# Class 3: JavaScript Objects & Modules

- Review: Last Class
- JSX Components → JavaScript Objects
- JavaScript Objects
- Components as Objects
- JavaScript Modules
- Relative Path Operators

# Review: 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.

# Review: JSX Components

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

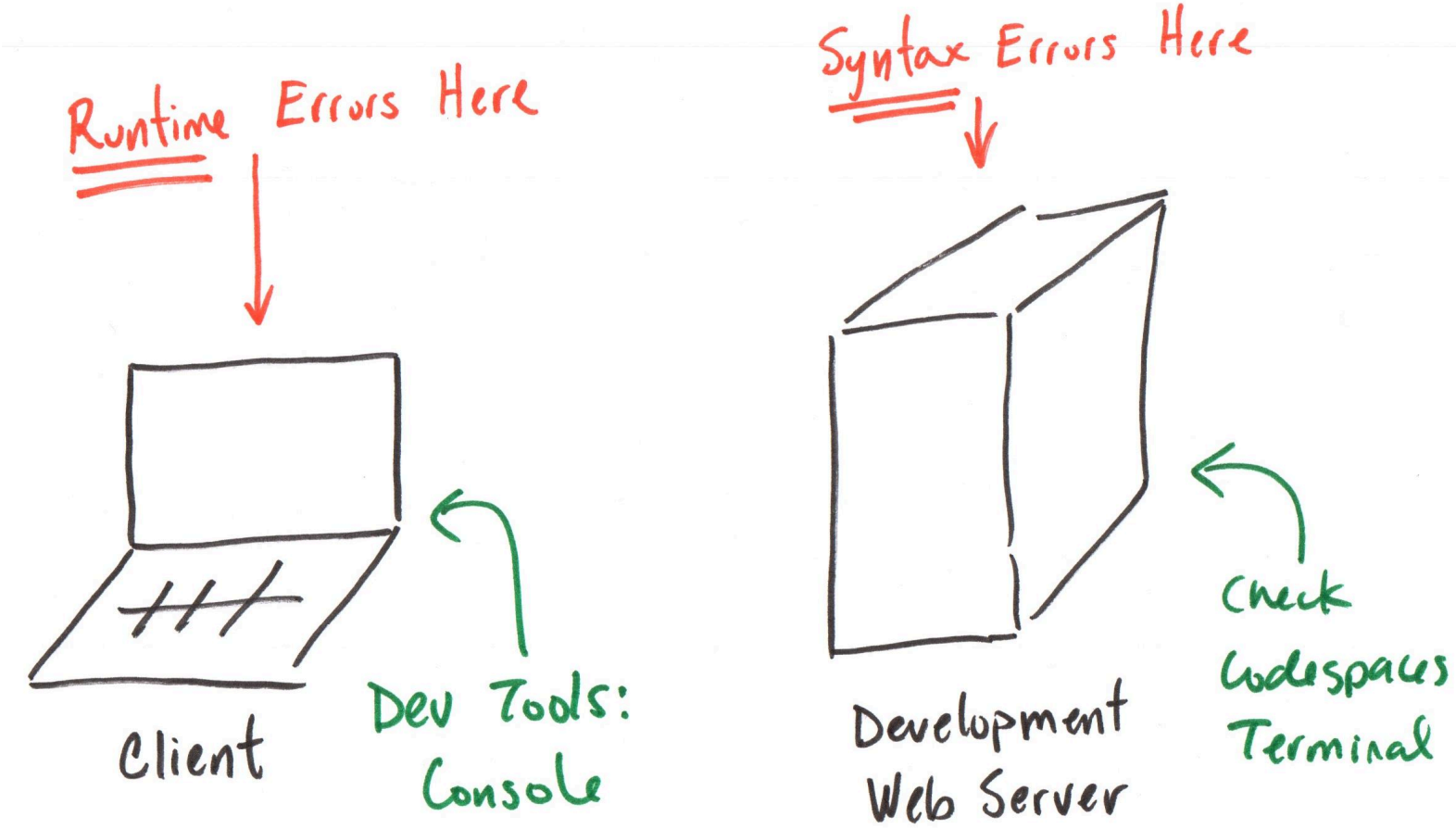
**src/components/ComponentName.jsx**

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

