Class 2: Single Page Applications & Components

Agenda

- Review: Last Class
- Single-Page Applications (SPAs)
- Components
- Troubleshooting
- JSX
- Summary & What's Next

Review: Websites

> A website is a collection of web pages and related content.

Static Websites (INFO 1300)

> A website that is delivered to the user's web browser exactly as it is stored.

Dynamic Websites (~~INFO 2300~~ & INFO 2310)

> A website that is constructed at runtime (during software execution) with content that changes depending on several factors (user, time of day, etc.)

Review: MERN

- **M**ongoDB - NoSQL database
- **E**xpress.js - back-end web *framework*
- **R**eact - front-end web *library*
- **N**ode.js - *server-side* JavaScript runtime

Big Picture: MERN

Client-Side (Today)

- React

Server-Side

- Node.js
- Express.js
- MongoDB

Single-Page Applications

Single-Page Application

A single-page application (SPA) is a web app implementation that loads only a single web document (i.e. HTML), and then updates the body content of that single document via JavaScript [...]

Source: https://developer.mozilla.org/en-US/docs/Glossary/SPA

Activity: SPA Exploration

1. Open today's activity repository as a Codespace.
2. With your peers (2-4), explore the code in the `client` folder.
3. Identify the parts of the code that make this a Single-Page Application (SPA) and then **complete the handout**.

Definition: A single-page application (SPA) is a web app implementation that loads only a single web document (i.e. HTML), and then updates the body content of that single document via JavaScript [...]

How it Works: Single-Page Application

- A single HTML document (`index.html`) bootstraps loading the application.
- The HTML document is **minimal**.
  - No HTML content.
  - May include link to CSS file(s).
  - Includes a `<script>` to load JavaScript code.
- JavaScript code dynamically updates the content of the page.

Demo: Client-Side Rendering

```
<h2>Debug Info</h2>
<p>{new Date().toLocaleString()}</p>
```

React

A client-side JavaScript library for building user interfaces using components.

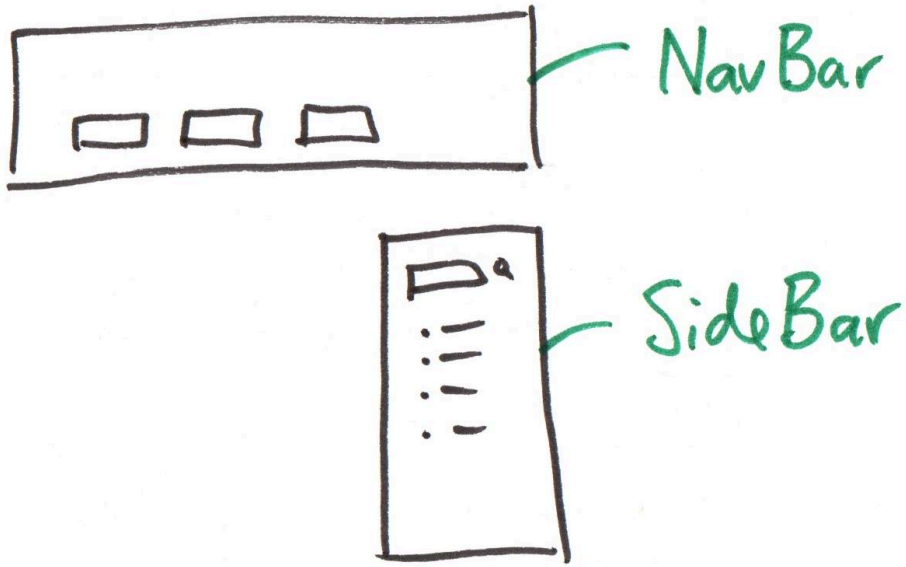
Often used to build Single-Page Applications (SPAs).

