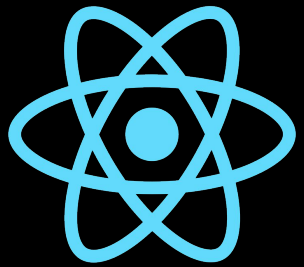
< React.js />



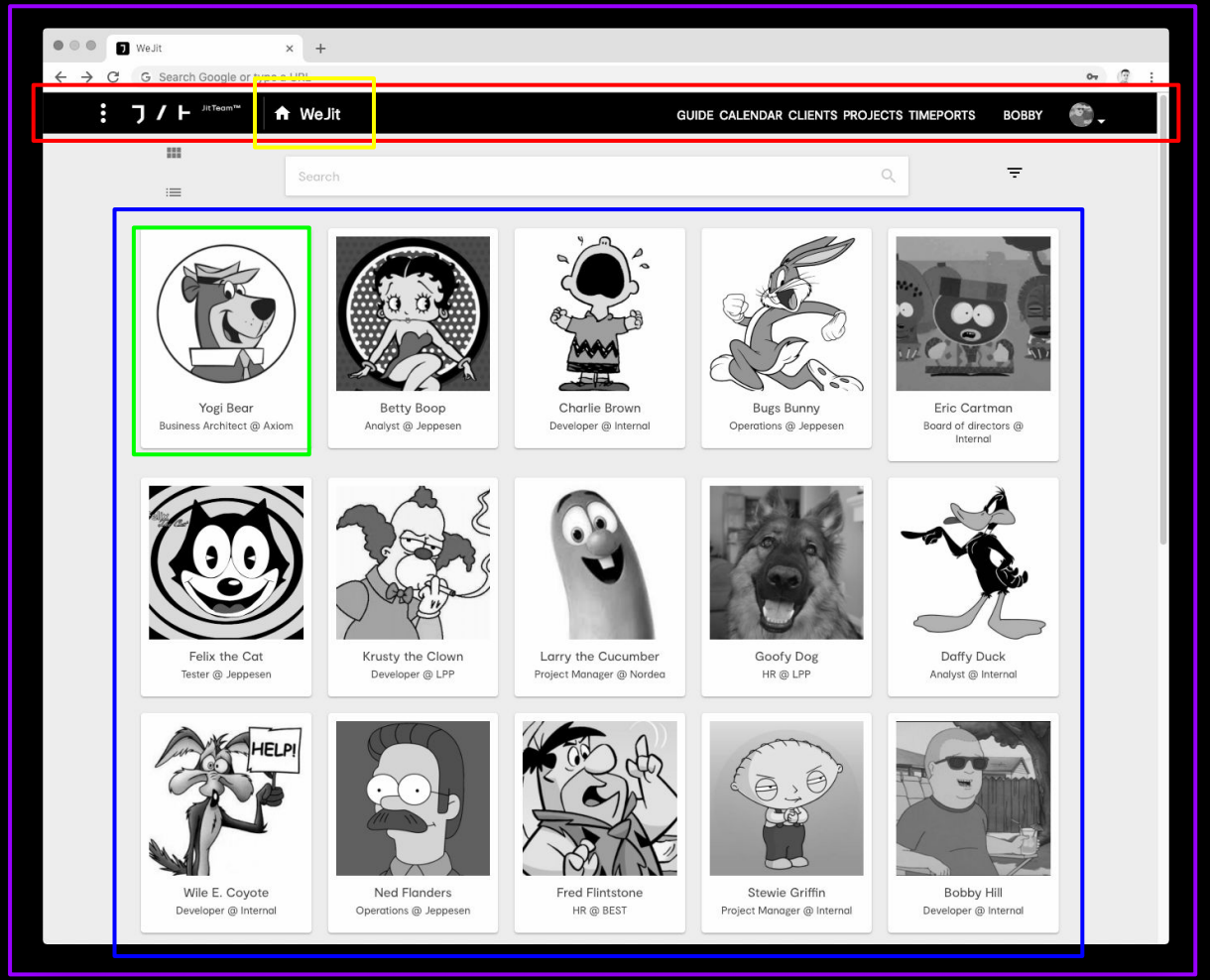
React is a declarative, efficient, and flexible JavaScript library for building user interfaces. It lets you compose complex UIs from small and isolated pieces of code called "components".

