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Describing the UI

React is a JavaScript library for rendering user interfaces (UI). UI is built from small units like buttons, text, and images. React lets you combine them into reusable, nestable *components*. From web sites to phone apps, everything on the screen can be broken down into components. In this chapter, you'll learn to create, customize, and conditionally display React components.

In this chapter

- [How to write your first React component](#)
- [When and how to create multi-component files](#)
- [How to add markup to JavaScript with JSX](#)
- [How to use curly braces with JSX to access JavaScript functionality from your components](#)
- [How to configure components with props](#)
- [How to conditionally render components](#)
- [How to render multiple components at a time](#)
- [How to avoid confusing bugs by keeping components pure](#)
- [Why understanding your UI as trees is useful](#)

Your first component

React applications are built from isolated pieces of UI called *components*. A React component is a JavaScript function that you can sprinkle with markup. Components can be as small as a button, or as large as an entire page. Here is a `Gallery` component rendering three `Profile` components:

[App.js](#)[Download](#) [Reload](#) [Clear](#) [Fork](#)

```
1 function Profile() {
```

```
2   return (  
3       
7   );  
8 }  
9  
10 export default function Gallery() {  
11   return (  
12     <section>
```

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Amazing scientists



Ready to learn this topic?

Read [Your First Component](#) to learn how to declare and use React components.

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Importing and exporting components

You can declare many components in one file, but large files can get difficult to navigate. To solve this, you can *export* a component into its own file, and then *import* that component from another file:

[Gallery.js](#) [Profile.js](#)

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```
import Profile from './Profile.js';

export default function Gallery() {
  return (
    <section>
      <h1>Amazing scientists</h1>
      <Profile />
      <Profile />
      <Profile />
    </section>
  );
}
```

Ready to learn this topic?

Read [Importing and Exporting Components](#) to learn how to split components into their own files.

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Writing markup with JSX

Each React component is a JavaScript function that may contain some markup that React renders into the browser. React components use a syntax extension called JSX to represent that markup. JSX looks a lot like HTML, but it is a bit stricter and can display dynamic information.

If we paste existing HTML markup into a React component, it won't always work:

App.js

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```
export default function TodoList() {
  return (
    // This doesn't quite work!
    <h1>Hedy Lamarr's Todos</h1>
    
    <ul>
      <li>Invent new traffic lights
      <li>Rehearse a movie scene
```

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If you have existing HTML like this, you can fix it using a [converter](#):

App.js

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```
export default function TodoList() {
  return (
    <>
      <h1>Hedy Lamarr's Todos</h1>
      
      <ul>
        <li>Invent new traffic lights</li>
        <li>Rehearse a movie scene</li>
      </ul>
    </>
  )
}
```

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Ready to learn this topic?

Read [Writing Markup with JSX](#) to learn how to write valid JSX.

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JavaScript in JSX with curly braces

JSX lets you write HTML-like markup inside a JavaScript file, keeping rendering logic and content in the same place. Sometimes you will want to add a little JavaScript logic or reference a dynamic property inside that markup. In this situation, you can use curly braces in your JSX to “open a window” to JavaScript:

App.js

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```
const person = {
  name: 'Gregorio Y. Zara',
  theme: {
    backgroundColor: 'black',
    color: 'pink'
  }
};

export default function TodoList() {
  return (
    <div style={person.theme}>
      <h1>{person.name}'s Todos</h1>
    </div>
  );
}
```

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Ready to learn this topic?

Read [JavaScript in JSX with Curly Braces](#) to learn how to access JavaScript data from JSX.

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Passing props to a component

React components use *props* to communicate with each other. Every parent component can pass some information to its child components by giving them props. Props might remind you of HTML attributes, but you can pass any JavaScript value through them, including objects, arrays, functions, and even JSX!