Components

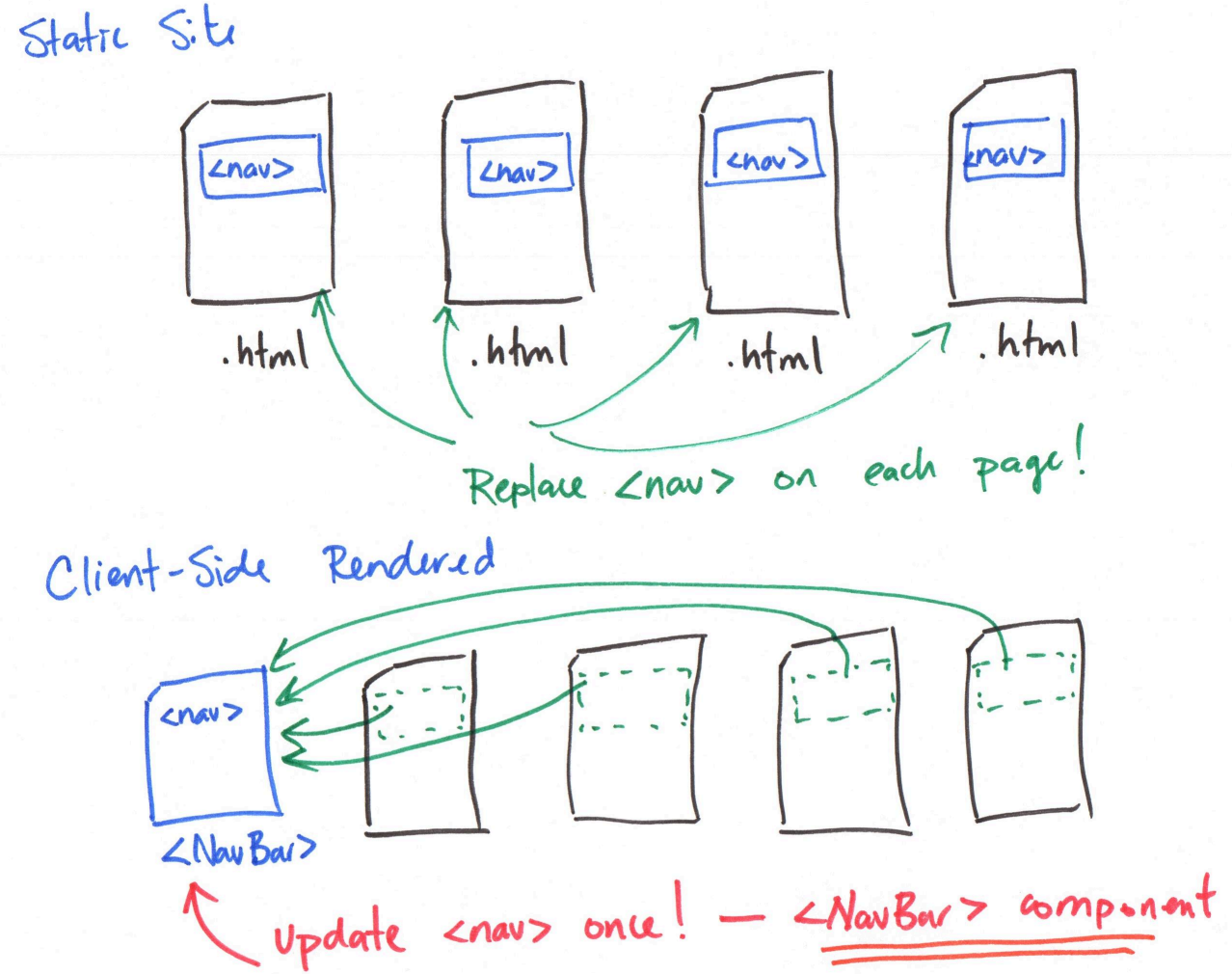
Definition: Component

A self-contained, often reusable, piece of code that describes a portion of a user interface.

Activity: Working with your peers (2-4), identify parts of your INFO 1300 project website that would be good candidates for components.



Example: Component



Activity: Component Practice

Working with your peers (2-4), complete the following:

- Review the existing activity repository code.
- Identify at least one component that could be created to reduce redundant code.

Creating (React) Components

1. Create a new `.jsx` file in the `src/components` folder. (.e.g. `ComponentName.jsx`) **Use CamelCase for component names.**
2. Add component "boilerplate" code:

```
export default function ComponentName() {
  return (
    <TODO_HTML_TAG>
    </TODO_HTML_TAG>
  );
}
```

Demo: `Citation` Component

`Citation.jsx`:

```jsx
export default function Citation() {
  return (
    <p style={{ textAlign: 'center' }}>
      Source: <cite>Microsoft Copilot</cite>
    </p>
  )
}
```

Activity: `GalleryCard` Component

Working with your peers (2-4), create a `GalleryCard` component.

`src/components/ComponentName.jsx`:

```
export default function ComponentName() {
  return (
    <TODO_HTML_TAG>
    </TODO_HTML_TAG>
  );
}
```

Using (React) Components

1. Import and use the component in other parts of your application.

```
import ComponentName from "./ComponentName";
```

2. Insert the component in your “HTML” code.

```
<ComponentName />
```

Demo: Using `Citation` Component

`GalleryCard.jsx`:

```
import Citation from "./Citation";

export default function GalleryCard() {
  return (
    <div className="card">
      ...
      <Citation />
    </div>
  )
}
```

Activity: Using `GalleryCard` Component

Working with your peers (2-4):