reactjs.org

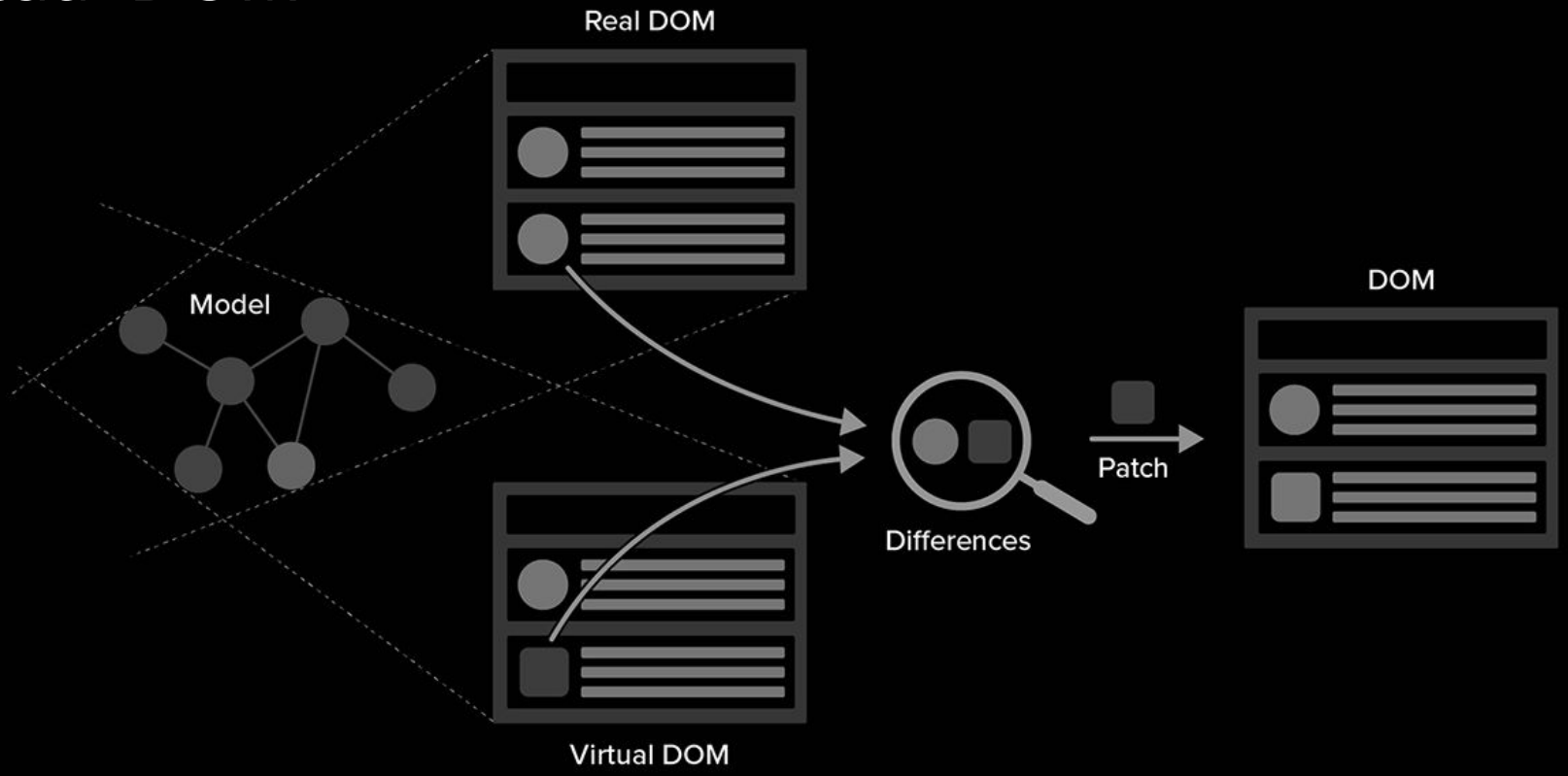
Components

Main

- Header
  - Logo
- UserList
  - UserItem



Virtual DOM



JSX

Syntax extension *not required*

HTML + JavaScript

markup + logic

JSX examples

```
const name = '3LO';

const element = <h1>Hello, {name}</h1>;
```

```
const element = <img src={user.avatarUrl} />
```

JSX element

```jsx
const element = (
  <h1 className="greeting">
    Hello, world!
  </h1>
);
```

```jsx
const element = React.createElement(
  'h1',
  {className: 'greeting'},
  'Hello, world!'
);
```

=

```jsx
// Note: this structure is simplified
const element = {
  type: 'h1',
  props: {
    className: 'greeting',
    children: 'Hello, world!'
  }
};
```

JSX rendering

```
ReactDOM.render(
 element,
 document.getElementById('root')
);
```

JSX updating

```
function tick() {
 const element = (
   <div>
     <h1>Hello, world!</h1>
     <h2>It is {new
Date().toLocaleTimeString()}.</h2>
   </div>
 );
 ReactDOM.render(element,
document.getElementById('root'));
}

setInterval(tick, 1000);
```

React Only Updates What's Necessary

Components

user-defined component

```
function Welcome() {
 return <h1>Hello, 3LO</h1>;
}
```

=

ES6

```
class Welcome extends React.Component {
 render() {
   return <h1>Hello, 3LO</h1>;
 }
}
```

function component

class component

Function component

```
function Welcome() {
 return <h1>Hello, 3LO</h1>;
}

const element = <Welcome/>;

ReactDOM.render(
 element,
 document.getElementById('root')
);
```

1. We call `ReactDOM.render()` with the `<Welcome/>` element.
2. React calls the `Welcome` component.
3. Our `Welcome` component returns a `<h1>Hello, 3LO</h1>` element as the result.
4. React DOM efficiently updates the DOM to match `<h1>Hello, 3LO</h1>`.

