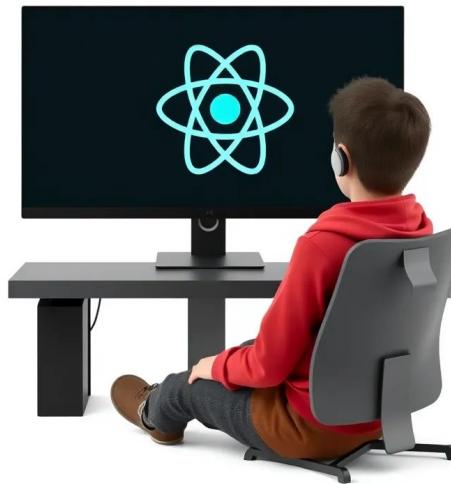
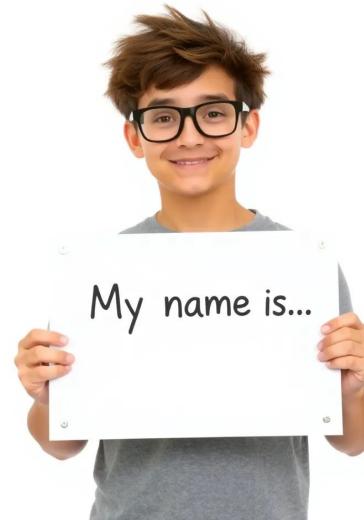


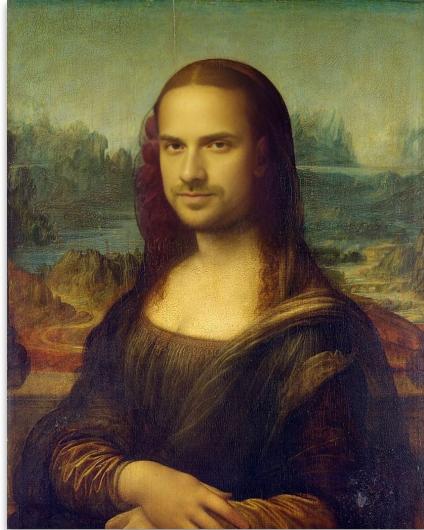
Introduction to React



Introduction Round

- Name
- Current area of responsibility in the company
- Prior knowledge in Web Development
- An interesting fact about yourself (optional)





- **Entwickler seit 1590 (geschätzt)** – Schon in den 90er Jahren Webseiten mit HTML & JavaScript gebaut.
 - **Von Entwicklung zu KI & Sicherheit** – Technik-Enthusiast, aber JavaScript war meine erste “Entwicklerliebe”.
 - **Informatik Master & MBA** – Eine Mischung aus technischer Expertise und Unternehmertum.
 - **Theorie? Klar. Praxis? Noch mehr.** – Vom Entwickler zum CTO – ich habe Einiges gesehen.
- ▶ <https://www.youtube.com/@ai-for-devs>



Vergangene React Projekte

Highenobiety – Shop & Culture ⓘ
Highend, Fashion, Sneakers, Style
Titel Media GmbH
★★★★★ 4.8 - 270 Ratings
[Folge](#)

iPhone Screenshots

The Highenobiety app puts the best of sneakers, luxury men's fashion, designer brands, and cultural content right at your fingertips. With a global shop from over 100+ brands featuring exclusives you won't find anywhere else. From established fashion houses to emerging labels, Highenobiety helps you stay ahead of the curve and find what's next in style.

What's New
We've made important improvements to your story-browsing experience with smoother navigation and improved responsiveness. Update to enjoy a more reliable and enjoyable way to explore stories!

Ratings and Reviews
4.8 out of 5
210 Ratings

Highenobiety App Review
Highenobiety is a standout platform in the realm of streetwear and contemporary culture. Without a doubt, it's a must-have app for those who are regulars and newcomers.

Stay Ahead of the Curve
Current events and latest trends.

Shop What's Next
Products that makes fashion history.

New Arrivals
Breaking news and daily updates.

In the Know
Breaking news and daily updates.

Strenger ⓘ
Haus, Wohnung, Objekt, Kauf, Mieten, Services, Über Strenger
BAU STOLZ

Baukonzept Haus / Wohnungsgut Bauleitplan Hochnahigkeit Ausbauhaus Standorte Kapitalanlage

Baukonzept von Strenger. Mehr Immobilie fürs Geld geht nicht.

Einfach clever, vom Fundament bis unter das Dach.

Unser Baukonzept ist ein intelligenter Planer, der Ihnen die optimale Nutzung Ihres Grundstücks ermöglicht. Unser hochwertiges, nachhaltiges und vorgeplante Bauwerk und Wohnungsbaurecht zu modernen Dachterrassen, nachhaltige und vorgeplante Bauweise und eine perfekte Planung wird nicht nur ein Festpreis, sondern auch eine optimale Nutzung des Grundstücks. Ein Baukonzept ist eine optimale Nutzung des Grundstücks und Wohnungen können im Baukonzept-Konfigurator online konfiguriert werden. Nach einem Mausklick sind Haus oder Wohnung fertiggestellt und ein zuverlässiger Fachgeschäftsmeister kümmert sich darum.

Unsere Baustolz Haustypen in verschiedenen Designs.

Carhartt WIP ⓘ
Work In Progress Textilhandels GmbH
Entwickelt für iPad
Gratis
[Anzeigen in Mac App Store](#) ⓘ

Screenshots ⓘ
iPad iPhone

The Carhartt WIP App
Easily discover, shop, and manage your purchases with the Carhartt WIP App, which features intuitive browsing and an efficient search function, as well as a wishlist to store and keep track of your favorite items. The app also offers shipping to 24 countries.

Neuheiten
Functionality first — we have made some improvements to the app including various bug fixes.

Bewertungen und Rezensionen
4,8 von 5
362 Bewertungen

Carhartt WIP App Review
Gut gestalteter App
Leider keine Info über den Bezahlungsaufwand in der App nach Bestellung noch keine Verbandsbestätigung. Über den Webbrowser wurde bisher spätestens 2 Tage nach E-Mail

Alle anzeigen

Expectations

- Grundsätzliches Verständnis
- Wie arbeite ich mit React
- States
- TypeScript Grundlagen
- Grundwissen auf dem man weiter aufbauen kann
- React Umfeld (Anbindung an System, Kafka)
- APIs (REST, GraphQL)
- Umgang mit Tabellen (Nutzereingabe, Relationale Datenbank simulieren)
- Debugging

- Microservices abwegen
- Node (Basics)
- AWS (wird inHouse genutzt), Hosting-Möglichkeiten (Scaling)
- Dynamo (key, value)
- ...

Day 1: React Fundamentals and Initial Steps

- JavaScript Basics
- Overview of React and Its Ecosystem
- Insights into Virtual DOM Functionality
- Fundamental Principles of React
- Understanding Components and Properties
- Comprehensive Analysis of JSX
- Initiating Your First Project with Next.js
- Methods of Conditional Rendering in React
- Approaches to Render Lists in React

Day 2: Advanced React Development

- Building a Portfolio Page Using React
- Handling Events and Propagation in React
- State Management in React: Techniques and Practices
- Integrating React with External Systems
- Dynamic Routing Implementation in React
- Data Retrieval from External APIs in React
- Employing React's Context API for Efficient State Management

Day 3: Leveraging TypeScript and React Advanced Topics

- Introduction to TypeScript for React
- Utilizing Type Aliases in TypeScript
- Interface Implementation in TypeScript
- TypeScript Functions: Definition and Usage
- Generic Types in TypeScript: An Overview
- Applying TypeScript in React Projects
- Comparing Server vs Client Rendering Techniques
- Exploring React in the Context of React Native
- Basics of IT Security in Web Development

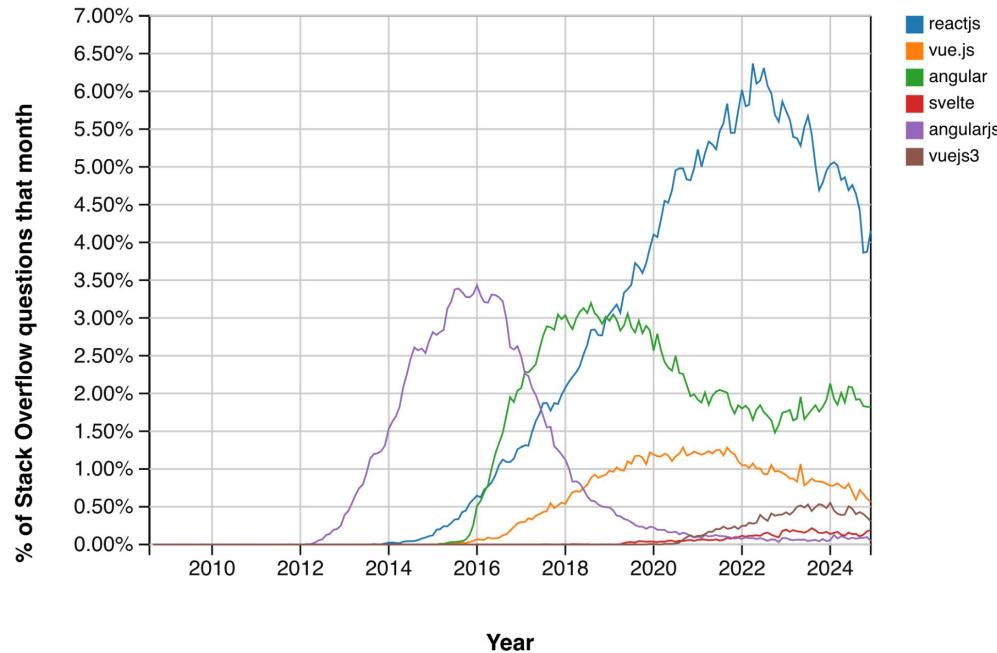
JavaScript Popularity



JavaScript Popularity

Feb 2025	Feb 2024	Change	Programming Language	Ratings	Change
1	1		 Python	23.88%	+6.72%
2	3		 C++	11.37%	+0.84%
3	4		 Java	10.66%	+1.79%
4	2		 C	9.84%	-1.14%
5	5		 C#	4.12%	-3.41%
6	6		 JavaScript	3.78%	+0.61%
7	7		 SQL	2.87%	+1.04%
8	8		 Go	2.26%	+0.53%
9	12		 Delphi/Object Pascal	2.18%	+0.78%
10	9		 Visual Basic	2.04%	+0.52%
11	11		 Fortran	1.75%	+0.35%
12	15		 Scratch	1.54%	+0.36%
13	18		 Rust	1.47%	+0.42%
14	10		 PHP	1.14%	-0.37%
15	21		 R	1.06%	+0.07%
16	13		 MATLAB	0.98%	-0.28%
17	14		 Assembly language	0.95%	-0.24%
18	19		 COBOL	0.82%	-0.18%
19	20		 Ruby	0.82%	-0.17%
20	24		Prolog	0.80%	+0.03%

React Popularity



Role of JS Developer in 2025?



JavaScript Essentials

JavaScript Essentials



**var, let,
const ?**

JavaScript Essentials

Core JavaScript knowledge is crucial for React.