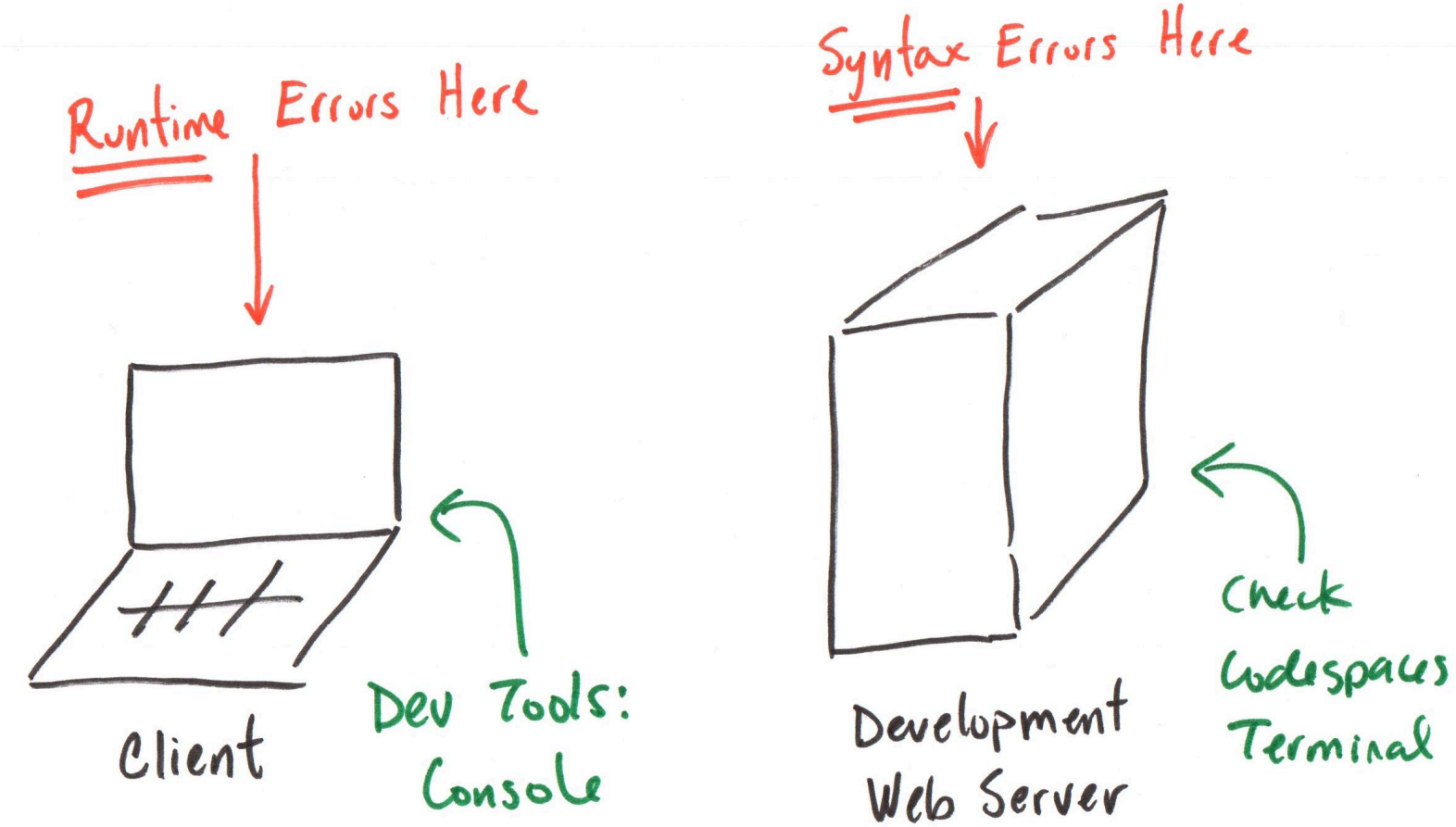
1. Use the `GalleryCard` component in `App.jsx`.
2. Replace the rundant HTML code with multiple instances of the `GalleryCard` component.

```
import ComponentName from "./ComponentName";

<ComponentName />
```

Troubleshooting React SPAs

Troubleshooting Overview



Syntax Errors

Syntax errors are shown in the **Debug Console** in your **Codespace**.

1. Your component code is compiled on the server.
2. The compiled JavaScript code is sent via development server to your browser.

Runtime Errors

Single Page Applications (SPAs) run in the **browser**.

Where should you check for errors in client-side code?

Browser DevTools Console!

All I see is a blank page!

You have an error in your code.

1. Check your Codespace's **Debug Console** for syntax errors.
2. Check your browser's **DevTools Console** for runtime errors.

