everything in the DOM.
- Optimization could be improved by keeping styling closer to the source. CSS can grow over time making your app much slower. And finally, if you're already in JS context, you can make styling more dynamic. Abstracting it out to a javascript module would be an alternative approach.

## Styles.js

Instead of a css file, you would use key-value pairs to maintain your code.

## Pros

- Closer to the DOM

## Cons

- more difficult to revise or modify a traditional site
- coupling of how a site looks vs how it functions
- javascript is not fast, css is faster.

## Summary of the above approaches

- You can do a compositional level approach using classes "p(10px) m(10px)" like that advocated by Atomic Css.
- You can use Single Class Rules, like BEM which enforces class pattern
- There are BEM variants which try to keep styling close to the source
- There are BEM variants one called Enduring CSS which uses sc-Component\_Node-variant
- You can organize your css into different folders which target different kinds of selectors SMACSS approach.

## Extra resources

[Compare Selector Speed](#)