- Variables & Scope: let, const, understanding function vs. block scope.
- Data Structures: Working with objects, arrays, and JSON.
- Functions: Defining and using functions, arrow functions, and scope.
- Asynchronous JS: Promises, async/await, handling asynchronous operations.
- ES6 Features: Destructuring, spread operator, template literals.
- DOM vs HTML
- Module System (Import & Export)

Variables & Scope - var

- If you declare a variable with var inside a function, it's scoped to that function.
- Outside of a function, it becomes a global variable.
- Declarations made using var are hoisted to the top of their scope.

js

[Copy](#) [Edit](#)

```
function exampleVar() {  
  console.log(x); // undefined (due to hoisting)  
  var x = 10;  
  console.log(x); // 10  
}  
exampleVar();
```

Variables & Scope - *let*

- A variable declared with let is limited to the nearest enclosing block.
- If you declare a variable with let, you cannot redeclare it again in the same scope.

js

Copy Edit

```
function exampleLet() {
  // console.log(y); // ReferenceError if uncommented (TDZ)
  let y = 10;
  console.log(y); // 10
  // let y = 20; // SyntaxError: Identifier 'y' has already been declared
}
exampleLet();
```

Variables & Scope - *global*

- Creates a global variable x on the window (in browsers) or global object (in Node.js).
- This is generally considered bad practice as it can lead to accidental global variables.
- In strict mode, this will throw a ReferenceError

```
js
```

Copy Edit

```
x = 10;
```

Variables & Scope - *const*

- Like let, a const-declared variable is scoped to the nearest enclosing block.
- A variable declared with const must be assigned an initial value.
- Once a const variable has been assigned, you cannot reassign it

js

[Copy](#)

```
const x = 10;  
x = 20; // TypeError: Assignment to constant variable
```

Essentials: Data Structures

Objects, arrays, and JSON are foundational structures in JS.

```
// Objects store key-value pairs
const person = {
  name: 'Alice',
  age: 25,
};

// Arrays hold ordered collections
const fruits = ['apple', 'banana', 'cherry'];

// JSON - Stringified object
const jsonData = JSON.stringify(person);
```

Essentials: Functions

Functions are blocks of reusable code, and arrow functions offer a concise syntax.

```
// Function declaration
function greet(name) {
  return `Hello, ${name}!`;
}

// Arrow function with implicit return
const greet = (name) => `Hello, ${name}!`;

// Arrow function with explicit return
const greet = (name) => {
  return `Hello, ${name}!`;
};
```

Essentials: Asynchronous JS

Handle asynchronous operations with Promises and async/await

```
// Promise usage
fetch('https://api.example.com/data')
  .then(response => response.json())
  .then(data => console.log(data));

// Async/await syntax
async function fetchData() {
  const response = await fetch('https://api.example.com/data');
  const data = await response.json();
  console.log(data);
}
```

Laufzeitumgebungen

1 **Browser:** Webbrowser bieten eine Umgebung, in der JavaScript-Code direkt auf Webseiten ausgeführt wird.

2 **Node.js:** Eine serverseitige Plattform, die es ermöglicht, JavaScript außerhalb des Browsers auszuführen.

ECMAScript und JavaScript

ECMAScript	JavaScript
Ein Standard für Skriptsprachen.	Die populärste Implementierung des ECMAScript-Standards.
Sprachen wie JS basieren auf dem ECMAScript-Standard.	Die Kernfunktionen von JavaScript basieren auf ECMAScript.
Basierend auf mehreren Technologien, darunter JavaScript (Netscape) und JScript (Microsoft).	JavaScript wurde zur Standardisierung bei ECMA eingereicht. Aufgrund von Markenrechtsproblemen mit dem Namen "JavaScript" wurde der Standard als "ECMAScript" bezeichnet.

Wichtigste ECMAScript 6 (ES6) Features

- **Klassen:** Einführung von Klassen-basierten Objektorientierung.
- **Pfeilfunktionen (=>):** Kompaktere Syntax für anonyme Funktionen und kein Binden von this.
- **Template Strings (` `):** Einfache String-Interpolation und Mehrzeilige Strings.
- **Destrukturierung:** Schnelles Extrahieren von Werten aus Arrays oder Objekten
- **let & const:** Block-Scoped-Variablen, let für veränderbare und const für unveränderbare Werte.
- **Iteratoren & Generatoren:** Neue Wege, um durch Daten zu iterieren

Hinweis: Alle diese ECMAScript-Features werden zu 100% von TypeScript unterstützt.

 http://w3schools.com/js/js_versions.asp

Essentials: ES6 Features

ES6 introduced a more expressive syntax for writing JS.

```
// Destructuring an object
const { name, age } = person;

// Spread operator for array
const newFruits = [...fruits, 'dragonfruit'];

// Template literals for strings
const greeting = `My name is ${name} and I am ${age} years old.`;
```

Essentials: Module System

Reusable pieces of code can be organized into modules, which can be imported and exported to enhance modularity and reusability.

```
// export-example.js
export const add = (a, b) => a + b;
export const subtract = (a, b) => a - b;

// import-example.js
import { add, subtract } from './export-example.js';

const sum = add(2, 3);
const difference = subtract(5, 2);
```

Exercise: Superhero Creator



- Create an object representing a superhero with properties like `name`, `power`, and `city`.
- Use `const` to ensure the superhero object itself cannot be reassigned.
- Use `let` to allow modifying a hero's stats dynamically.
- Use destructuring to extract and display hero properties.
- Use template literals to print a cool introduction

```
js                                         ⌂ Copy ⌂ Edit

// 1. Erstelle ein Superhelden-Objekt mit const
const superhero = {
  ...: "...",
  ...: "...",
  ...: "...",
  ...: ...
};

// 2. Nutze Destructuring, um Werte aus dem Objekt zu extrahieren
const { ..., ..., ..., ... } = superhero;

// 3. Gib die Superhelden-Infos mit Template Literals aus
console.log(`🌟 Meet ..., the guardian of ...!`);
console.log(`⚡ Superpower: ...`);
console.log(`💪 Strength Level: ...`);

// 4. Verwende let, um eine Eigenschaft dynamisch zu aktualisieren
let newStrength = ...;
console.log(`🔥 After training, ...'s ... increased to ...`);

// 5. Versuche, das gesamte Objekt neu zuzuweisen (dies sollte fehlschlagen)
// superhero = {}; // ❌ Fehler: Assignment to constant variable

console.log("🌟 Superhero setup complete! Ready to save the world!");
```

Solution: Superhero Creator



```
js                                         ⚡ Copy  ⚡ Edit

// 1. Define a superhero using const and an object
const superhero = {
  name: "Lightning Bolt",
  power: "Super Speed",
  city: "Metropolis",
  strength: 80
};

// 2. Use destructuring to extract properties
const { name, power, city, strength } = superhero;

// 3. Print superhero details using template literals
console.log(`🌟 Meet ${name}, the guardian of ${city}!`);
console.log(`⚡ Superpower: ${power}`);
console.log(`💪 Strength Level: ${strength}`);

// 4. Use let to modify the strength of the superhero
let newStrength = strength + 20;
console.log(`🔥 After training, ${name}'s strength increased to ${newStrength}!`);

// 5. Try to reassign the superhero object (this should fail)
// superhero = {} // ✖ Error: Assignment to constant variable

console.log("🌟 Superhero setup complete! Ready to save the world!");
↓
```

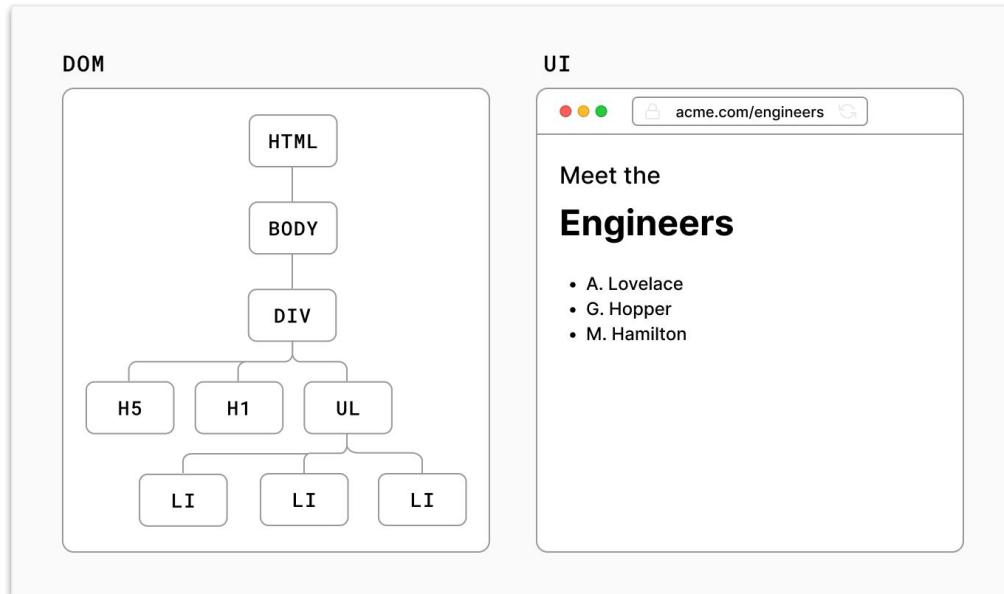
DOM

HTML vs. the DOM



What is the DOM?

The DOM is an object representation of the HTML elements. It acts as a bridge between your code and the user interface, and has a tree-like structure with parent and child relationships.



DOM Manipulation

Document Access & Selection

- Interact with the page structure and find elements using `getElementById()` or `querySelector()`.

Event Handling

- Use `addEventListener()` to respond to clicks, key presses, or other user actions.

Updating the DOM

- Change text, attributes, or styles (`innerHTML`, `setAttribute()`, etc.).

Creating & Removing Elements

- Generate new nodes with `createElement()` and attach them using `appendChild()`.

DOM Manipulation

```
1  <html>
2  |  <head> </head>
3  |  <body>
4  |    <div id="app"></div>
5  |    <script>
6  |      const app = document.getElementById('app');
7  |      const header = document.createElement('h1');
8  |      const text = 'Develop. Preview. Ship.';
9  |      const headerContent = document.createTextNode(text);
10 |      header.appendChild(headerContent);
11 |      app.appendChild(header);
12 |
13 |      const button = document.createElement('button');
14 |      const buttonText = 'Click me';
15 |      const buttonContent = document.createTextNode(buttonText);
16 |      button.appendChild(buttonContent);
17 |      app.appendChild(button);
18 |
19 |      button.addEventListener('click', () => {
20 |        alert('Hello');
21 |      });
22 |
23 |    </script>
24 |  </body>
25 </html>
```

HTML vs. the DOM

Open the developer tools to see the live DOM, which may differ from the original HTML due to newly added or updated elements.