Tip: Use GitHub Copilot to Understand Errors

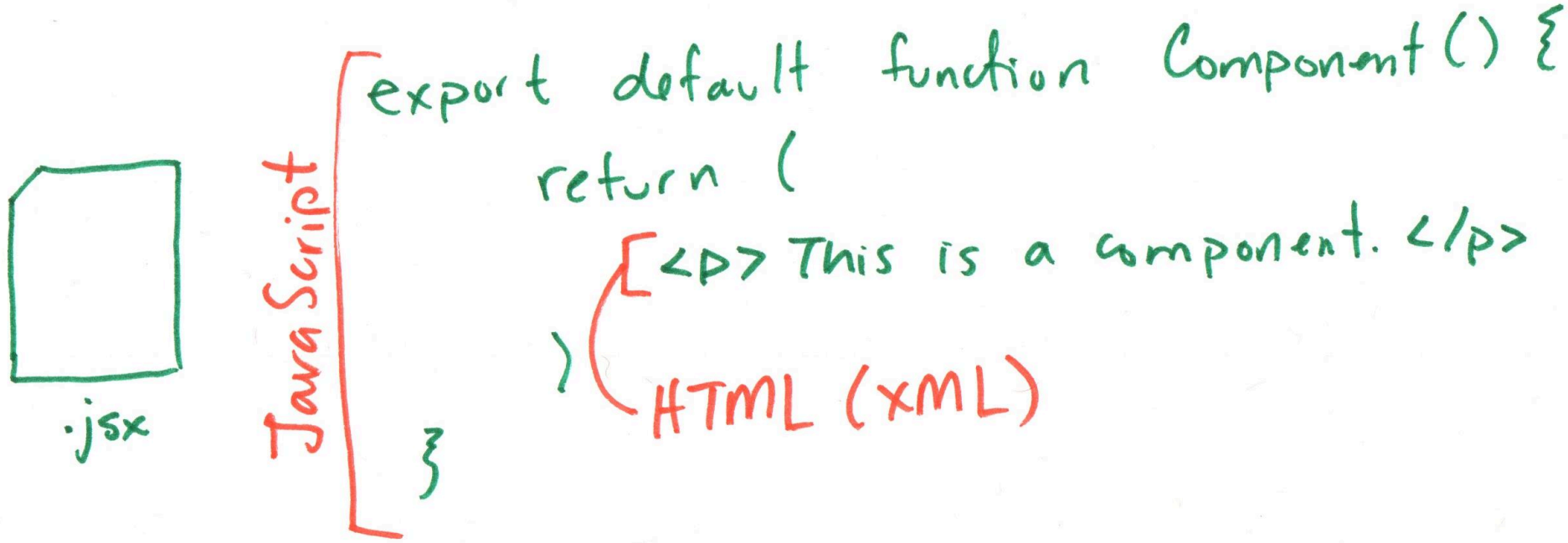
1. Copy the error message from your Codespace's Debug Console or your browser's DevTools Console.
2. Paste the error message into the GitHub Copilot chat window.

```
Help me understand this error message: [PASTE ERROR MESSAGE HERE]
```

JSX

JSX (JavaScript XML)

An extension to JavaScript with HTML-like make-up. (Combines JavaScript + HTML)



JSX Rules

1. Always **return** a single “HTML” element.

Yes!

```
return (
  <div>
    <h2>Title</h2>
    <p>Paragraph</p>
  </div>
);
```

No!

```
return (
  <h2>Title</h2>
  <p>Paragraph</p>
);
```

JSX Rules

2. If you have no container element, use a **fragment**.

```
return (
  <>
    <h2>Title</h2>
    <p>Paragraph</p>
  </>
);
```

JSX Rules

3. JSX is **not** HTML, it's **XML**. The rules are different!
    - Always use **closing tags**.
    - Empty elements must be **self-closed**.
    - Use `className` instead of `class`

```
return (
  <div className="container">
    <p>This is a paragraph.</p>
    <img src="image.png" alt="An image" />
  </div>
);
```

JSX Rules

4. JSX Components are case-sensitive and should use **CamelCase** (PascalCase).

Yes!

```
import MyComponent from "./MyComponent";
return (
  <div>
    <MyComponent />
  </div>
);
```

No!

```
import myComponent from "./MyComponent";
return (
  <div>
    <mycomponent />
  </div>
);
```

Summary

- Single-Page Applications (SPAs) load a single HTML document and dynamically update content with JavaScript.
- React is a JavaScript library for building user interfaces using components.
- Components are reusable pieces of code that describe a portion of a user interface.
- JSX is a syntax extension for JavaScript that looks similar to HTML and is used to describe

What's Next

Friday Sections: ~~Practice Problem Workshop~~ Class 3
Next Friday: Practice Problem Workshop

Due Thursday: Class 3 Preparation

Assigned Today: Project 1, Milestone 1
Due Monday: Project 1, Milestone 1

Important! You have learned everything you need today, to complete Project 1, Milestone 1!