In CSS, **hierarchy** refers to how styles are applied and resolved when multiple rules target the same element. This process involves three key concepts: **specificity**, **inheritance**, and **cascading**. Let's break them down and also include the role of the !important rule.

1. Specificity

Specificity determines which CSS rule is applied when multiple rules could apply to the same element. It is essentially a scoring system that calculates which rule is "more specific" or has a higher priority. The more specific a selector is, the higher its priority.

How Specificity Works:

- **Inline styles**: These are styles directly written in an element's style attribute in HTML. They have the highest specificity.
- **ID selectors**: Styles applied using an id attribute (e.g., #header) have a higher specificity than class or element selectors.
- **Class selectors, attribute selectors, and pseudo-classes**: These selectors (e.g., .container, [type="text"], :hover) have a moderate specificity.
- **Element selectors and pseudo-elements**: These are the least specific (e.g., div, p, ::before).

Specificity Calculation:

Specificity is calculated in four parts, represented as (a, b, c, d):

- **a**: If the style is inline, add 1, otherwise it's 0.
- **b**: The number of #id selectors in the rule.
- **c**: The number of .class, [attribute], or :pseudo-class selectors in the rule.
- **d**: The number of type selectors (like h1, p) or ::pseudo-element selectors.

Example:

```
/* Specificity: 0, 1, 0, 1 (1 class, 1 type) */div.container {
   color: blue;
}
/* Specificity: 0, 1, 0, 0 (1 class) */.container {
   color: red;
}
/* Specificity: 1, 0, 0, 0 (inline) */
<div style="color: green;">Hello</div>
```

In this case:

- The inline style (color: green) wins because it has the highest specificity.
- If you remove the inline style, .container { color: red; } will be applied.

2. Inheritance

Inheritance refers to how some CSS properties are **passed down** from parent elements to their children. Not all CSS properties are inherited, but common examples include font properties (like color, font-family) and text alignment (text-align).

If a property is inherited, the child elements will adopt the same value unless specifically overridden.

Example of Inheritance:

```
body {
   font-family: Arial, sans-serif;  /* This will be inherited by all child elements */
}
p {
   color: blue;  /* This is also inherited by <span> within <p> */
}
<body>
  <p>This text is blue and uses Arial.</p></body>
```

- The <p> element inherits the font-family from the body.
- Inherited properties can be overridden by applying more specific rules to child elements.

Properties That Are Inherited:

- color
- font-family
- font-size
- line-height
- text-align

Properties like margin, padding, border, and background are **not inherited** by default.

3. Cascading

The "Cascading" part of CSS (Cascading Style Sheets) means that when multiple rules apply to the same element, the **priority of each rule** is determined by three factors:

- **Importance** (!important)
- **Specificity**
- **Source order** (which rule appears last)

The process is called **cascading** because CSS rules "cascade" down, with conflicts resolved in a certain order.

Cascading Order:

1. **Importance** (!important): If a rule is marked with !important, it overrides any other conflicting rules, regardless of specificity or source order.
2. **Specificity**: The rule with the highest specificity wins.
3. **Source Order**: If two rules have the same specificity, the one that appears later in the CSS file will be applied.

Example of Cascading:

```
/* This rule is more specific */
#nav {
   color: red;
}
/* This rule is less specific, but marked as important */
.nav {
   color: blue !important;
}
```

In this case, .nav { color: blue !important; } wins because it uses !important, even though the #nav selector has higher specificity.

4. !important

The !important rule overrides all other CSS rules, regardless of specificity or source order. It is a way to ensure that a particular style is always applied, unless there is another !important rule with higher specificity.

Example:

```
css
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/* Normally, #nav would win because it has higher specificity */
#nav {
  color: red;
}
/* But this rule uses !important, so it overrides #nav */
.nav {
  color: blue !important;
}
```

Use !important sparingly, as it makes debugging CSS harder and can lead to conflicts.

Summary of Key Concepts:

Specificity: Determines which rule takes priority based on how specific the selectors are.

Inline styles > ID selectors > Class selectors > Element selectors.

Inheritance: Some properties (e.g., color, font-family) are inherited from parent elements, while others are not.

Inherited properties can be overridden by more specific rules.

Cascading: CSS resolves conflicts between rules based on importance (!important), specificity, and source order.

Rules marked with !important override other rules, specificity helps determine which rule applies, and in the case of ties, the last rule in the source wins.

By understanding how these concepts interact, you can write more effective and predictable CSS, while managing style conflicts and avoiding common pitfalls.