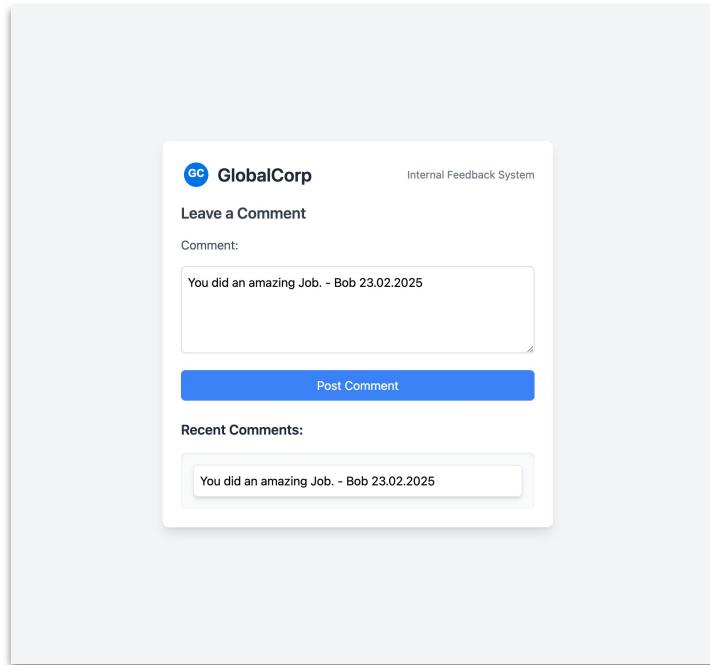
DOM

```
1 <html>
2 <head></head>
3 <body>
4   <div id="app">
5     <h1>Develop. Preview.
6 Ship. 🚀</h1>
7   </div>
8   <script type="text/
9 javascript">...</script>
10  </body>
11 </html>
```

SOURCE CODE (HTML)

```
1 <html>
2 <head></head>
3 <body>
4   <div id="app"></div>
5   <script type="text/
6 javascript">...</script>
7   </body>
8 </html>
9
10
11
```

Sometimes Dangerous ...



Exercise: DOM Manipulation

- Create an index.html file with an empty `<div>` that has `id="app"`.
- Create a card (with a title, a text, and a button).
- Append the card to the `#app` div.
- When clicking the button, change the text inside the card.

```
html

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>DOM Exercise</title>
</head>
<body>

    <div id="app"></div>

    <script>
        const app = document.getElementById("...");

        const card = document.createElement("...");
        const title = document.createElement("...");
        const text = document.createElement("...");
        const button = document.createElement("...");

        title.textContent = "...";
        text.textContent = "...";
        button.textContent = "...";

        card.appendChild(...);
        card.appendChild(...);
        card.appendChild(...);
        app.appendChild(...);

        button.addEventListener("...", () => {
            text.textContent = "...";
        });
    </script>

</body>
</html>
```

React

Building Blocks of a Web Application

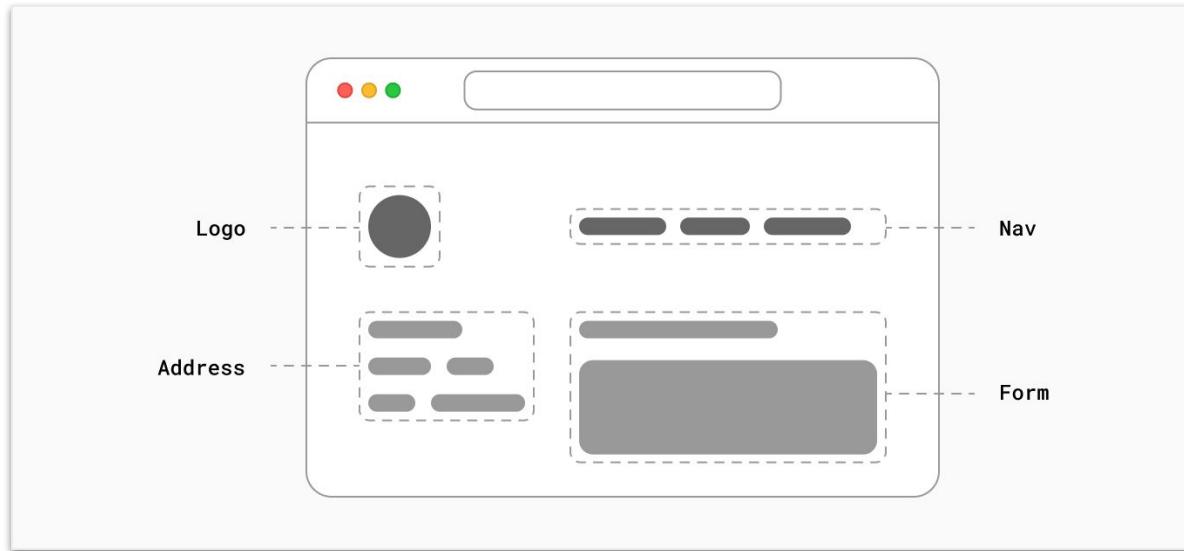
There are a few things you need to consider when building modern applications. Such as:

- **User Interfaces:** Streamlined interfaces for optimal user interaction.
- **Routing:** Efficient user flow between application segments.
- **Data Fetching:** Strategic data sourcing and retrieval methods.
- **Content Delivery:** Dynamic and static content rendering techniques.
- **Deployment Strategy:** Use of Serverless, CDN, and Edge for code execution.
- **Speed Optimization:** Enhancements for peak application performance.

For each part of your application, you will need to decide whether you will build a solution yourself or use other tools such as libraries and frameworks.

What is React?

React is a JavaScript library for building interactive user interfaces.



What is React?

React is a declarative, efficient, and flexible JavaScript library for building user interfaces.

- **Declarative UI:** Simplifies code readability and maintenance.
- **Component-Based:** Encapsulates code into reusable components.
- **Virtual DOM:** Optimizes rendering for performance gains.
- **Unidirectional Data Flow:** Ensures stability via controlled data.
- **Ecosystem Flexibility:** Integrates with various libraries and tools.

Imperative Programming (tell what to do)

Updating the DOM with plain JavaScript is very powerful but verbose. You've written all this code to add an `<h1>` element with some text.

With this approach, developers spend a lot of time writing instructions to tell the computer **how it should do things**.

```
6      const app = document.getElementById('app');
7      const header = document.createElement('h1');
8      const text = 'Develop. Preview. Ship.';
9      const headerContent = document.createTextNode(text);
10     header.appendChild(headerContent);
11     app.appendChild(header);
12
13     const button = document.createElement('button');
14     const buttonText = 'Click me';
15     const buttonContent = document.createTextNode(buttonText);
16     button.appendChild(buttonContent);
17     app.appendChild(button);
```

Declarative Programming (tell what you want)

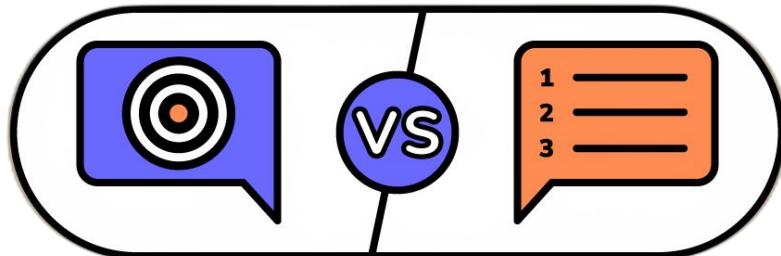
But wouldn't it be nice to describe what you want to show and let the computer figure out how to update the DOM?

```
<Header text="Develop. Preview. Ship. 🚀" />
```

Declarative vs Imperative Programming

In other words, imperative programming is like giving a chef step-by-step instructions on how to make a pizza.

Declarative programming is like ordering a pizza without being concerned about the steps it takes to make the pizza. 



Exercise: Basic Example

Copy the code and run the example on your computer.

 https://github.com/verwec/02_React_Example

```
1  <!DOCTYPE html>
2  <html>
3  |  <head>
4  ||  <title>React App</title>
5  |</head>
6  <body>
7  |  <div id="app"></div>
8  |  <script src="https://unpkg.com/react@18/umd/react.development.js"></script>
9  |  <script src="https://unpkg.com/react-dom@18/umd/react-dom.development.js"></script>
10 |  <script src="https://unpkg.com/@babel/standalone/babel.min.js"></script>
11 <script type="text/babel">
12   function App() {
13     return (
14       <div>
15         <h1>Develop. Preview. Ship.</h1>
16       </div>
17     );
18   }
19
20   ReactDOM.render(<App />, document.getElementById('app'));
21 </script>
22 </body>
23 </html>
```

React Library Split

React and ReactDOM are separate to modularize client and renderer.

- **React Core:** Defines components and manages application logic.
- **ReactDOM Bindings:** Connects React to the DOM for web rendering.

✓ **Platform Agnostic:** Core concepts are universal, not tied to web or native.

✓ **Cleaner Updates:** Independent versioning and updates for each library.

Babel Transformation

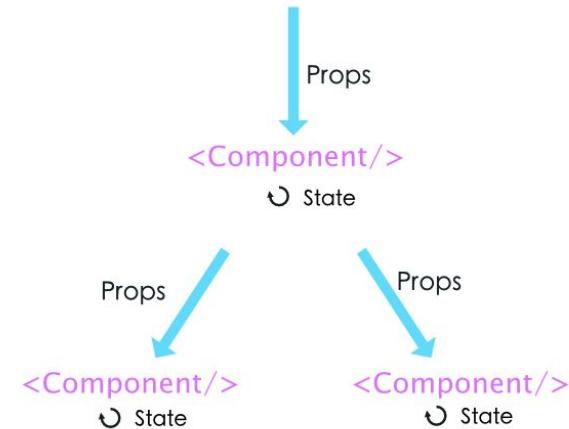
Babel transpiles modern JavaScript and JSX to browser-compatible code.

- **JSX to JavaScript:** Converts JSX syntax into plain JavaScript objects.
- **ES6+ Support:** Translates modern ES6+ code to ES5 for broader compatibility.
- **Browser Compatibility:** Ensures code runs on older web browsers.
- **Development Efficiency:** Allows developers to use the latest JS features.
- **Plugin Ecosystem:** Offers plugins for advanced code transformations and features.

React Core Concepts

There are three core concepts of React that you'll need to be familiar with to start building React applications. These are:

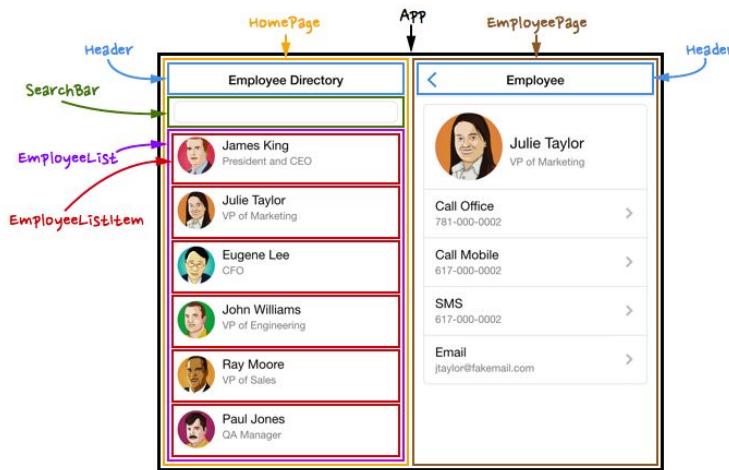
- Components
- Props
- State



Components

Components Hierarchy

Break up your user interface (design) into separate elements.



