**📘 3.3 Spread and Rest Operators (Finalized)**

**3.3.1 What is the Spread Operator (...)**

The spread operator allows an iterable (like an array or object) to be expanded in places like function arguments or array literals.

js

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const arr = [1, 2, 3];

const newArr = [...arr, 4, 5]; // [1, 2, 3, 4, 5]

**3.3.2 What is the Rest Operator (...)**

The rest operator collects all remaining elements into a single array.

js

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function sum(...args) {

console.log(args); // All arguments as an array

}

sum(1, 2, 3); // Output: [1, 2, 3]

**3.3.3 Rest in Function Parameters ✅ *(taught in class)***

js

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function sum(...numbers) {

let total = 0;

for (const num of numbers)

total += num;

console.log(total);

}

sum(3, 5, 7, 4, 3, 4, 6, 8, 0); // Output: 40

**3.3.4 Rest in Destructuring ✅ *(taught in class)***

js

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const [a, b, ...rest] = [4, 7, 3, 2, 8, 7, 5, 3, 2];

console.log(a); // 4

console.log(b); // 7

console.log(rest); // [3, 2, 8, 7, 5, 3, 2]

**3.3.5 Difference Between Spread and Rest**

| **Feature** | **Spread** | **Rest** |
| --- | --- | --- |
| Usage | Expands elements | Gathers elements |
| Use in Arrays | [...arr] | const [a, ...rest] = arr |
| Use in Objects | {...obj} | function func(...args) |

**3.3.6 Common Use Cases**

* Copying arrays
* Merging arrays
* Passing arguments
* Collecting function arguments
* Partial destructuring

**3.3.7 Common Errors / Gotchas**

* Can only use one rest element per function
* Rest must be the last parameter
* Spread creates shallow copies (not deep)

**🚀 PROJECT SECTION: React App Setup with Vite**

**🔧 React Project Initialization (Vite-based)**

1. **Run Vite Project Creation Command:**

bash

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npm create vite@latest my-react-app

1. **Respond to Prompts:**

sql

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Need to install the following packages:

create-vite@7.0.3

Ok to proceed? (y) y

1. **Select Variant:**

* Choose: JavaScript

cpp

------------

◇ Select a variant:

│ JavaScript

1. **Vite scaffolds the project:**

arduino

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◇ Scaffolding project in ...

└ Done. Now run:

cd my-react-app

npm install

npm run dev

1. **Navigate into the project:**

bash

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cd my-react-app

1. **Install dependencies:**

bash

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npm install

Output sample:

rust

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added 152 packages, and audited 153 packages in 18s

33 packages are looking for funding

run `npm fund` for details

found 0 vulnerabilities

1. **Run development server:**

bash

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npm run dev

Output:

css

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> my-react-app@0.0.0 dev

> vite

VITE v7.0.6 ready in 677 ms

➜ Local: http://localhost:5173/

➜ Network: use --host to expose

➜ press h + enter to show help

**📌 Why React Applications Are SPA (Single Page Applications)**

* **SPA** means the browser loads **a single HTML file (index.html)**, and dynamically updates the UI using JavaScript.
* In React:
  + Page changes don’t reload the entire page.
  + Instead, components are shown/hidden or updated via **JavaScript + Virtual DOM**.
* This leads to:
  + Faster user experience (no full reloads).
  + Smooth transitions between pages.
  + Easy state management with tools like Redux/Context.

**🌐 Client-Server Interaction in React (with Vite)**

* On initial load:
  1. Browser requests the site → server sends index.html.
  2. <script type="module" src="/src/main.jsx"> boots the React app.
  3. All content changes happen inside the **<div id="root">** via JavaScript.
  4. Subsequent navigation doesn’t re-request index.html.

💡 **Only the first time** the full HTML is fetched; after that, React handles UI changes internally.

**⚙️ App.jsx Initial Setup (as taught in class)**

In Vite's default structure, the App.jsx file is where the core logic of your React component resides.

**🔸 File: App.jsx**

jsx

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import { useState } from 'react'

import reactLogo from './assets/nik.jpg'

import viteLogo from '/vite.svg'

import './App.css'

function App() {

return (

<div>

<h1>Hellooo</h1>

<h1>maii Namee in Nikhil</h1>

</div>

);

}

export default App;

**🔍 Breakdown:**

| **Line** | **Explanation** |
| --- | --- |
| useState import | Prepares for using React state (not used yet here). |
| nik.jpg | Image file imported from assets folder. |
| vite.svg | Default Vite logo used in most starter templates. |
| App.css | Styling file applied to this component. |
| function App() | Defines a functional React component. |
| return (...) | Returns JSX to render UI. |
| export default App; | Makes App available for use in main.jsx. |

✅ Your React app will render this component into the DOM (inside #root) via main.jsx.

📁 **File Relationship (so far)**:

* index.html → Loads main.jsx
* main.jsx → Loads App.jsx
* App.jsx → Displays JSX content and uses CSS/assets