App.js utils.js

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```
import { getImageUrl } from './utils.js'
```

```
export default function Profile() {
```

```
return (  
  <Card>  
    <Avatar  
      size={100}  
      person={{  
        name: 'Katsuko Saruhashi',  
        imageId: 'Yfe0qp2'  
      }}  
    />  
  </Card>  
)
```

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Ready to learn this topic?

Read [Passing Props to a Component](#) to learn how to pass and read props.

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Conditional rendering

Your components will often need to display different things depending on different conditions. In React, you can conditionally render JSX using JavaScript syntax like `if` statements, `&&`, and `? :` operators.

In this example, the JavaScript `&&` operator is used to conditionally render a checkmark:

App.js

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```
function Item({ name, isPacked }) {  
  return (  
    <li className="item">  
      {name} {isPacked && '✓'}  
    </li>  
  );  
}  
  
export default function PackingList() {  
  return (  
    <section>  
      <h1>Sally Ride's Packing List</h1>  
    </section>  
  );  
}
```

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Ready to learn this topic?

Read [Conditional Rendering](#) to learn the different ways to render content conditionally.

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Rendering lists

You will often want to display multiple similar components from a collection of data. You can use JavaScript's `filter()` and `map()` with React to filter and transform your array of data into an array of components.

For each array item, you will need to specify a `key`. Usually, you will want to use an ID from the database as a `key`. Keys let React keep track of each item's place in the list even if the list changes.

App.js data.js utils.js

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```
import { people } from './data.js';
import { getImageUrl } from './utils.js';

export default function List() {
  const listItems = people.map(person =>
    <li key={person.id}>
      <img
        src={getImageUrl(person)}
        alt={person.name}
      />
      <p>
        <b>{person.name}</b>
      </p>
    </li>
  );
}
```

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Ready to learn this topic?

Read [Rendering Lists](#) to learn how to render a list of components, and how to choose a key.

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Keeping components pure

Some JavaScript functions are *pure*. A pure function:

- **Minds its own business.** It does not change any objects or variables that existed before it was called.
- **Same inputs, same output.** Given the same inputs, a pure function should always return the same result.

By strictly only writing your components as pure functions, you can avoid an entire class of baffling bugs and unpredictable behavior as your codebase grows. Here is an example of an impure component:

```
let guest = 0;

function Cup() {
  // Bad: changing a preexisting variable!
  guest = guest + 1;
  return <h2>Tea cup for guest #{guest}</h2>;
}

export default function TeaSet() {
  return (
    <>
    <Cup />
  )
}
```

▼ Show more

You can make this component pure by passing a prop instead of modifying a preexisting variable:

```
function Cup({ guest }) {
  return <h2>Tea cup for guest #{guest}</h2>;
}
```

```
export default function TeaSet() {  
  return (  
    <>  
    <Cup guest={1} />  
    <Cup guest={2} />  
    <Cup guest={3} />  
  </>  
),  
}
```

Ready to learn this topic?

Read [Keeping Components Pure](#) to learn how to write components as pure, predictable functions.

[Read More >](#)

Your UI as a tree

React uses trees to model the relationships between components and modules.

A React render tree is a representation of the parent and child relationship between components.

An example React render tree.

Components near the top of the tree, near the root component, are considered top-level components. Components with no child components are leaf components. This categorization of components is useful for understanding data flow and rendering performance.

Modelling the relationship between JavaScript modules is another useful way to understand your app. We refer to it as a module dependency tree.

A dependency tree is often used by build tools to bundle all the relevant JavaScript code for the client to download and render. A large bundle size regresses user experience for React apps. Understanding the module dependency tree is helpful to debug such issues.

Ready to learn this topic?

Read [Your UI as a Tree](#) to learn how to create a render and module dependency trees for a React app and how they're useful mental models for improving user experience and performance.

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What's next?

Head over to [Your First Component](#) to start reading this chapter page by page!

Or, if you're already familiar with these topics, why not read about [Adding Interactivity](#)?

NEXT
[Your First Component](#)



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