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

```
<ComponentName />
```

# Review: Troubleshooting



# JSX Components → JavaScript Objects

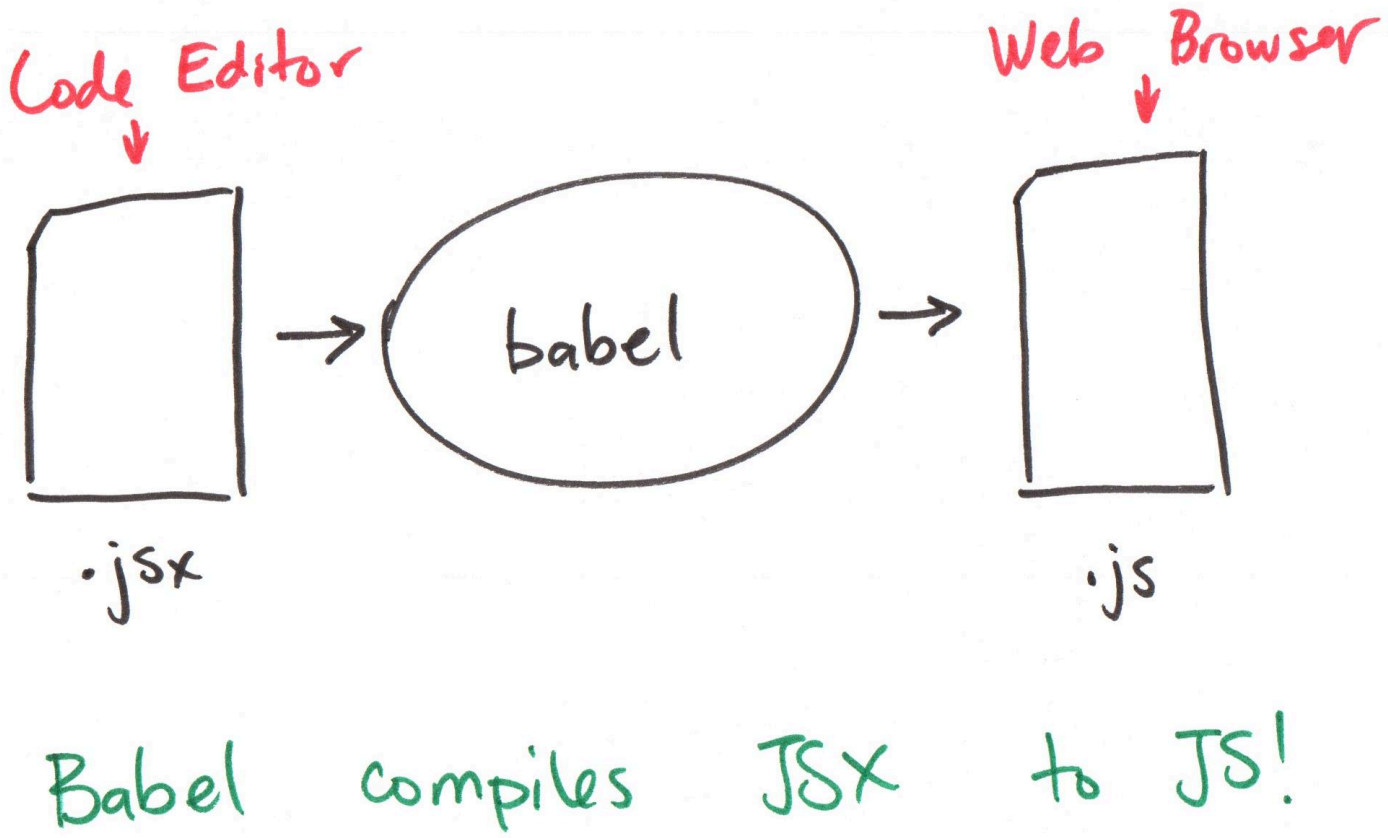
# Understanding JSX Components

Declare a component using a **function** that returns an **object**:

```
export default function ComponentName() {
  return <div>Hello</div>
}
```

`<div>` looks like HTML, but it's not! It's a JavaScript object!