Class component

function component

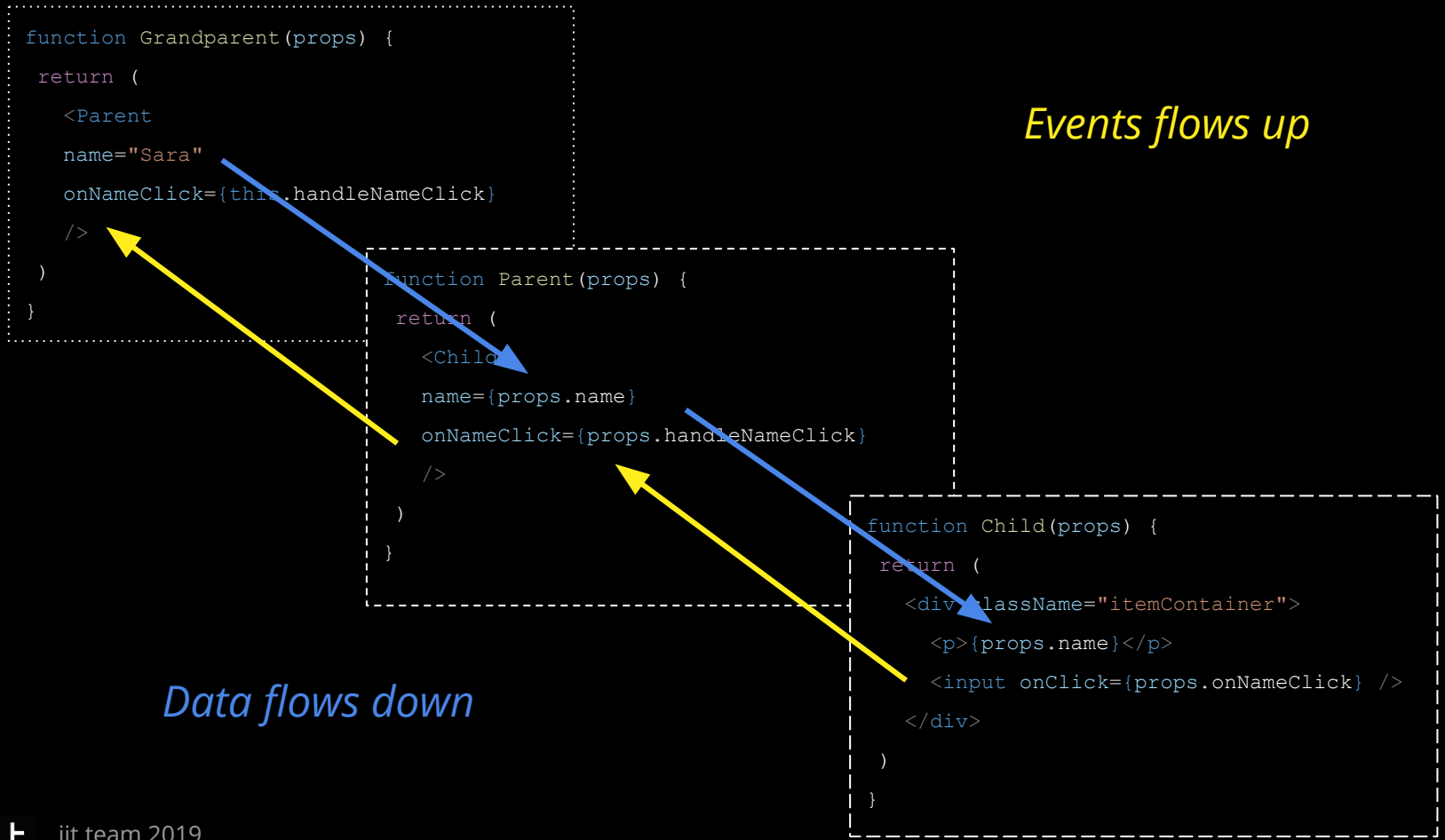
```
function Welcome() {
 return <h1>Hello, 3LO</h1>;
}

const element = <Welcome/>;

ReactDOM.render(
 element,
 document.getElementById('root')
);
```

class component

```
class Welcome extends React.Component {
 render() {
   return (
     <div>
       <h1>Hello, 3LO!</h1>
     </div>
   );
 }
}
ReactDOM.render(
 <Welcome/>,
 document.getElementById('root')
);
```

Props

```
class Clock extends React.Component {
 render() {
   return (
     <div>
       <h1>Hello, 3LO!</h1>
       <h2>It is
{this.props.date.toLocaleTimeString()}.</h2>
     </div>
   );
 }
}
ReactDOM.render(
 <Clock date={new Date()} />,
 document.getElementById('root')
);
```


function Grandparent(props) {
return (
<Parent
name="Sara"
onNameClick={this.handleNameClick}
/>
)
}
function Parent(props) {
return (
<Child
name={props.name}
onNameClick={props.handleNameClick}
/>
)
}
function Child(props) {
return (

{props.name}
<input onClick={props.onNameClick} />

)
}
Events flows up
Data flows down

State

```
class Clock extends React.Component {
 constructor(props) {
   super(props);
   this.state = {date: new Date()};
 }
 render() {
   return (
     <div>
       <h1>Hello, world!</h1>
       <h2>It is {this.state.date.toLocaleTimeString()}.</h2>
     </div>
   );
 }
}
```

setState( )

```
this.state.comment = 'Hello';
```

wrong

```
this.setState({comment: 'Hello'});
```

correct

Handling Events

HTML

```
<a href="#" onclick="console.log('The link was clicked.'); return false" >
 Click me
</a>
```

addEventListener?