Nesting Components

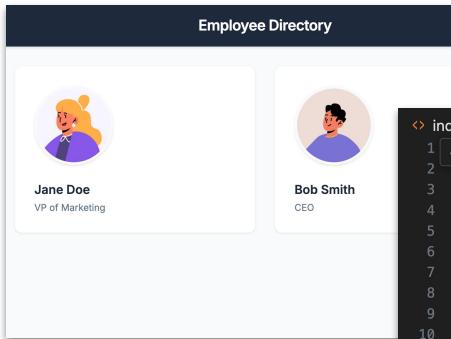
Applications usually include more content than a single component. You can nest React components inside each other like you would regular HTML elements.

```
function App() {
  return (
    <div>
      <header>
        <h1>Employee Directory</h1>
      </header>
      <main>
        <EmployeeCard />
        <OtherEmployeeCard />
      </main>
    </div>
  );
}
```

```
function EmployeeCard() {
  return (
    <div className="employee-card">
      
      <strong>Jane Doe</strong>
      <p>VP of Marketing</p>
    </div>
  );
}
```

Exercise: Simple React “Employee Directory”

Create the component App and implement all nested Components.



```
<> index.html > ...
1 ~/courses/react/03_COMPONENTS/index.html • 1 problem in this file
2 <!DOCTYPE html>
3 <html lang="en">
4   <head>
5     ...
6   </head>
7   <body>
8     <div id="root"></div>
9     <script type="text/babel">
10    ...
11
12    function App() {
13      return (
14        <div>
15          <header>
16            <h1>Employee Directory</h1>
17          </header>
18          <main>
19            <EmployeeCard />
20            <OtherEmployeeCard />
21          </main>
22        </div>
23      );
24
25      ReactDOM.render(<App />, document.getElementById('root'));
26    </script>
27  </body>
```

```
function EmployeeCard() {
  return (
    <div className="employee-card">
      
      <strong>Jane Doe</strong>
      <p>VP of Marketing</p>
    </div>
  );
}
```

Solution: Simple React “Employee Directory”

```
8   <script type="text/babel">
9     function EmployeeCard() {
10       return (
11         <div className="employee-card">
12           
16           <strong>Jane Doe</strong>
17           <p>VP of Marketing</p>
18         </div>
19       );
20     }
21
22     function OtherEmployeeCard() {
23       return (
24         <div className="employee-card">
25           
29           <strong>Bob Smith</strong>
30           <p>CEO</p>
31         </div>
32       );
33     }
34
35     function App() {
36       return (
37         <div>
38           <header>
39             <h1>Employee Directory</h1>
40           </header>
41           <main>
42             <EmployeeCard />
43             <OtherEmployeeCard />
44           </main>
45         </div>
46       );
47     }
48
49     ReactDOM.render(<App />, document.getElementById('root'));
50   </script>
```

Components & Props

Displaying Data without Props

Lot of code duplication :-(

```
function EmployeeList() {
  return (
    <>
      | <h1>Employee List</h1>
      | <div>
      |   | <Employee />
      |   | <hr />
      |   | <Employee2 />
      | </div>
    </>
  );
}

function Employee() {
  return (
    <div>
      | <div>Name: Bob</div>
      | <div>Age: 25</div>
      | <div>Salary: $100,000</div>
    </div>
  );
}

function Employee2() {
  return (
    <div>
      | <div>Name: Lisa</div>
      | <div>Age: 31</div>
      | <div>Salary: $80,000</div>
    </div>
  );
}
```

Exercise: Remove duplication

Remove the duplication with props.

```
function EmployeeList() {
  return (
    <>
      <h1>Employee List</h1>
      <div>
        <Employee name="Bob" age="25" salary="100,000" />
        <hr />
        <Employee name="Lisa" age="31" salary="80,000" />
      </div>
    </>
  );
}

function Employee({name, age, salary}) {
  return (
    <div>
      <div>Name: {name}</div>
      <div>Age: {age}</div>
      <div>Salary: {salary}</div>
    </div>
  );
}
```

JSX Rules

The Rules of JSX

- Return a single root element.
- To return multiple elements from a component, wrap them with a single parent tag.



```
<>
  <h1>Employee List</h1>
  <div>
    <Employee name="Bob" age="25" salary="100,000" />
    <hr />
    <Employee name="Lisa" age="31" salary="80,000" />
  </div>
</>
```

The Rules of JSX

JSX requires tags to be explicitly closed: self-closing tags like `` must become ``, and wrapping tags like ``oranges must be written as `oranges`.

```
<>
  
  <ul>
    <li>Name: {name}</li>
    <li>Age: {age}</li>
    <li>Salary: {salary}</li>
  </ul>
</>
```

The Rules of JSX

- React uses camelCase for HTML/SVG attributes (e.g. `stroke-width` → `strokeWidth`).
- `class` is reserved, so React uses `className` instead.

```
return (
  <div className="employee">
    
    <ul>
      <li>Name: {name}</li>
      <li>Age: {age}</li>
      <li>Salary: {salary}</li>
    </ul>
  </div>
);
```

Using “double curly braces”

- In addition to strings, numbers, and other JavaScript expressions, you can even pass objects in JSX.
- Objects are also denoted with curly braces. Therefore, to pass a JS object in JSX, you must wrap the object in another pair of curly braces



```
<div style={{border: '1px solid #ccc', padding: '10px'}}>
  
  <ul>
    <li>Name: {name}</li>
    <li>Age: {age}</li>
    <li>Salary: {salary}</li>
  </ul>
</div>
```

create-react-app

Demo: Create React App



Exercise: Create React App

Install react globally

- `npm install -g create-react-app`

Create a new React app

- `npx create-react-app my-app`
- `cd my-app`
- `npm start`

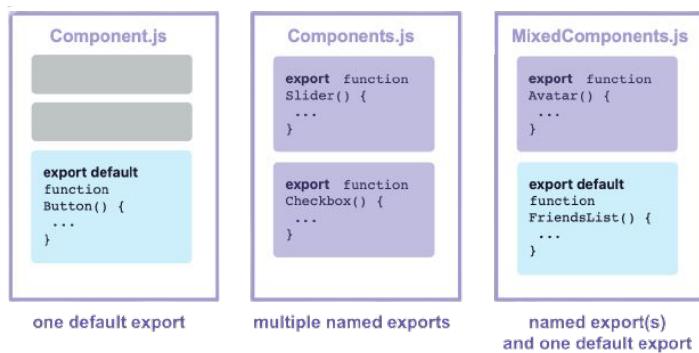
Show A List of 2-3 Employees in `App.js`

```
1 import logo from './logo.svg';
2 import './App.css';
3
4 function App() {
5   return (
6     <>
7       <h1>Employee List</h1>
8       <div>
9         <div>
10           <p>Name: Bob</p>
11           ...
12         </div>
13         <hr />
14         ...
15       </div>
16     </>
17   );
18 }
19
20 export default App;
21 //L to chat, #K to generate
```

In- & Exporting

Makes the code more modular and reusable in other files. Done in three steps:

1. Make a new JS file to put the components in.
2. Export your function component from that file (using either default or named exports).
3. Import it in the file where you'll use the component (using the corresponding technique for importing default or named exports).



In- & Exporting

```
1 import React from 'react';
2
3 function Employee() {
4   return <div>Employee</div>;
5 }
6
7 export default Employee;
```

```
3
4 import Employee from './Employee';
5
```



In- & Exporting

```
my-app > src > JS Employee.js > [?] default
1  import React from 'react';
2
3  function Employee({ name, age, salary }) {
4    return (
5      <div className="employee-card">
6        <h2>{name}</h2>
7        <p>Age: {age}</p>
8        <p>Salary: ${salary}</p>
9      </div>
10   );
11 }
12
13 function OfficeDog({ breed, age }) {
14   return (
15     <div className="employee-card">
16       <h2>{breed}</h2>
17       <p>Age: {age}</p>
18     </div>
19   );
20 }
21
22 export { OfficeDog };
23
24 export default Employee;
```



Props

Destructuring vs. Direct Prop Access

```
function OfficeDog({ breed, age }) {  
  return (  
    <div className="employee-card">  
      <h2>{breed}</h2>  
      <p>Age: {age}</p>  
    </div>  
  );  
}  
  
function OfficeCat(props) {  
  let breed = props.breed;  
  let age = props.age;  
  
  return (  
    <div className="employee-card">  
      <h2>{breed}</h2>  
      <p>Age: {age}</p>  
    </div>  
  );  
}
```

Highly recommend!

Props Default Values

```
function OfficeDog({ breed, age, isVaccinated=true }) {  
  return (  
    <div className="employee-card">  
      <h2>{breed}</h2>  
      <p>Age: {age}</p>  
      <p>Vaccinated: {isVaccinated ? "Yes" : "No"}</p>  
    </div>  
  );  
}
```



Props Forwarding

```
function AnimalOfTheWeek(props) {
  return (
    <>
    <h1> Animal of the Week</h1>
    <OfficeDog {...props} />
  </>
);
}

function OfficeDog({ breed, age, isVaccinated=true }) {
  return (
    <div className="animal-card">
      <h2>{breed}</h2>
      <p>Age: {age}</p>
      <p>Vaccinated: {isVaccinated ? "Yes" : "No"}</p>
    </div>
);
}
```

Passing JSX as children

```
function Card({children}) {
  return (
    <div className="p-6 max-w-sm mx-auto rounded-xl shadow-lg">
      {children}
    </div>
  );
}

function AnimalOfTheWeek(props) {
  return (
    <Card>
      <h1 className="text-2xl font-bold mb-2"> Animal of the Week</h1>
      <OfficeDog {...props} />
    </Card>
  );
}
```

Animal of the Week

Labrador

Age: 5

Vaccinated: Yes

Exercise: Refactoring & Styling

Remove the code duplication from your App.js.

- Use Employee components
- Integrate `<script src="https://cdn.tailwindcss.com"></script>` in your index.html
- Checkout <https://tailwindcss.com/docs/styling-with-utility-classes>
- Improve Styling by using the `{children}` syntax
(e.g. a wrapping Card Component)



John Doe

Age: 30

Salary: \$100000



Jane Doe

Age: 25

Salary: \$80000



Jim Doe

Age: 35

Salary: \$120000

Conditional Rendering

Conditional Rendering

Simple Solution:

App.js

```
1 function Item({ name, isPacked }) {
2   if (isPacked) {
3     return <li className="item">{name} ✓</li>;
4   }
5   return <li className="item">{name}</li>;
6 }
7
8 export default function PackingList() {
9   return (
10     <section>
11       <h1>Sally Ride's Packing List</h1>
12       <ul>
13         <Item
14           isPacked={true}
15           name="Space suit"
16         />
17     </ul>
18   )
19 }
```

Download Reset Fork

Sally Ride's Packing List

- Space suit ✓
- Helmet with a golden leaf ✓
- Photo of Tam

Show more

Conditional Rendering

JavaScript has a compact syntax for writing a conditional expression – the conditional operator or “ternary operator”.

```
return (
  <li className="item">
    {isPacked ? name + ' ✓' : name}
  </li>
);
```

Logical AND operator (&&)

Another common shortcut you'll encounter is the JavaScript logical AND (&&) operator. Inside React components, it often comes up when you want to render some JSX when the condition is true, or render nothing otherwise.

```
return (
  <li className="item">
    {name} {isPacked && '✓'}
  </li>
);
```

Exercise: Conditional Rendering

Add a 'Grandpa' emoji for all Employees that are older 50 years 😊



John Doe

Age: 30

Salary: \$100000



Jane Doe

Age: 25

Salary: \$80000



Jim Doe

Age: 35

Salary: \$120000



Jill Doe 😊

Age: 60

Salary: \$150000

Rendering Lists

Rendering Lists

You will often want to display multiple similar components from a collection of data.

1. **Map Functionality:** Render array items as components with map().
2. **Filter Usage:** Display only certain items using filter().
3. **React Keys:** Assign unique keys for stable identities.
4. **Component Arrays:** Transform data to component arrays for UI.
5. **Selective Rendering:** Control which elements to render and when.