# Gotcha: Browsers do not understand JSX



# JSX → JavaScript

```jsx
export default function ComponentName() {
  return <div>Hello</div>
}
```

In JSX, the *HTML-like* elements are transpiled into JavaScript function calls to `React.createElement`:

```jsx
export default function ComponentName() {
  return React.createElement('div', null, 'Hello')
}
```

# `createElement` Returns an Object

```
React.createElement('div', null, 'Hello')
```

`React.createElement` creates and returns a JavaScript object:

```
{
  type: 'div',
  props: { children: 'Hello' },
  // ...
}
```

# JavaScript Objects

# JavaScript Objects

Declare on object using **object literal** syntax:

```
{
  type: 'div',
  props: { children: 'Hello' },
}
```

`{}` declares an object literal.
The object has **properties** (key-value pairs): `propertyName: propertyValue,`

- `type`, `props`, and `children` are property names.
- `'div'`, `{ children: 'Hello' }`, and `'Hello'` are property values.

# Activity: Declare a “Style” Object

We can style an HTML element as follows:

```
<div style="color: red; font-size: 20px; font-weight: bold;">Hello</div>
```

However, JavaScript doesn’t understand CSS. We need to represent the style as a JavaScript object.

**Activity:** Working with your peers (2-4) at the board, declare a JavaScript object that represents the style of the above `<div>` element.

# Gotcha: JavaScript Identifiers

A function, variable, or property must be a valid **JS identifier**:

- Letters (a-z, A-Z), digits (0-9), underscore ( `_` ), and `$` only.
- No spaces.
- No hyphens ( `-` ).
- Cannot start with a number.
- Cannot be a reserved word (e.g., `return`, `function`, `class`, etc.)

# Solution: Style Object

```
<div style="color: red; font-size: 20px; font-weight: bold;">Hello</div>
```

`font-size` and `font-weight` are not valid JS identifiers (they contain hyphens). Use **camelCase** instead:

```
{
  color: 'red',
  fontSize: '20px',
  fontWeight: 'bold',
}
```

# Components as Objects

# Components are Objects

```
export default function ComponentName() {
  return <div>Hello</div>
}
```

Calling `ComponentName()` returns a JavaScript object:

```
{
  type: 'div',
  props: { children: 'Hello' },
  // ...
}
```

# JSX Component Invocation

```
<ComponentName />
```

`<ComponentName />` is transpiled into a JS function call:

```
ComponentName()
```

When your SPA is rendering `<ComponentName />`, it calls the function `ComponentName()` to get the object that describes what to render.

# JavaScript Modules

# JavaScript Modules

A JavaScript module is a **file** that contains JavaScript code.

- Each module has its own **scope**.
- Variables, functions, and classes declared in a module are not visible outside the module unless explicitly exported.
- Modules can **import** code from other modules.

**src/components/ComponentName.jsx**

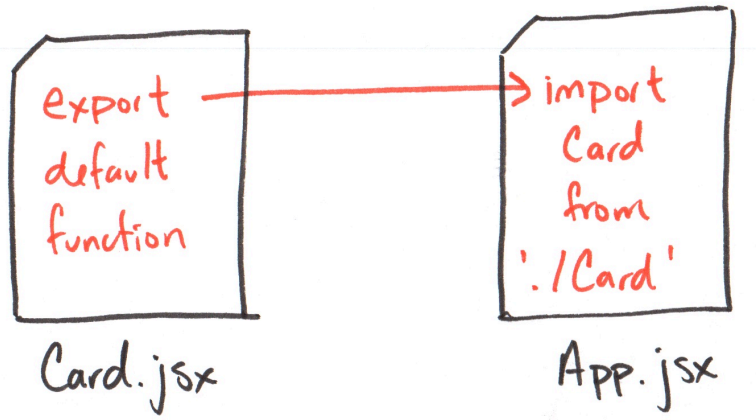
```jsx
export default function ComponentName() {
  return (
    <div>Hello</div>
  )
}
```

# Exporting from a Module

Exporting a function makes it available for import in other modules.

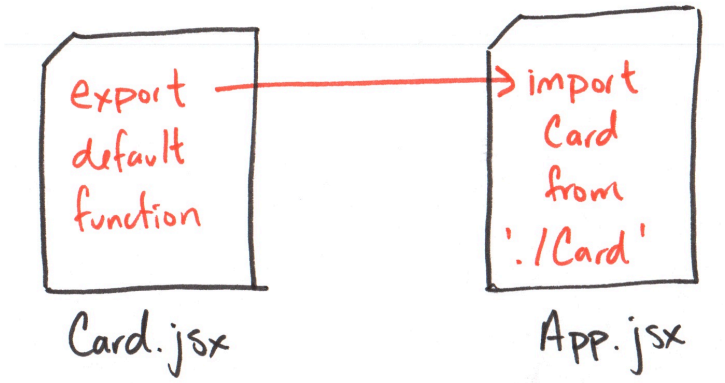
**src/components/ComponentName.jsx**

```
export default function ComponentName() {
  return <div>Hello</div>
}
```



# Importing into a Module

Importing a function makes it available for use in the current module.




