## ~~Introduction~~

~~This presentation is intended as a companion to the course textbook (Software Engineering: The Year 11 Course).~~

~~It is highly recommended that you read the~~ **~~‘\*\*\*~~**~~’ section in the textbook to gain a better understanding of this topic (~~**~~pages \*\*-\*\*~~**~~). Participation in class discussions and completion of quizzes and practice questions will also help to enhance your understanding.~~

## Front-end development and styling

Front-end development focuses on designing and building the user interface (UI) of a website or web application. It involves using HTML, CSS, and JavaScript to create interactive, visually appealing, and responsive web pages. Styling ensures consistency, flexibility, and maintainability across different screen sizes and devices.

For example, consider a news website where:

* HTML structures the content (headings, paragraphs, images).
* CSS styles the layout (colours, fonts, responsive design).
* JavaScript enables interactive features (live updates, animations).

A front-end framework like Bootstrap could be used to apply pre-designed layouts and make development more efficient.

## CSS and its impact on web design

CSS allows developers to define styling rules separately from HTML structure, making it easier to apply and update designs without modifying the content. For example, instead of adding colours and fonts directly in HTML, a CSS file can control the styling for an entire website.

By using global styles, CSS ensures that all pages of a website maintain a uniform appearance. Websites with multiple pages, such as e-commerce stores, use CSS to keep buttons, fonts, and layouts consistent across different product pages.

CSS allows web pages to adapt to different screen sizes using techniques like media queries, Flexbox, and Grid. For example, a navigation bar can automatically switch from horizontal to a mobile-friendly dropdown when viewed on a smaller screen.

Instead of updating styling on every individual page, developers can modify a single CSS file to apply changes site-wide. This is especially useful for large websites, such as news portals, where frequent updates are needed without disrupting the design.

## Key CSS concepts

Key CSS concepts that are useful to a web developer include:

### Selectors and specificity

CSS selectors determine which HTML elements a style rule applies to. Specificity controls which styles take precedence when multiple rules target the same element. For example, #header (ID selector) has a higher specificity than .header (class selector), meaning it overrides conflicting styles.

css

A black rectangular object with white text

AI-generated content may be incorrect.

html



What would be the colour of the text “Hello, World!”?

### Box model

The CSS **box model** defines how elements are spaced and sized using margin, padding, border, and content. For example, increasing the padding inside a button makes it larger, while adjusting the margin changes the spacing between elements. Understanding the Box Model helps create well-structured and visually appealing layouts.

### Flexbox and grid

CSS flexbox and grid are modern layout techniques that help arrange elements efficiently. **Flexbox** is useful for aligning items in a row (such as a navigation bar), while **grid** is better suited for complex, two-dimensional layouts, like a photo gallery.

### Media queries

**Media queries** enable responsive design, allowing websites to adjust based on screen size. For example, a desktop menu might be horizontal, but with media queries, it can switch to a mobile-friendly dropdown when viewed on smaller screens.

### Class activity

### Research – CSS rules

1. Open a popular (and safe for school) website that you are familiar with.
2. Open the developer tools (usually accessed by pressing F12).
3. Expand the HTML code to identify then select individual HTML elements (this should show the CSS in the next pane down).
4. Experiment with changing CSS properties to see style updates in real-time.
5. Experiment with disabling CSS properties to observe changes.

## Front-end frameworks and template engines

### Front-end frameworks

Front-end frameworks are pre-built libraries that help developers create responsive and visually appealing websites quickly. They provide pre-styled components and structured layouts, reducing the need for manual CSS coding.

For example, **Bootstrap** offers a grid system, buttons, and navigation bars, making it easy to build consistent designs. **Tailwind CSS**, a utility-first framework, allows developers to apply styles directly in HTML, giving more flexibility while keeping code lightweight.

### Template engines

Template engines generate dynamic HTML efficiently, reducing repetitive coding and improving maintainability. Instead of writing the same HTML structures multiple times, developers use templates with placeholders that are filled with content dynamically.

Popular examples include **Handlebars.js**, which lets developers insert variables and loops into templates, and **Pug**, which simplifies HTML syntax for cleaner, more readable code. These tools are especially useful for web applications and content-heavy websites, improving development speed and code organisation.

### Comparison

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | CSS only | Frameworks | Template engines |
| Styling effort | High | Low | Medium |
| Reusability | Low | High | High |
| Customisation | High | Medium | Medium |

## Class discussion

### Discuss – Frameworks or traditional CSS

Consider the following questions before discussing your answer with the class:

* How much faster was the framework vs. writing custom CSS?
* Which method is best for large-scale projects?
* Would you prefer to use frameworks or write CSS from scratch? Why?

## Front-end development and styling question 1

What is the main role of front-end development?

1. Designing and building the user interface of a website
2. Managing databases and server-side logic
3. Encrypting user passwords for security
4. Handling backend authentication processes

## Front-end development and styling question 2

How does CSS improve website design?

1. It applies styling rules separately from HTML, making designs flexible and easier to maintain
2. It replaces the need for JavaScript functionality
3. It allows developers to structure website content
4. It prevents websites from displaying on mobile devices

## Front-end development and styling question 3

Which CSS layout technique is best suited for creating a two-dimensional grid structure?

1. Grid
2. Flexbox
3. Box model
4. Media queries

## Front-end development and styling question 4

What is the main advantage of using a front-end framework like Bootstrap?

1. It provides pre-styled components and layouts, speeding up development
2. It eliminates the need for CSS entirely
3. It allows developers to modify databases directly from the front end
4. It only works on mobile devices

## Bibliography

* Davis, S., Chantler, D., Downie, F., Rainger, G., Pennington, S. & Purcell, M. (2024). *Software Engineering: The Year 11 Course*. Parramatta Education Centre. <https://pedc.com.au/>
* OpenAI. (2024). *ChatGPT* (GPT-4o) [Large language model]. <https://chat.openai.com>
* Freepik. (2024). [Conversation icon]. <https://www.flaticon.com/free-icon/conversation_3050431>
* Freepik. (2024). [Question icon]. <https://www.flaticon.com/free-icon/question_471664>
* Freepik. (2024). [Research icon]. <https://www.flaticon.com/free-icon/research_3041005>