Rendering data from arrays

App.js

Download Reset Fork

```
1 const people = [
2   'Creola Katherine Johnson: mathematician',
3   'Mario José Molina-Pasquel Henríquez: chemist',
4   'Mohammad Abdus Salam: physicist',
5   'Percy Lavon Julian: chemist',
6   'Subrahmanyam Chandrasekhar: astrophysicist'
7 ];
8
9
10 export default function List() {
11   const listItems = people.map(person =>
12     <li>{person}</li>
13   );
14   return <ul>{listItems}</ul>;
15 }
```

- Creola Katherine Johnson: mathematician
- Mario José Molina-Pasquel Henríquez: chemist
- Mohammad Abdus Salam: physicist
- Percy Lavon Julian: chemist
- Subrahmanyam Chandrasekhar: astrophysicist

▼ Console (1) (x)

Warning: Each child in a list should have a unique "key" prop.

Check the render method of `List`. See <https://reactjs.org/link/warning-keys> for more information.

at li
at List

Filtering arrays of items

App.js data.js utils.js

5 Reset 2 Fork

```
1 import { people } from './data.js';
2 import { getImageUrl } from './utils.js';
3
4 export default function List() {
5   const chemists = people.filter(person =>
6     person.profession === 'chemist'
7   );
8   const listItems = chemists.map(person =>
9     <li>
10       <img
11         src={getImageUrl(person)}
12         alt={person.name}
13       />
14       <p>
15         <b>{person.name}</b>
16         {' ' + person.profession + ' '}
17         known for {person.accomplishment}
18       </p>
19     </li>
20   );
21   return <ul>{listItems}</ul>;
22 }
```



Mario José Molina-Pasquel Henríquez: chemist known for discovery of Arctic ozone hole



Percy Lavon Julian: chemist known for pioneering cortisone drugs, steroids and birth control pills

▼ Console (1)

Warning: Each child in a list should have a unique "key" prop.

Check the render method of 'List'. See <https://reactjs.org/link/warning-keys> for more information.

at li
at List

^ Show less

Keeping list items in order with key

1. You need to give each array item a key – a string or a number that uniquely identifies it among other items in that array. A well-chosen key helps React infer what exactly has happened, and make the correct updates to the DOM tree.

```
<li key={person.name}>...</li>
```

Exercise 1: List Rendering

- Replace the hardcoded employee components with a map function based on the list below.
- Create an Employee component for each item in the array.

```
const employees = [
  { name: "John Doe", age: 30, salary: 100000 },
  { name: "Jane Doe", age: 25, salary: 80000 },
  { name: "Jim Doe", age: 35, salary: 120000 },
  { name: "Jill Doe", age: 60, salary: 150000 }
];
```

Exercise 2: Group the list (filter)

- Add a new property `active`
- Group by `active` and `Inactive` (using filter)

Active Employees



John Doe

Age: 30

Salary: \$100000



Jane Doe

Age: 25

Salary: \$80000

Inactive Employees



Jim Doe

Age: 35

Salary: \$120000



Jill Doe 😊

Age: 60

Salary: \$150000

State

State: A Component's Memory

App.js data.js

```
1 import { sculptureList } from './data.js';
2
3 export default function Gallery() {
4   let index = 0;
5
6   function handleClick() {
7     index = index + 1;
8   }
9
10  let sculpture = sculptureList[index];
11  return (
12    <>
13      <button onClick={handleClick}>
14        Next
15      </button>
16      <h2>
17        <i>{sculpture.name} </i>
18        by {sculpture.artist}
19      </h2>
20      <h3>
21        ({index + 1} of {sculptureList.length})
22      </h3>
23      <img
24        src={sculpture.url}
25        alt={sculpture.alt}
26      />
27      <p>
28        {sculpture.description}
29      </p>
30    </>
31  );
32}
```

Next

Homenaje a la Neurocirugía by Marta Colvin Andrade
(1 of 12)



Although Colvin is predominantly known for abstract themes that allude to pre-Hispanic symbols, this gigantic sculpture, an homage to neurosurgery, is one of her most recognizable public art pieces.

▲ Show less

Here's a component that renders a sculpture image. Clicking the "Next" button should show the next sculpture by changing the index to 1, then 2, and so on. However, this won't work.

State: A Component's Memory

```
const employees = [
  { name: "John Doe", age: 30, salary: 100000, active: true },
  { name: "Jane Doe", age: 25, salary: 80000, active: true },
  { name: "Jim Doe", age: 35, salary: 120000, active: false },
  { name: "Jill Doe", age: 60, salary: 150000, active: false }
];

function App() {
  let index = 0;

  function handleClick() {
    console.log('index', index);
    index++;
  }

  const employee = employees[index];

  return (
    <div className="container p-6 max-w-7xl">
      <div className="mb-12" onClick={handleClick}>
        <h2 className="text-2xl font-bold mb-6">Active Employees</h2>
        <Employee
          name={employee.name}
          age={employee.age}
          salary={employee.salary}
          active={employee.active} />
      </div>
    </div>
  );
}
```

State: A Component's Memory

The `handleClick` event handler is updating a local variable, `index`. But two things prevent that change from being visible:

1. **Local variables don't persist between renders.** When React renders this component a second time, it renders it from scratch—it doesn't consider any changes to the local variables.
2. **Changes to local variables won't trigger renders.** React doesn't realize it needs to render the component again with the new data.

To update a component with new data, two things need to happen:

1. Retain the data between renders.
2. Trigger React to render the component with new data (re-rendering).

State: A Component's Memory

App.js data.js

Reset Fork

Next

Homenaje a la Neurocirugía by Marta Colvin Andrade
(1 of 12)



Although Colvin is predominantly known for abstract themes that allude to pre-Hispanic symbols, this gigantic sculpture, an homage to neurosurgery, is one of her most recognizable public art pieces.

```
1 import { useState } from 'react';
2 import { sculptureList } from './data.js';
3
4 export default function Gallery() {
5   const [index, setIndex] = useState(0);
6
7   function handleClick() {
8     setIndex(index + 1);
9   }
10
11   let sculpture = sculptureList[index];
12   return (
13     <>
14       <button onClick={handleClick}>
15         Next
16       </button>
17       <h2>
18         <i>{sculpture.name} </i>
19         by {sculpture.artist}
20       </h2>
21       <h3>
22         ({index + 1} of {sculptureList.length})
23       </h3>
24       <img
25         src={sculpture.url}
26         alt={sculpture.alt}
27       />
28       <p>
29         {sculpture.description}
30       </p>
31     </>
32   );
33 }
34
```

▲ Show less

State: Usage

Call `useState` at the top level of your component to declare one or more state variables.

`useState` returns an array with exactly two items:

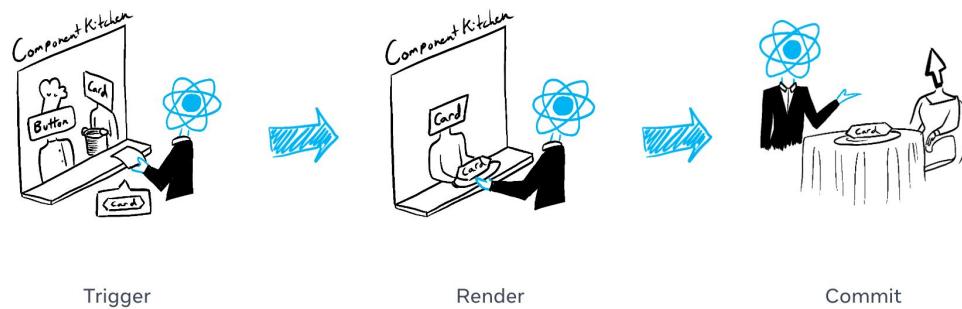
1. The current state of this state variable, initially set to the initial state you provided.
2. The set function that lets you change it to any other value in response to interaction.

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

function MyComponent() {
  const [age, setAge] = useState(42);
  const [name, setName] = useState('Taylor');
  // ...
}
```

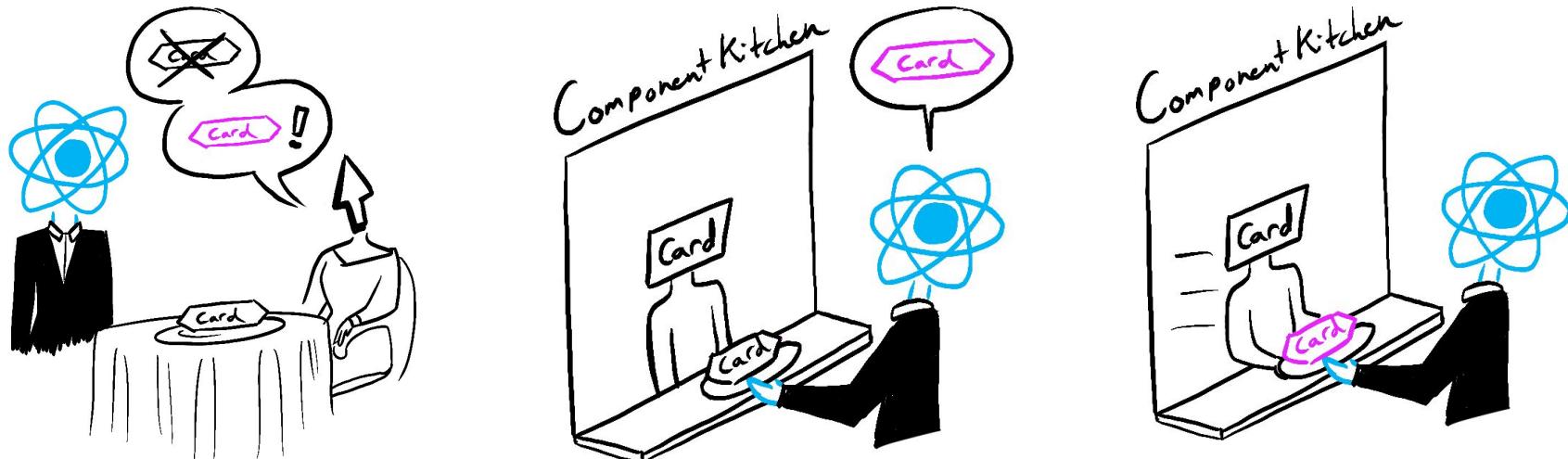
Render & Commit

Imagine that your components are cooks in the kitchen, assembling tasty dishes from ingredients. In this scenario, React is the waiter who puts in requests from customers and brings them their orders. This process of requesting and serving UI has three steps:



Re-renders when state updates

Updating your component's state automatically queues a render. (You can imagine these as a restaurant guest ordering tea, dessert, and all sorts of things after putting in their first order, depending on the state of their thirst or hunger.)



Responding to events

React lets you add event handlers to your JSX. Event handlers are your own functions that will be triggered in response to user interactions like clicking, hovering, focusing on form inputs, and so on.

App.js

Download Reset Fork

