# React Notes Book

A concise guide to understanding and using React for building modern web applications.

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## Introduction to React

React is a JavaScript library for building user interfaces, particularly single-page applications. Developed by Facebook, it allows developers to create reusable UI components.

- **Key Features**:
  - Component-based architecture
  - Virtual DOM for efficient rendering
  - Declarative syntax for predictable UI updates
- **Use Case**: Ideal for dynamic, interactive web applications.

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## Core Concepts

### Virtual DOM

React uses a Virtual DOM to minimize direct manipulation of the actual DOM, improving performance by only updating changed elements.

### JSX

JSX (JavaScript XML) allows you to write HTML-like syntax within JavaScript, making UI code more intuitive.

```
const element = <h1>Hello, React!</h1>;
```

### Rendering

React components render UI by returning JSX, which is converted to DOM elements.

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# Components and Props

Components are the building blocks of a React application. They can be functional or class-based.

### Functional Component

```
function Welcome(props) {
  return <h1>Hello, {props.name}!</h1>;
}
```

### Props

Props (properties) are read-only inputs passed to components to customize their behavior or output.

```
<Welcome name="Alice" />
```

- **Tip**: Props should not be modified within a component (immutable).

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# State and Lifecycle

State is a built-in object that holds data that influences a component's rendering.

### Using State in Functional Components (with Hooks)

```
import { useState } from 'react';

function Counter() {
  const [count, setCount] = useState(0);

  return (
    <div>
      <p>Count: {count}</p>
      <button onClick={() => setCount(count + 1)}>Increment</button>
    </div>
  );
}
```

### Lifecycle (Class Components)

Class components have lifecycle methods like `componentDidMount`, `componentDidUpdate`, and `componentWillUnmount` for handling side effects.

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# Hooks

Hooks are functions that let you use state and lifecycle features in functional components.

### Common Hooks

- **useState**: Manages state in functional components.
- **useEffect**: Handles side effects (e.g., data fetching, subscriptions).
- `import { useEffect } from 'react';`
- 
- `useEffect(() => {`
- `  document.title = \`Count: ${count}\`;`
- `  return () => {`
- `    document.title = 'React App';`
- `  };`
- `}, [count]);`
- **useContext**, **useReducer**: For advanced state management.
- **Rule**: Only call Hooks at the top level of components or custom Hooks.

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## Best Practices

1. **Keep Components Small**: Break down large components into smaller, reusable ones.
2. **Use Functional Components**: Prefer functional components with Hooks over class components.
3. **Leverage PropTypes**: Validate props for better debugging.
4. **Avoid Inline Styles**: Use CSS modules or libraries like Tailwind CSS.
5. **Optimize Performance**: Use `React.memo` or `useCallback` to prevent unnecessary re-renders.
6. **Follow Naming Conventions**: Use PascalCase for component names, camelCase for props.

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## Example: Simple Counter App

Below is a complete example of a counter app using React with functional components, Hooks, and Tailwind CSS for styling.

```
import { useState } from 'react';

function CounterApp() {
  const [count, setCount] = useState(0);

  return (
    <div className="flex flex-col items-center justify-center h-screen bg-
gray-100">
      <h1 className="text-3xl font-bold mb-4">React Counter</h1>
      <p className="text-xl mb-4">Count: {count}</p>
      <div className="space-x-4">
        <button
          className="px-4 py-2 bg-blue-500 text-white rounded hover:bg-
blue-600"
```

```
          onClick={() => setCount(count + 1)}
        >
          Increment
        </button>
        <button
          className="px-4 py-2 bg-red-500 text-white rounded hover:bg-red-
600"
          onClick={() => setCount(count - 1)}
        >
          Decrement
        </button>
      </div>
    </div>
  );
}

export default CounterApp;
```

### Steps to Use

1. Create a new React project: `npx create-react-app my-app`.
2. Replace `src/App.js` with the above code.
3. Install Tailwind CSS or use a CDN for styling.
4. Run `npm start` to view the app.

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# Additional Resources

- **Official Docs**: reactjs.org
- **Tutorials**: freeCodeCamp, Scrimba
- **Community**: Reactiflux Discord, Stack Overflow