Omit the file extension when importing modules ( `.js` or `.jsx` ):

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

# Module Paths

# Review: Absolute vs. Relative Paths

## Absolute Paths

- **Always** begins with `/`.
- From the root of the file system (or web server).

Examples:

- `/etc/passwd`
- `/home/user/Downloads/ticket.pdf`

**Gotcha:** Absolute paths are **not** used in JavaScript module imports!

## Relative Paths

Relative to the **current module** (or current directory).

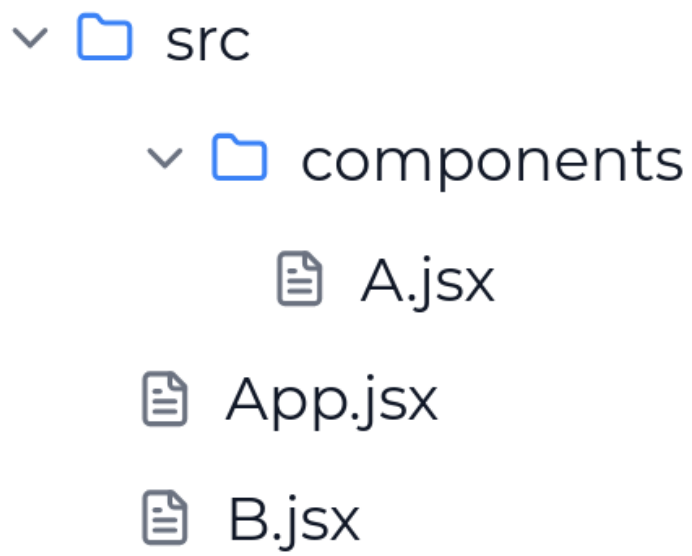
Examples from `src/`:

- `components/ComponentName.jsx`
- `./components/ComponentName.jsx`

Example from `src/components/`:

- `../App.jsx`

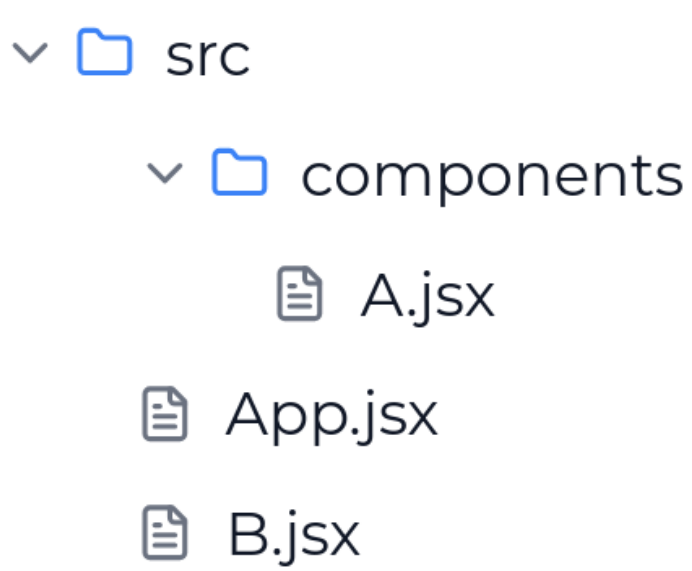
# Relative Path Operator: `./` (Current Directory)




