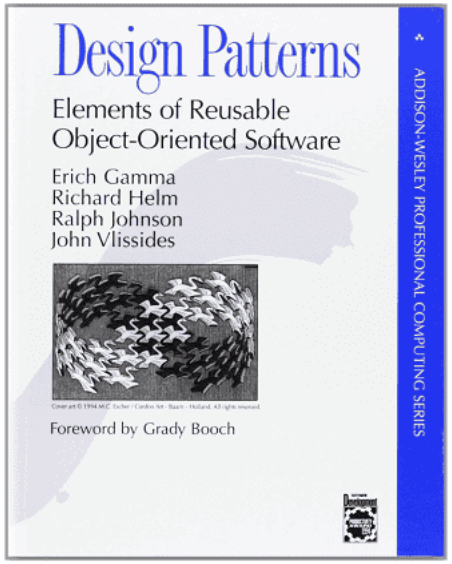


Design Patterns

In software engineering, a **design pattern** is a general repeatable solution to a commonly occurring problem in software **design**

Reusability & Separation of Concerns.

- **The DRY principle – Don't Repeat Yourself.**
- **Techniques to improve DRY(ness) (increase reusability):**
  1. **Inheritance** (is-a **relationships, e.g. Car is an automabile)**
  2. **Composition** (has-a **relationships, e.g. Car has an Engine)**

- **React favors composition.**
- **Core React composition Patterns:**
  1. **Container.**
  2. **Render Props.**
  3. **Higher Order Components.**

Composition - Children

- **HTML is composable**

```
<div>
    <h2>Some Heading</h2>
    <ul>
        <li> . . . . . </li>
        <li> . . . . . </li>
        <li> . . . . . </li>
    </ul>
</div>
```

```
<div>
    <p>…….</p>
   <img ……. />
  <a href ……./>
<</div>
```

** has three children.**

- ** has two children; has three children**

The Container pattern.

All React components have a special <u>children</u> prop. It allows a consumer (container) to pass other components to it by nesting them inside the jsx.

```
const Picture = (props) => {
  return (
    <div>
      <img src={props.src}/>
      {props.children}
    </div>
  )
}
```

```
3   const Container = () => {
4     // .. code ...
5     return (
6       <div className="container" >
7         <Picture src={anImageRef}>
8             // JSX here is bound to
9             // props.children of Picture
10        </Picture>
11      </div>
12    );
13  };
```

- **The container determines what** Picture **renders,**
- **This <u>de-couples</u> the** Picture **component from its content and makes it <u>reusable</u>.**

```
const OtherComponent1 = props => {
  . . . . . .
  return (
    <div className='container'>
      <Picture src={picture.src}>
          <button>.......</button>
      </Picture>
    </div>
  )
}
```

```
const OtherComponent2 = props => {
  . . . . . .
  return (
    <div className='container'>
      <Picture src={picture.src}>
          <ul>. . . . . </ul>
      </Picture>
    </div>
  )
}
```

```
const OtherComponent3 = props => {
  . . . . . .
  return (
    <div className='container'>
      <Picture src={picture.src}>
          <ComplexComponewnt>
            . . . . . .
          </ComplexComponewnt>
      </Picture>
    </div>
  )
```

Image

Button

Image

List

Image

Complex Component

Picture is **composed** with other elements / components

The Render Prop pattern

- **Use the pattern to share logic between components.**
- **Dfn:** A render prop is a <u>function prop</u> that a component uses to generate part of its rendered output.