```
1 export default function Button() {
2   function handleClick() {
3     alert('You clicked me!');
4   }
5
6   return (
7     <button onClick={handleClick}>
8       Click me
9     </button>
10  );
11}
12
```

Click me

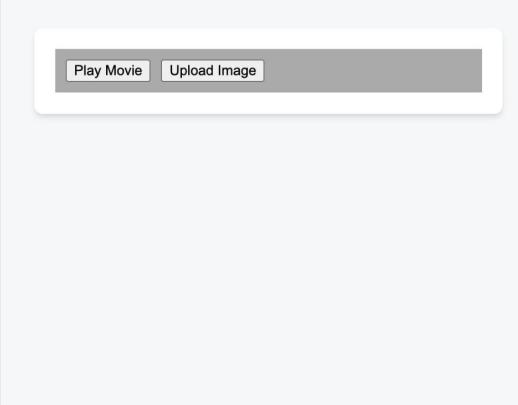
Event propagation

Event handlers will also catch events from any children your component might have. We say that an event “bubbles” or “propagates” up the tree: it starts with where the event happened, and then goes up the tree.

App.js

Download Reset Fork

```
1  export default function Toolbar() {
2    return (
3      <div className="Toolbar" onClick={() => {
4        alert('You clicked on the toolbar!');
5      }}>
6        <button onClick={() => alert('Playing!')}>
7          Play Movie
8        </button>
9        <button onClick={() => alert('Uploading!')}>
10          Upload Image
11        </button>
12      </div>
13    );
14  }
15
```



The screenshot shows a code editor with the file 'App.js' open. The code defines a 'Toolbar' component that contains a 'div' with a 'className' of 'Toolbar'. This 'div' has an 'onClick' event handler that alerts 'You clicked on the toolbar!'. Inside this 'div' are two 'button' elements. The first 'button' has an 'onClick' event handler that alerts 'Playing!'. The second 'button' has an 'onClick' event handler that alerts 'Uploading!'. To the right of the code editor is a preview window showing a light gray rectangular box with a dark gray horizontal bar at the top. On this bar are two buttons: 'Play Movie' and 'Upload Image'.

Event propagation

```
function Card({children}) {  
  
  function handleClick() {  
    console.log('clicked');  
  }  
  
  return (  
    <div className="p-6 mt-6 w-[200px] mx-auto rounded-xl shadow-lg" onClick={handleClick}>  
      {children}  
    </div>  
  );  
}  
  
function Employee({ name, age, salary }) {  
  
  return (  
    <Card>  
      <img src={`https://i.prvat.cc/50?img=${age}`} alt="Avatar" />  
      <h2 className="text-lg font-bold">  
        {name} {age > 50 && '🌟'}  
      </h2>  
      <p>Age: {age}</p>  
      <p>Salary: ${salary}</p>  
      <button className="bg-blue-500 text-white p-2 my-2 rounded-md"> Click me </button>  
    </Card>  
  );  
}
```

Exercise: A Employees Gallery

Create a gallery where you can switch between the Employees by clicking Next



John Doe 😊

Age: 60

Salary: \$150000

Next

This page is intentionally left blank ;-)

Agenda Day 2

- Portfolio Page Development with React
- Use Effect Hook & APIs
- Fetching Data from External APIs
- State Management in React Components
- Integration with External Systems
- Utilizing React's Context API for State Distribution
- Leveraging TypeScript for Type Safety in React
- AI for Developers

Exercise: A small Blog Site

1. Let's extract components together
2. Implementation of the components

The screenshot shows a blog site portfolio page. At the top, there's a navigation bar with links for Home, Services, Portfolio, and Contact. Below the navigation, a bio section features a black and white photo of a person wearing a cap and a graphic t-shirt, sitting at a desk. The bio text reads: "I'm a creative graphic & web designer". A smaller text below states: "A Product Designer and Visual Developer. I specialize in UI/UX Design, Responsive Web Design, and Visual Development." A purple "Connect with me" button is located to the left of the photo. The main content area is titled "Services I Provide" and includes four categories: UX/UI Design, Web Design, Mobile App Design, and Web Development, each with a brief description and icon.

Portfolio

Home Services Portfolio Contact

I'm a creative graphic & web designer

A Product Designer and Visual Developer. I specialize in UI/UX Design, Responsive Web Design, and Visual Development.

Connect with me

Services I Provide

Specialized in creating modern digital experiences

UX/UI Design
Creating intuitive and engaging user experiences

Web Design
Building responsive and modern websites

Mobile App Design
Designing native and cross-platform mobile applications

Web Development
Developing fast and scalable web applications

Use Effect

Demo API Access

SimpleReactRestAPIExample / src / App.js

verwec Simple API Example

Code Blame 33 lines (27 loc) · 716 Bytes

```
1 import logo from './logo.svg';
2 import './App.css';
3
4 import Employee from './Employee';
5 import { useEffect, useState } from 'react';
6
7
8 function App() {
9   const [isLoading, setIsLoading] = useState(true);
10  const [employees, setEmployees] = useState([]);
11
12  useEffect(() => {
13    fetch('https://jsonplaceholder.typicode.com/users')
14      .then(response => response.json())
15      .then(data => {
16        setEmployees(data);
17        setIsLoading(false);
18      });
19  }, []);
20  if (isLoading) {
21    return <div>Loading...</div>;
22  }
23
24  return (
25    <>
26      {employees.map(employee => (
27        <Employee key={employee.id} name={employee.name} email={employee.email} />
28      ))}
29    </>
30  );
31}
32
33 export default App;
```

<https://github.com/verwec/SimpleReactRestAPIExample/blob/main/src/App.js>

Exercise: API Access

- Show Pikachu :-)

```
import { useState, useEffect } from 'react';
import './App.css';

function App() {
  const [pokemon, setPokemon] = useState(null);
  const [loading, setLoading] = useState(true);

  useEffect(() => {
    // Fetch Pikachu's data as an example
    fetch('https://pokeapi.co/api/v2/pokemon/pikachu')
      .then(response => response.json())
      .then(data => {
        setPokemon(data);
        setLoading(false);
      })
      .catch(error => {
        console.error('Error fetching Pokemon:', error);
        setLoading(false);
      });
}, []);

export default App;
```

pikachu



Height: 4

Weight: 60

Exercise 2: API Access

- Show A list of Pokemons and allow to click on them to fetch the Details from API

```
src > js App.js > ...
1  import './App.css';
2  import { useState, useEffect } from 'react';
3
4  function App() {
5
6    const pokemons = [
7      { name: 'Bulbasaur', url: 'https://pokeapi.co/api/v2/pokemon/ditto' },
8      { name: 'Ivysaur', url: 'https://pokeapi.co/api/v2/pokemon/ivysaur' },
9      { name: 'Venusaur', url: 'https://pokeapi.co/api/v2/pokemon/venusaur' },
10     ];
11
12   const [selectedPokemon, setSelectedPokemon] = useState(pokemons[0]);
13   const [pokemonData, setPokemonData] = useState(null);
14
15   useEffect(() => {
16     // Fetch data for the selected Pokemon when it changes
17     // The fetch call will get Pokemon details from the API
18     // and update pokemonData state with the response
19     // tab
20   }, [selectedPokemon]);
21
22   // Return JSX that:
23   // 1. Maps over pokemons array to display each Pokemon's name and select button
24   // 2. Shows a horizontal line separator
25   // 3. Displays the currently selected Pokemon's name
26   // 4. If pokemonData exists, shows the Pokemon's front sprite image
```

Bulbasaur

Select Pokemon

Ivysaur

Select Pokemon

Venusaur

Select Pokemon

Selected Pokemon: Bulbasaur



Solution 2: API Access

- <https://github.com/verwec/pokemon-api-consumption>

```
5  ✓  function App() {
6
7    const pokemons = [
8      {
9        name: 'venusaur',
10       url: 'https://pokeapi.co/api/v2/pokemon/venusaur'
11     },
12     {
13       name: 'ivysaur',
14       url: 'https://pokeapi.co/api/v2/pokemon/ivysaur'
15     },
16     {
17       name: 'bulbasaur',
18       url: 'https://pokeapi.co/api/v2/pokemon/bulbasaur'
19     }
20   ]
21
22   const [isLoading, setIsLoading] = useState(true);
23   const [selectedPokemon, setSelectedPokemon] = useState(pokemons[0]);
24   const [detailedPokemonData, setDetailedPokemonData] = useState(null);
25
26   useEffect(() => {
27     fetch(selectedPokemon.url)
28       .then(response => response.json())
29       .then(pokemonData => {
30         setDetailedPokemonData(pokemonData)
31         setIsLoading(false)
32       })
33   }, [selectedPokemon]);
34
35
```

```
36     if (isLoading) {
37       return <div>Loading...</div>
38     }
39
40     return (
41       <div className="App">
42         <h1>Pokemons</h1>
43         {pokemons.map(pokemon => (
44           <div key={pokemon.name}>
45             <h2>{pokemon.name}</h2>
46             <button onClick={() => setSelectedPokemon(pokemon)}>Select Pokemon</button>
47           </div>
48         ))
49       )}
50       {detailedPokemonData && (
51         <div>
52           <h2>{detailedPokemonData.name}</h2>
53           <img src={detailedPokemonData.sprites.front_default} />
54         </div>
55       )}
56     );
57   }
58 }
```

Demo Backend & SQL

```
1 import express from 'express';
2 import employees from './employees.js';
3
4 const app = express();
5 const port = 80;
6
7 app.get('/employees', (req, res) => {
8   res.json(employees);
9 });
10
11 app.listen(port, () => {
12   console.log(`Server running at http://localhost:${port}`);
13});
```

<https://pokemon-endpoint.onrender.com/employees>

Demo Backend & SQL

```
1 import sqlite3 from 'sqlite3';
2
3 const db = new sqlite3.Database('employees.db', (err) => {
4     if (err) {
5         console.error('Error connecting to database:', err);
6     }
7 });
8
9 ▼ const getEmployees = () => {
10     return new Promise((resolve, reject) => {
11         db.all('SELECT * FROM employees', [], (err, rows) => {
12             if (err) {
13                 reject(err);
14                 return;
15             }
16             resolve(rows);
17         });
18     });
19 };
20
21 export default getEmployees;
```

<https://pokemon-endpoint.onrender.com/employees>

Services

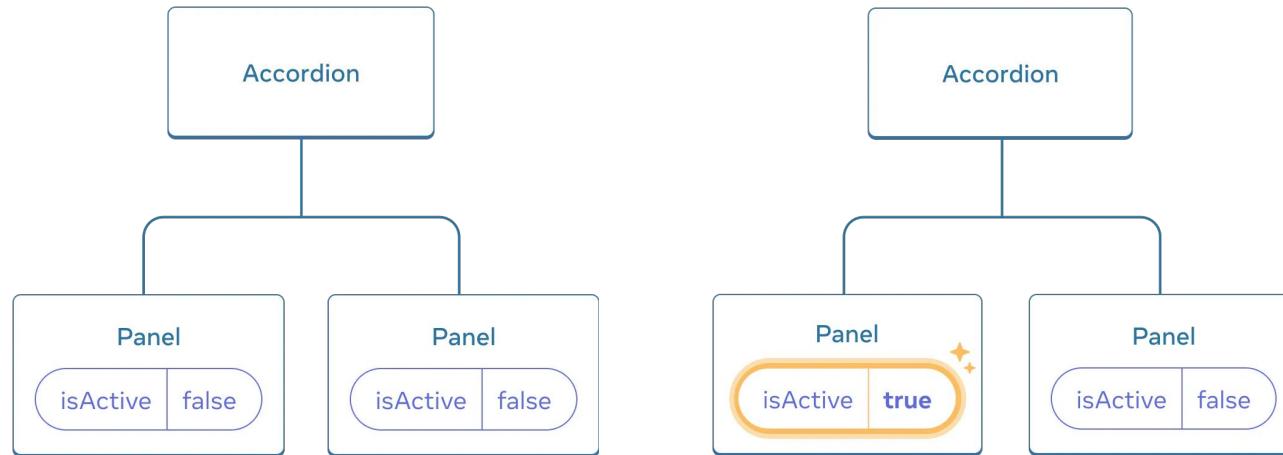
- render.com
- heroku.com
- vercel.com

Sharing States

Sharing State Between Components

Sometimes, you want the state of two components to always change together. To do it, remove state from both of them, move it to their closest common parent, and then pass it down to them via props.

Let's say you want to change it so that only one panel is expanded at any given time:



