Introduction to CSS: Syntax, Box Model, and Selectors

What is CSS?

Full Form: Cascading Style Sheets

CSS is a stylesheet language used to control the presentation of web documents written in HTML.

Role in Web Development:

- Adds styles (colors, fonts, layouts) to web pages.
- Separates content from design.
- Enhances user experience and aesthetics.

Example: Plain HTML vs Styled HTML

```
/* Plain HTML */

Hello, World!



/* Styled HTML with CSS */
p {
    color: blue;
    font-size: 20px;
    text-align: center;
}
```

History of CSS

- **1996:** CSS1 introduced (basic styling).
- **1998:** CSS2 added features like positioning and z-index.
- **2011:** CSS3 modularized, bringing animations, media queries, and gradients.

> **Current Status:** A cornerstone of modern web development.

> **Fun Fact:** Before CSS, web design relied on table-based layouts and inline styling.

CSS Syntax

A CSS rule is structured as:

```
/* Selector */
selector {
    property: value;
}
```

Example: Changing heading color and size:

```
h1 {
    color: blue;
    font-size: 24px;
}
```

> **Tip:** Always end each CSS declaration with a semicolon (;).

Types of CSS

- **Inline CSS:** Style directly in the HTML element.

  ```
  <p style="color: red;">This is red text.</p>
  ```

- **Internal CSS:** Style within a <style> tag in the <head>.

  ```
  <style>
  p { color: green; }
  </style>
  ```

- **External CSS:** Styles in a separate file.

  ```
  <link rel="stylesheet" href="styles.css">
  ```

> **Best Practice:** Use external CSS for maintainability and scalability.

Box Model Overview

The box model describes how elements are structured in a webpage layout.

- **Content:** The actual content inside the box (e.g., text or images).
- **Padding:** Space between the content and the border.
- **Border:** Surrounds the padding (optional).
- **Margin:** Space outside the border.

```
/* Example Box Model */
div {
    width: 300px;
    padding: 20px;
```

```
    border: 5px solid black;
    margin: 10px;
}
```

Key Box Modal properties

- **Width and Height:** Size of the content area.

```
/* Width and Height Example */
div {

    width: 300px;
    height: 200px;
}
```

- **Padding:** Space between content and border.

```
/* Padding Example */
div {
    padding: 20px;
}
```

- **Border:** Line surrounding the padding.

```
/* Border Example */
div {
    border: 5px solid black;
}
```

- **Margin:** Space outside the border.

```
/* Margin Example */
div {
    margin: 10px;
}
```

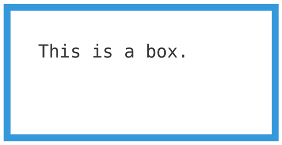
Box Sizing Modes

- **Content-Box:** Width and height include content.

```
/* Content-Box Example */
div {
    width: 300px;
    padding: 20px;
    border: 5px solid black;
    margin: 10px;
}
```

- **Border-Box:** Width and height include padding and border.

```
/* Border-Box Example */
.box {
  width: 200px;              /* Content width */
  height: 100px;             /* Content height */
  padding: 20px;             /* Adds 20px space around the content */
  border: 5px solid #3498db; /* A 5px solid blue border */
  margin: 15px;              /* Adds 15px space outside the box */
  background-color: #f8f9fa; /* Light gray background color */
  box-sizing: border-box;    /* Includes padding and border in the width/height */
}
```



This is a box.

```
/* Rendered Box Dimensions */
With box-sizing: content-box:

Total Width = 200px (width) + 20px (left padding) + 20px (right padding) + 5px (left border) + 5px (right border) = 250px
Total Height = 100px (height) + 20px (top padding) + 20px (bottom padding) + 5px (top border) + 5px (bottom border) = 150px


With box-sizing: border-box:
The total width and height remain 200px and 100px, respectively, because padding and border are included.
```

CSS Selectors

Common Selectors:

- Universal Selector: *

```
/* Universal Selector Example */
* {
    margin: 0;
    padding: 0;
}
```

- Type Selector: `h1, p`

```
/* Type Selector Example */
h1 {
    color: blue;
}
```

- Class Selector: `.className`

```
/* Class Selector Example */
  .highlight {
      background-color: yellow;
  }

  <p class="highlight">This text is highlighted.</p>
```

- ID Selector: `#idName`

```
/* ID Selector Example */
#main-content {
    font-size: 18px;
}
```

- Grouping Selector: `h1, h2, h3`

```
/* Grouping Selector Example */
h1, h2, h3 {
    color: blue;
}
```

Advanced Selectors

- **Attribute Selectors** (e.g., `[type="text"]`).

```
/* Attribute Selector Example */
input[type="text"] {
  border: 1px solid grey;
}
```

```
/* Attribute Selector with Partial Match */
a[href^="https"] {
  color: green;
}
```

```
/* Attribute Selector with Case Insensitive Match */
input[type="text"] {
  background-color: lightblue;
}
```

- **Combinators:** Descendant (`div p`), Child (`div > p`), etc.

```
/* Descendant Selector (A B): Selects elements inside another element. */
div p {
  color: grey;
}
```

```
/*Child Selector (A > B): Selects direct children.*/
ul > li {
  margin: 10px;
}
```

```
/*Adjacent Sibling Selector (A + B): Selects the first sibling immediately following another.*/
h1 + p {
  color: darkblue;
}
```

```
/*General Sibling Selector (A ~ B): Selects siblings that follow another sibling.*/
h1 ~ p {
  color: darkblue;
}
```

- **Pseudo-classes:** Add styles based on element states (`a:hover`).

```
/* Pseudo-class Example */
a:hover {
  color: red;
}
```

```
/*:nth-child(n): Selects the nth child of its parent.*/
li:nth-child(odd) {
  background-color: #f9f9f9;
}
```

```
/*:not(selector): Selects elements that do not match a specific selector.*/
p:not(.special) {
  color: blue;
}
```

```
/*:first-child: Selects the first child of its parent.*/
li:first-child {
  font-weight: bold;
}
```

```
/*:last-child: Selects the last child of its parent.*/
li:last-child {
  font-style: italic;
}
```

- **Pseudo-elements:** Style parts of an element (`p::first-line`).

```
/* Pseudo-element Example */
p::first-line {
  font-weight: bold;
}
```

```
/*::before and ::after: Insert content before and after an element.*/
p::before {
  content: "Read this: ";
  font-weight: bold;
}

p::after {
  content: " (End of article)";
  font-style: italic;
}
```

Future Trends

- Custom properties (--variable usage).

```
:root {
  --primary-color: #3498db;
  --font-size: 16px;
}

body {
  background-color: var(--primary-color);
  font-size: var(--font-size);
}

button {
  color: white;
  background-color: var(--primary-color);
  padding: 10px 20px;
  border: none;
  border-radius: 4px;
  font-size: calc(var(--font-size) * 1.25); /* Example of using variables in calculations */
}
```

- CSS Houdini APIs for deeper browser-level control.