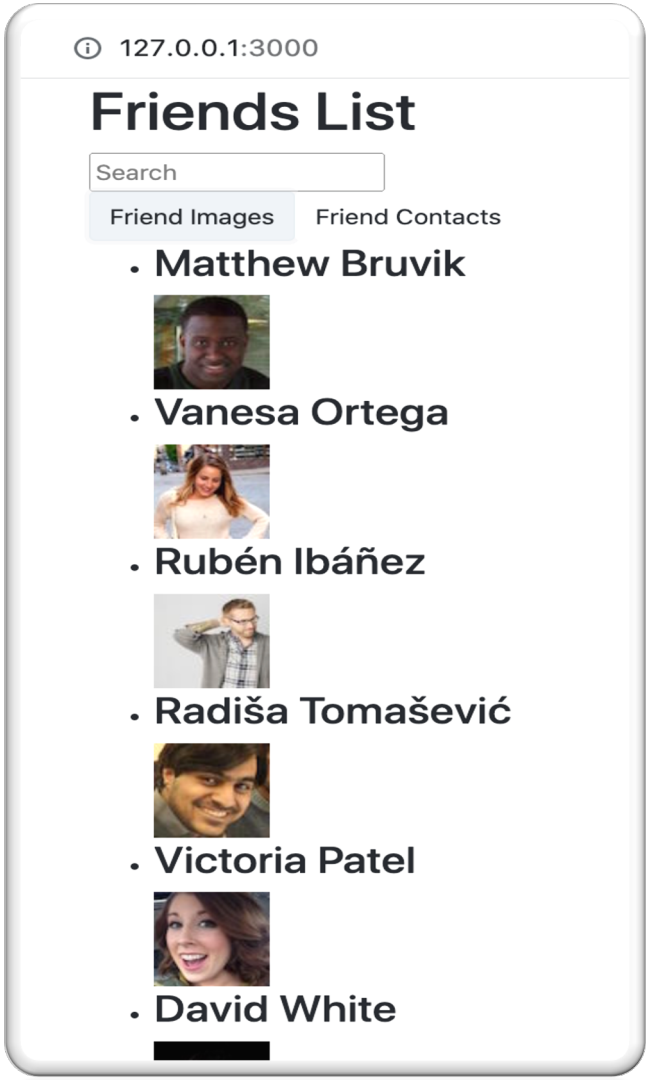
```
const SharedComponent = (props) => {
  ..........
  return (
    <div className="classX"
            onMouseOver={funcY} >
      { props.render() }
    </div>
  );
};
```

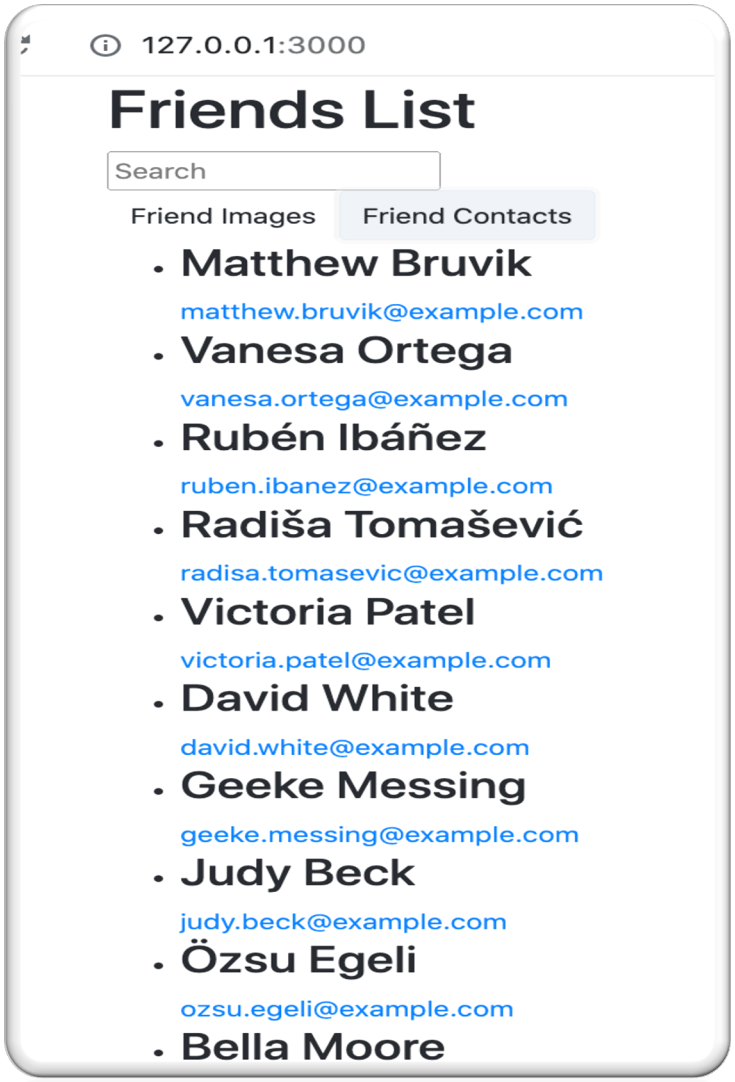
- SharedCoomponent **receives its render logic from the consumer, i.e.** SayHello.
- Prop name is arbitrary.

```
const SayHello = (props) => {
  ..........
  return (
    ........
    <SharedComponent render={() =>
      <span>Say Hello</span>
    } />
    ............
  );
};
```