```
1 import { useState } from 'react';
2
3 function Panel({ title, children }) {
4   const [isActive, setIsActive] = useState(false);
5   return (
6     <section className="panel">
7       <h3>{title}</h3>
8       {isActive ? (
9         <p>{children}</p>
10      ) : (
11        <button onClick={() => setIsActive(true)}>
12          Show
13        </button>
14      )}
15     </section>
16   );
17 }
18
19 export default function Accordion() {
20   return (
21     <>
22       <h2>Almaty, Kazakhstan</h2>
23       <Panel title="About">
24         With a population of about 2 million, Almaty is K
25       </Panel>
26       <Panel title="Etymology">
27         The name comes from <span lang="kk-KZ">алма</span>
28       </Panel>
29     </>
30   );
31 }
32
```

Almaty, Kazakhstan

About

With a population of about 2 million, Almaty is Kazakhstan's largest city. From 1929 to 1997, it was its capital city.

Etymology

The name comes from алма, the Kazakh word for "apple" and is often translated as "full of apples". In fact, the region surrounding Almaty is thought to be the ancestral home of the apple, and the wild *Malus sieversii* is considered a likely candidate for the ancestor of the modern domestic apple.

Sharing State Between Components

To coordinate these two panels, you need to “lift their state up” to a parent component in three steps:

1. Remove state from the child components.
2. Pass hardcoded data from the common parent.
3. Add state to the common parent and pass it down together with the event handlers.

Sharing State Between Components

```
1 import { useState } from 'react';
2
3 export default function Accordion() {
4   const [activeIndex, setActiveIndex] = useState(0);
5   return (
6     <>
7       <h2>Almaty, Kazakhstan</h2>
8       <Panel
9         title="About"
10        isActive={activeIndex === 0}
11        onShow={() => setActiveIndex(0)}
12      >
13        With a population of about 2 million, Almaty is ¤
14      </Panel>
15      <Panel
16        title="Etymology"
17        isActive={activeIndex === 1}
18        onShow={() => setActiveIndex(1)}
19      >
20        The name comes from <span lang="kk-KZ">алма</span>
21      </Panel>
22    </>
23  );
24}
25
26 function Panel({
27   title,
28   children,
29   isActive,
30   onShow
31 }) {
32   return (
33     <section className="panel">
34       <h3>{title}</h3>
35       {isActive ? (
36         <p>{children}</p>
37       ) : (
38         <button onClick={onShow}>
39           Show
40         </button>
41       )}
42     </section>
43   );
44 }
45
```

Exercise 1: Extract Employee Overview

```
import { useState } from 'react';
import EmployeeOverview from './EmployeeOverview';

const employees = [
  { name: "John Doe", age: 30, salary: 100000, active: true },
  { name: "Jane Doe", age: 25, salary: 80000, active: true },
  { name: "Jim Doe", age: 35, salary: 120000, active: false },
  { name: "Jill Doe", age: 60, salary: 150000, active: false }
];
⌘L to chat, ⌘K to generate
function App() {
  return (
    <div className="container p-6 max-w-7xl">
      <EmployeeOverview employees={employees} />
    </div>
  );
}

export default App;
```

Exercise 2: Employee Salary Overview

Create a second component (EmployeeSalaryOverview) that lists all Salaries

```
function App() {
  return (
    <div className="container p-6 max-w-7xl">
      <EmployeeOverview employees={employees} />
      <EmployeeSalaryOverview employees={employees} />
    </div>
  );
}
```

Active Employees



John Doe

Age: 30
Salary: \$100000

Next

Monthly Salaries

John Doe	\$8,333.33
----------	------------

Jane Doe	\$6,666.67
----------	------------

Jim Doe	\$10,000.00
---------	-------------

Jill Doe	\$12,500.00
----------	-------------

Exercise 3: Lift state up

1. Remove state from the child components
2. Add state to the common parent (App.js) and pass it down



Monthly Salaries

John Doe	\$8,333.33
Jane Doe	\$6,666.67
Jim Doe	\$10,000.00
Jill Doe	\$12,500.00

Pair-Programming mit KI

Copy & Paste Ansatz (GPT4o)

Bitte schreibe ein einfaches Code-Beispiel für einen call zur OpenAI API in python.

Hier ist ein einfaches Code-Beispiel für einen API-Call zur OpenAI API mit Python:

```
python
import openai

# Setze deinen API-Schlüssel hier ein
api_key = "dein-api-schlüssel"

# Erstelle eine Anfrage an die OpenAI API
response = openai.ChatCompletion.create(
    model="gpt-4", # oder "gpt-3.5-turbo"
    messages=[
        {"role": "system", "content": "Du bist ein hilfreicher Assistent."},
        {"role": "user", "content": "Erkläre mir, wie die OpenAI API funktioniert."},
    ],
    api_key=api_key # Falls erforderlich, kann auch `openai.api_key = api_key` gesetzt werden
)

# Ausgabe der Antwort
print(response["choices"][0]["message"]["content"])
```

Copy & Paste Ansatz (Sonnet 3.5)

S Bitte schreibe ein einfaches Code-Beispiel für einen call zur OpenAI API in python.

Welches LLM fürs Coden? Benchmarks!

	AIME 2024 pass@1	AIME 2024 cons@64	MATH- 500 pass@1	GPQA Diamond pass@1	LiveCodeBench pass@1	CodeForce rating
GPT-4o-0513	9.3	13.4	74.6	49.9	32.9	759.0
Claude-3.5-Sonnet-1022	16.0	26.7	78.3	65.0	38.9	717.0
o1-mini	63.6	80.0	90.0	60.0	53.8	1820.0
QwQ-32B	44.0	60.0	90.6	54.5	41.9	1316.0
DeepSeek-R1-Distill-Qwen-1.5B	28.9	52.7	83.9	33.8	16.9	954.0
DeepSeek-R1-Distill-Qwen-7B	55.5	83.3	92.8	49.1	37.6	1189.0
DeepSeek-R1-Distill-Qwen-14B	69.7	80.0	93.9	59.1	53.1	1481.0
DeepSeek-R1-Distill-Qwen-32B	72.6	83.3	94.3	62.1	57.2	1691.0
DeepSeek-R1-Distill-Llama-8B	50.4	80.0	89.1	49.0	39.6	1205.0
DeepSeek-R1-Distill-Llama-70B	70.0	86.7	94.5	65.2	57.5	1633.0

Vorteile integrierter AI-Codetools

- Direkte Codevorschläge im Editor – kein ständiger Wechsel nötig
- Kontextbezogene Tipps – versteht Projektstruktur und Code
- Automatisches Refactoring – Vorschläge für Optimierung direkt im Code
- Weniger Unterbrechungen – nahtlose Integration statt Copy & Paste
- Einfache Fehlersuche – Inline-Debugging und Fehlermeldungen



Cursor - Smarte Codevorschläge

```
1  from openai import OpenAI
2
3  client = OpenAI()
4
5
6  response = client.chat.completions.create(
7      model="gpt-4o",
8      messages=[
9          {
10              "role": "user",
11              "content": "hi"
12          }
13      ]
14  )
15
16  print(response.choices[0].message.content)
```

Cursor - Chat Interface

The screenshot shows a code editor interface with a dark theme. On the left, there is a file named `app.py` containing Python code for generating text completions using OpenAI's GPT-4o model. On the right, a floating window titled "Cursor Settings" displays a "CHAT" tab where a user has asked the AI to "Please research the prices for the used model in @Web". The AI has responded with the message " claude-3.5-sonnet image". Below the message, there are buttons for "submit" and "codebase".

```
app.py      ✎ Cursor Settings
app.py > ...
1  from openai import OpenAI
2
3  client = OpenAI()
4
5  response = client.chat.completions.create(
6      model="gpt-4o",
7      messages=[
8          {
9              "role": "user",
10             "content": "hi"
11         }
12     ]
13 )
14
15 print(response.choices[0].message.content)
```

CHAT COMPOSER BUG FINDER

+ ⏪ ... ×

+ ⏪ Web × app.py ×

Please research the prices for the used model in @Web >

claude-3.5-sonnet image

submit ↵ codebase ⌘ ↵

Cursor - Inline Editieren mit KI

```
1  from openai import OpenAI
2
3  client = OpenAI()
4
5  response = client.chat.completions.create([
6      model="gpt-4o",
7      messages=[{
8          "role": "user",
9          "content": "hi"
10     }
11   ]
12 ])
13 )
```

Please change the user message to something that we can input directly in the terminal.

Submit Edit quick question claude-3.5-sonnet ⌘K to toggle

Cursor - Terminal Befehle

```
○ (venv) ➔ ppedv git reset --hard HEAD~1
```

What is the command to revert the last commit?|X

➡ Submit

↖ ↗ quick question

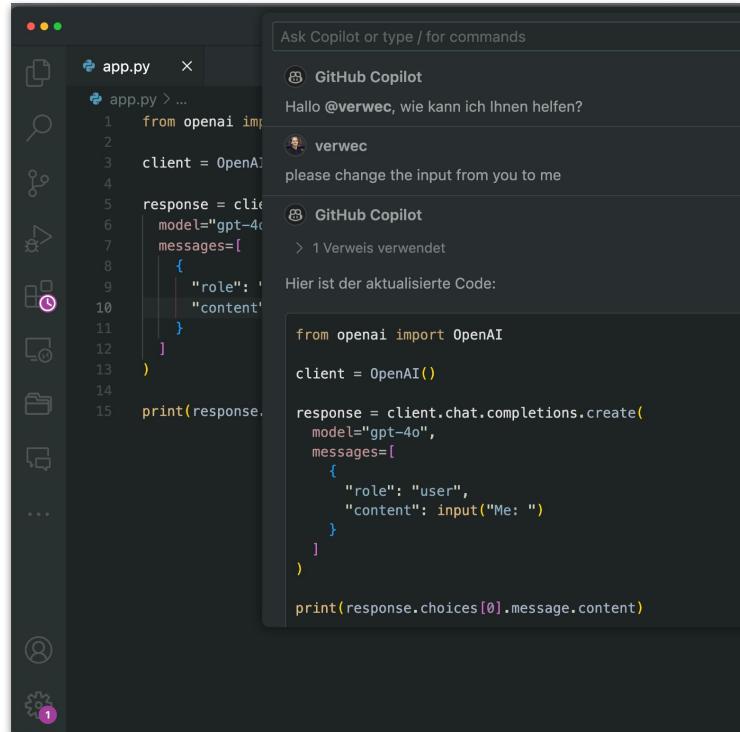
↙ claude-3.5-sonnet ⌘K to toggle focus

Cursor vs. GitHub Copilot