`App.jsx`:

```
import A from './components/A'
import B from './B'
```

# Relative Path Operator: `../` (Parent Directory)

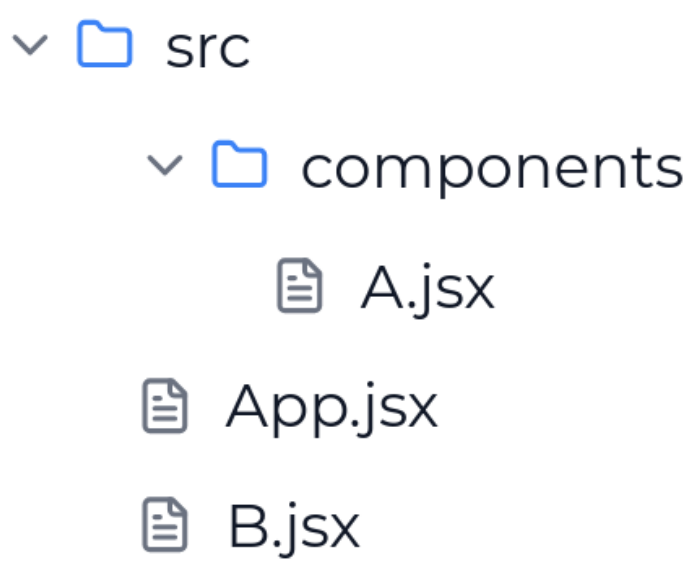



`A.jsx`:

```
import B from '../B'
```

# Activity: Module Path Practice

Complete the handout with your peers (2-4).

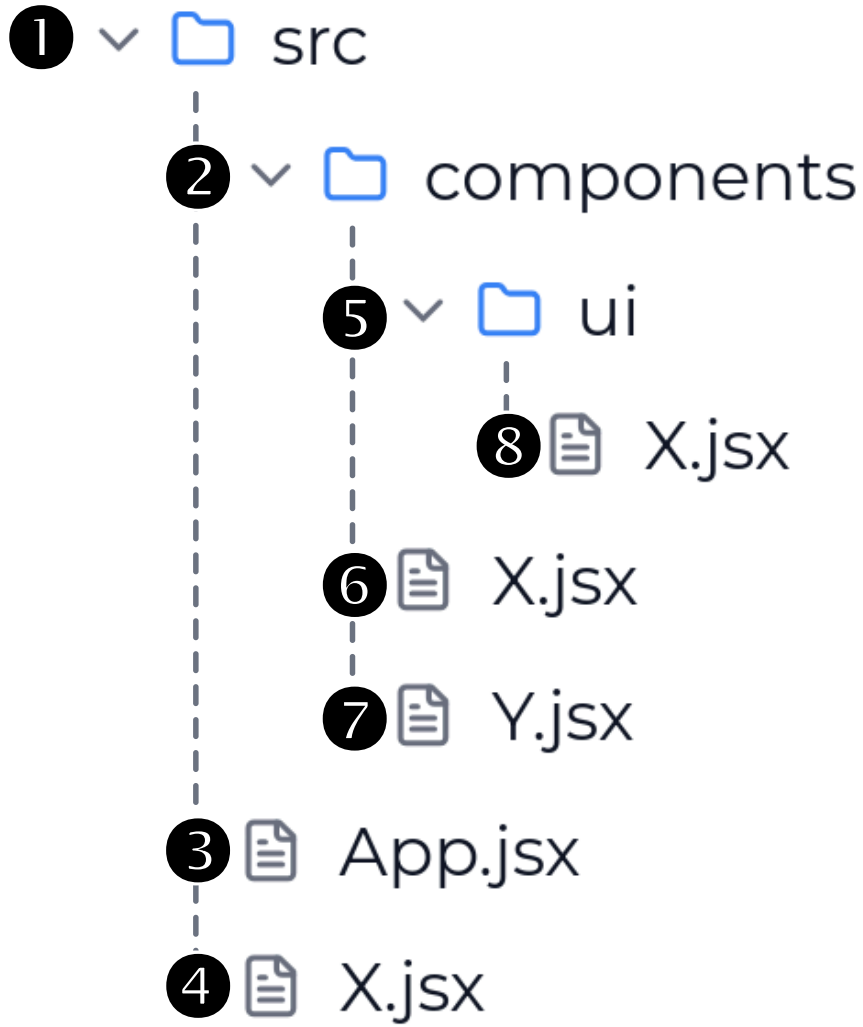



`App.jsx`:

```
import A from './components/A'
import B from './B'
```

`A.jsx`:

```
import B from '../B'
```


1
src
2
components
5
ui
8
X.jsx
6
X.jsx
7
Y.jsx
3
App.jsx
4
X.jsx

# Summary

- JSX components are functions that return JavaScript objects.
- JavaScript objects are collections of key-value pairs (properties).
- JavaScript modules are files that contain JavaScript code.
- Modules can export and import code to share functionality.
- Relative paths use `./` for the current directory and `../` for the parent directory.

# What's Next

**Due Sunday:** Class 4 Preparation

**Due Monday:** Project 1, Milestone 1

**Important!** Nothing from today's lecture is **required** for Milestone 1. (Though it may be helpful.)