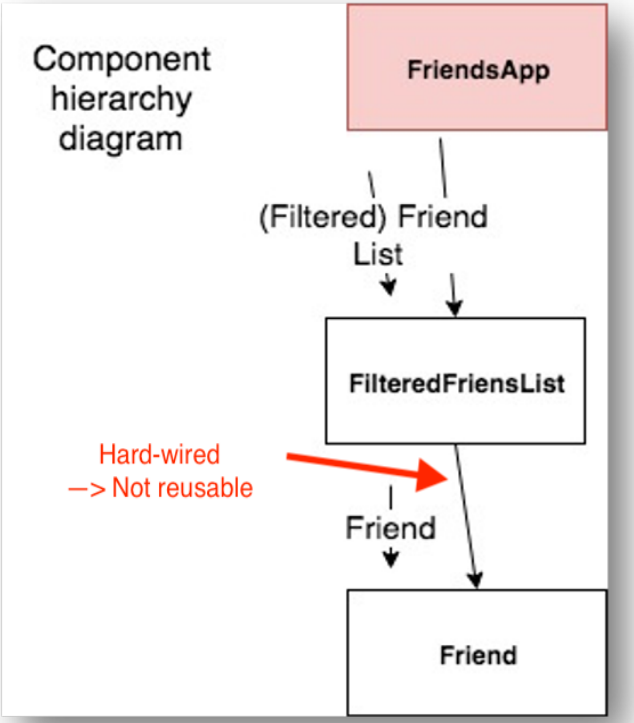
```
<div className="classX"
        onMouseOver={funcY} >
  <span>Say Hello</span>
</div>
```

The Render Prop - Sample App.





The Render Props - Sample App.



- **Updates to design:**

1. FriendsApp **passes a render-prop to** FilteredFriendList**, indicating** how **Friends should be rendered.**
2. **Remove static import of Friend component type from** FilteredFriendList**.**

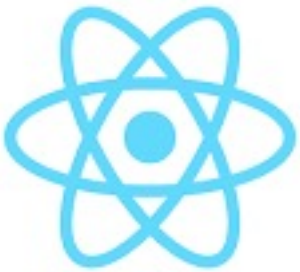
```
<FilteredFriendList
  list={filteredList}
  render={(friend) => <FriendImage friend={friend} />}
/>
```

```
1   import React from "react";
2   You, 5 days ago • Initial structure
3   const FilteredFriendList = props => {
4     // console.log('Render of FilteredFriendList')
5     const friends = props.list.map(item => (
6       props.render(item)
7     ));
8     return <ul>{friends}</ul>;
9   };
10
11  export default FilteredFriendList;
12
```

```
<FilteredFriendList
  list={filteredList}
  render={(friend) => <FriendContact friend={friend} />}
/>
```

- **Without this pattern we would need a** FilteredFriendList **component for each use case, thus violating the DRY principle.**

- **The prop name is arbitrary;** render **is a convention.**



Custom Hooks

Custom Hooks.

- **Custom Hooks let you extract component logic into** reusable **functions.**
- **Improves code readability and modularity.**

Example:

```
const BookPage = props => {
  const isbm = props.isbn;
  const [book, setBook] = useState(null);
  useEffect(() => {
    fetch(
    `https://api.for.books?isbn=${isbn}`)
    .then(res => res.json())
    .then(book => {
      setBook(book);
    });
  }, [isbn]);
  . . . .rest of component code . . . .
}
```

Objective – Extract the book-related state code into a custom hook.

Custom Hook Example.

Solution:

```
const useBook = isbn => {
  const [book, setBook] = useState(null);
  useEffect(() => {
     fetch(
    `https://api.for.books?isbn=${isbn}`)
    .then(res => res.json())
    .then(book => {
      setBook(book);
    });
  }, [isbn]);
   return [book, setBook];
};
```

```
const BookPage = props => {
  const isbm = props.isbn;
  const [book, setBook] = useBook(isbn);

  . . . .rest of component code . . . .
}
```

- **Custom Hook is an ordinary function BUT should only be called from a React component function.**
- **Prefix hook function name with** use **to leverage linting support.**
- **Function can return any collection type (array, object), with any number of entries.**