```
1  from openai import OpenAI
2
3  client = OpenAI()
4
5  response = client.chat.completions.create(
6      model="gpt-4o",
7      messages=[
8          {
9              "role": "user",
10             "content": "hi"
11         }
12     ]
13 )
```

Please change the user message to something that we can run in the terminal.

[Submit Edit](#) [quick question](#)



Cursor vs. GitHub Copilot

- **Eigenständiger Editor vs. IDE-Plugin:** Cursor ist ein eigener KI-Codeeditor, Copilot eine Erweiterung für VS Code/JetBrains.
- **Integriertes Chat-Interface:** Cursor bietet Chat- und Debug-Funktionen direkt im Editor; Copilot ist primär auf Code-Vervollständigung spezialisiert (inzwischen auch Chat).
- **Refactoring & Testing:** Cursor ermöglicht schnelle Refactoring-Schritte und teils integrierte Tests, Copilot liefert vor allem Code-Snippets.
- **Projektkontext:** Cursor kann das Projekt umfassend indexieren und verstehen, Copilot nutzt IDE-Kontext sowie Daten von GitHub.
- **Preismodell:** Cursor (zum Teil kostenlos/beta) vs. Copilot (Abo-Modell, z.B. 10 USD/Monat).

Cursor vs. GitHub Copilot

GitHub Copilot:

- Große Verbreitung, vertraut durch GitHub/Microsoft, tiefe IDE-Integration.
- Standard für viele: „Set it and forget it“ – Autovervollständigung direkt in VS Code oder JetBrains.

Cursor:

- AI-first Editor mit Chat und RAG-Indexing (gesamter Projektkontext).
- Interaktiv & Lernfokus: Ideal, wenn man beim Debugging oder Refactoring mit seinem Code „reden“ möchte.

Copilot dominiert noch, Cursor lockt mit innovativen Funktionen und ist noch im Wachstum.

Cursor vs. GitHub Copilot

GitHub Copilot features

Code completion

Autocomplete-style suggestions from Copilot in supported IDEs (*Visual Studio Code, Visual Studio, JetBrains IDEs, Azure Data Studio, Xcode, and Vim/Neovim*). For more information, see [Getting code suggestions in your IDE with GitHub Copilot](#).

Copilot Chat

A chat interface that lets you ask coding-related questions. GitHub Copilot Chat is available on the GitHub website, in GitHub Mobile, in supported IDEs (*Visual Studio Code, Visual Studio, and JetBrains IDEs*), and in Windows Terminal. Users can also use skills with Copilot Chat. For more information, see [Asking GitHub Copilot questions in GitHub](#) and [Asking GitHub Copilot questions in your IDE](#).

Copilot in the CLI

A chat-like interface in the terminal, where you can ask questions about the command line. You can ask Copilot to provide command suggestions or explanations of commands. Users can also integrate Copilot in Windows Terminal Canary. For more information, see [Using GitHub Copilot in the command line](#).

OpenAI Chat Completion API

<https://github.com/verwec/node-openai-example>

Day 3

Day 3: Leveraging TypeScript and React Advanced Topics

- Context API
- Introduction to TypeScript for React
- Utilizing Type Aliases in TypeScript
- Interface Implementation in TypeScript
- TypeScript Functions: Definition and Usage
- Generic Types in TypeScript: An Overview
- Applying TypeScript in React Projects
- Basics of IT Security in Web Development

Recap: Lift states up

Exercise 1: Extract Employee Overview

```
import { useState } from 'react';
import EmployeeOverview from './EmployeeOverview';

const employees = [
  { name: "John Doe", age: 30, salary: 100000, active: true },
  { name: "Jane Doe", age: 25, salary: 80000, active: true },
  { name: "Jim Doe", age: 35, salary: 120000, active: false },
  { name: "Jill Doe", age: 60, salary: 150000, active: false }
];
⌘L to chat, ⌘K to generate
function App() {
  return (
    <div className="container p-6 max-w-7xl">
      <EmployeeOverview employees={employees} />
    </div>
  );
}

export default App;
```

Exercise 2: Employee Salary Overview

Create a second component (EmployeeSalaryOverview) that lists all Salaries

```
function App() {
  return (
    <div className="container p-6 max-w-7xl">
      <EmployeeOverview employees={employees} />
      <EmployeeSalaryOverview employees={employees} />
    </div>
  );
}
```

Active Employees



John Doe

Age: 30
Salary: \$100000

Next

Monthly Salaries

John Doe	\$8,333.33
----------	------------

Jane Doe	\$6,666.67
----------	------------

Jim Doe	\$10,000.00
---------	-------------

Jill Doe	\$12,500.00
----------	-------------

Exercise 3: Lift state up

1. Remove state from the child components
2. Add state to the common parent (App.js) and pass it down



Monthly Salaries

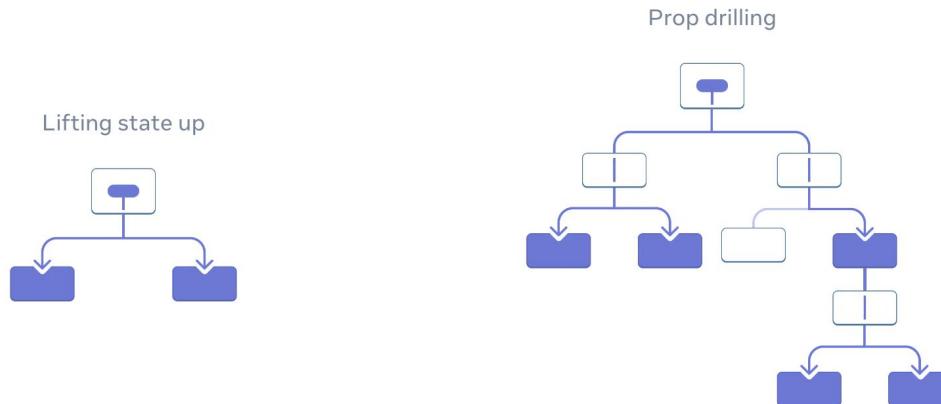
John Doe	\$8,333.33
Jane Doe	\$6,666.67
Jim Doe	\$10,000.00
Jill Doe	\$12,500.00

Context API

Context API

Passing props is a great way to explicitly pipe data through your UI tree to the components that use it.

But passing props can become verbose and inconvenient when you need to pass some prop deeply through the tree, or if many components need the same prop.



Context API

Centralized state management for React components.

- State Globalization: Share state across many components.
- Prop Drilling Avoidance: Eliminate passing props at every level.
- Provider/Consumer Pattern: Wrap and consume context effectively.
- Performance Optimization: Prevent unnecessary renders.
- Application Scalability: Facilitates larger application architectures.

Context vs Provider

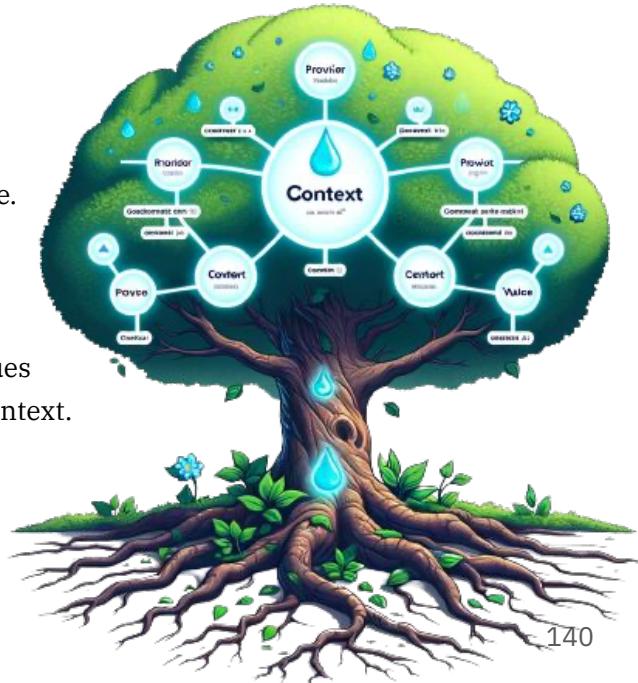
Context and Provider work together in React to manage and distribute state.

Context:

- A construct that holds state and allows components to subscribe to it.
- Created with `createContext()` and doesn't hold state until provided with one.
- Conceptually, it represents the "what" — what data or functionality will be available.

Provider:

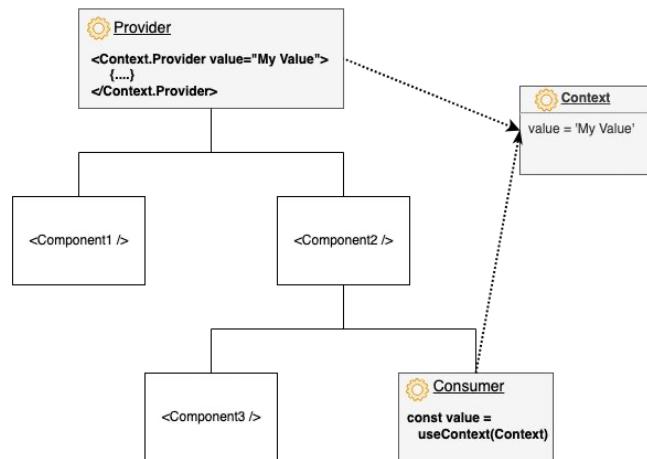
- A component that wraps a part of the component tree and provides the actual values
- It takes a `value` prop which is the actual data you want to distribute through the Context.
- It's the "how" — how the context's data is supplied and updated across the tree.



Context API

Centralized state management for React components.

React Context



Demo: Use Context to Show Employees

Implement a context that allows to show Employees (<https://github.com/verwec/ContextExample>)

```
1  import './App.css';
2  import Homepage from './Homepage';
3  const employees = [
4    {
5      name: 'John Doe',
6      email: 'john.doe@example.com',
7      phone: '123-456-7890',
8    },
9    {
10      name: 'Jane Smith',
11      email: 'jane.smith@example.com',
12      phone: '123-456-7890',
13    },
14    {
15      name: 'Jim Beam',
16      email: 'jim.beam@example.com',
17      phone: '123-456-7890',
18    },
19  ];
20
21  function App() {
22    return (
23      <div className="App" style={{ margin: '20px', textAlign: 'left' }}>
24        <Homepage employees={employees} />
25      </div>
26    );
27  }
28
29  export default App;
```

Exercise: Use Context to Show Employees

```
src > EmployeeContext.jsx > EmployeeProvider
1  [* tab]
2  export const EmployeeContext = createContext();
3
4  export const EmployeeProvider = ({ children }) => [
5
6    const employees = [
7      {
8        name: 'John Doe',
9        email: 'john.doe@example.com',
10       phone: '123-456-7890',
11     },
12   ];
13
14   return (
15     <EmployeeContext.Provider value={{employees}}>{children}</EmployeeContext.Provider>
16   );
17 ];
```



```
function App() {
  return (
    <div className="App" style={{ margin: '20px', textAlign: 'left' }}>
      <EmployeeProvider>
        | Homepage
        | </EmployeeProvider>
      </div>
    );
}
```

```
1  import React from 'react';
2  import { useContext } from 'react';
3  import { EmployeeContext } from '../EmployeeContext';
4
5  const EmployeesList = () => {
6    const { employees } = useContext(EmployeeContext);
7    return (
8      <ul>
9        {employees.map((employee) => (
10          <li key={employee.name}>{employee.name}</li>
11        )));
12      </ul>
13    );
14  };
15
16  export default EmployeesList;
```