REACT

```
function ActionLink() {
 function handleClick(e) {
   e.preventDefault();
   console.log('The link was clicked.');
 }

 return (
   <a href="#" onClick={handleClick}>
     Click me
   </a>
 );
}
```

Handling Events bind

```
class Toggle extends React.Component {
 constructor(props) {
   super(props);
   this.state = {isToggleOn: true};
   this.handleClick = this.handleClick.bind(this);
 }
 handleClick() {
   this.setState(state => ({
     isToggleOn: !state.isToggleOn
   }));
 }
 render() {
   return (
     <button onClick={this.handleClick}>
       {this.state.isToggleOn ? 'ON' : 'OFF'}
     </button>
   );
 }
}
```

ES6 arrow functions

(parameters) => { statement }

---

1. Shorter syntax
2. No binding of ***this***

ES6 arrow functions

Shorter syntax

```
function sayHello(person) {
 return `Hello, ${person}`;
}
sayHello('3LO');
// Hello, 3LO
```

```
var sayHello = (person) => { `Hello, ${person}` }
sayHello('3LO');
// Hello, 3LO
```

```
var sayHello = person => `Hello, ${person}`
```

ES6 arrow functions

*No binding of **this***

```
<button onClick={(e) => this.deleteRow(id, e)}>Delete Row</button>
```

=

```
<button onClick={this.deleteRow.bind(this, id)}>Delete
Row</button>
```

Handling Events class fields

```
class LoggingButton extends React.Component {
 handleClick = () => {
   console.log('this is:', this);
 }

 render() {
   return (
     <button onClick={this.handleClick}>
       Click me
     </button>
   );
 }
}
```

=

```
class LoggingButton extends React.Component {
 handleClick() {
   console.log('this is:', this);
 }

 render() {
   return (
     <button onClick={(e) => this.handleClick(e)}>
       Click me
     </button>
   );
 }
}
```

Lists & Keys

MAP

```
const numbers = [1, 2, 3, 4, 5];
const listItems = numbers.map((number) =>
 <li>{number}</li>
);
```

RENDER

```
ReactDOM.render(
 <ul>{listItems}</ul>,
 document.getElementById('root')
);
```



```
function NumberList(props) {
 const numbers = props.numbers;
 const listItems = numbers.map((number) =>
   <li key={number.toString()}>
     {number}
   </li>
 );
 return (
   <ul>{listItems}</ul>
 );
}

const numbers = [1, 2, 3, 4, 5];

ReactDOM.render(
 <NumberList numbers={numbers} />,
 document.getElementById('root')
);
```

Forms

type

value

onChange

onSubmit

checked

selected

```
class NameForm extends React.Component {
 constructor(props) {
   super(props);
   this.state = {value: ''};

   this.handleChange = this.handleChange.bind(this);
   this.handleSubmit = this.handleSubmit.bind(this);
 }
 handleChange(event) {
   this.setState({value: event.target.value});
 }
 handleSubmit(event) {
   alert('An essay was submitted: ' + this.state.value);
   event.preventDefault();
 }
 render() {
   return (
     <form onSubmit={this.handleSubmit}>
       <label>
         Name:
           <input type="text" value={this.state.value}
onChange={this.handleChange} />
       </label>
       <input type="submit" value="Submit" />
     </form>
   );
 }
}
```

Lifecycle methods

Mounting

constructor()
static getDerivedStateFromProps()
render()
componentDidMount()

Updating

static getDerivedStateFromProps()
shouldComponentUpdate()
render()
getSnapshotBeforeUpdate()
componentDidUpdate()

Unmounting

componentWillUnmount()

Error Handling

static getDerivedStateFromError()
componentDidCatch()


```
class Clock extends React.Component {
 constructor(props) {
   ...
 }
 componentDidMount() {
   this.timerID = setInterval(
     () => this.tick(),
     1000
   );
 }
 componentWillUnmount() {
   clearInterval(this.timerID);
 }
 tick() {
   this.setState({
     date: new Date()
   });
 }
 render() {
 ...
 }
}
```

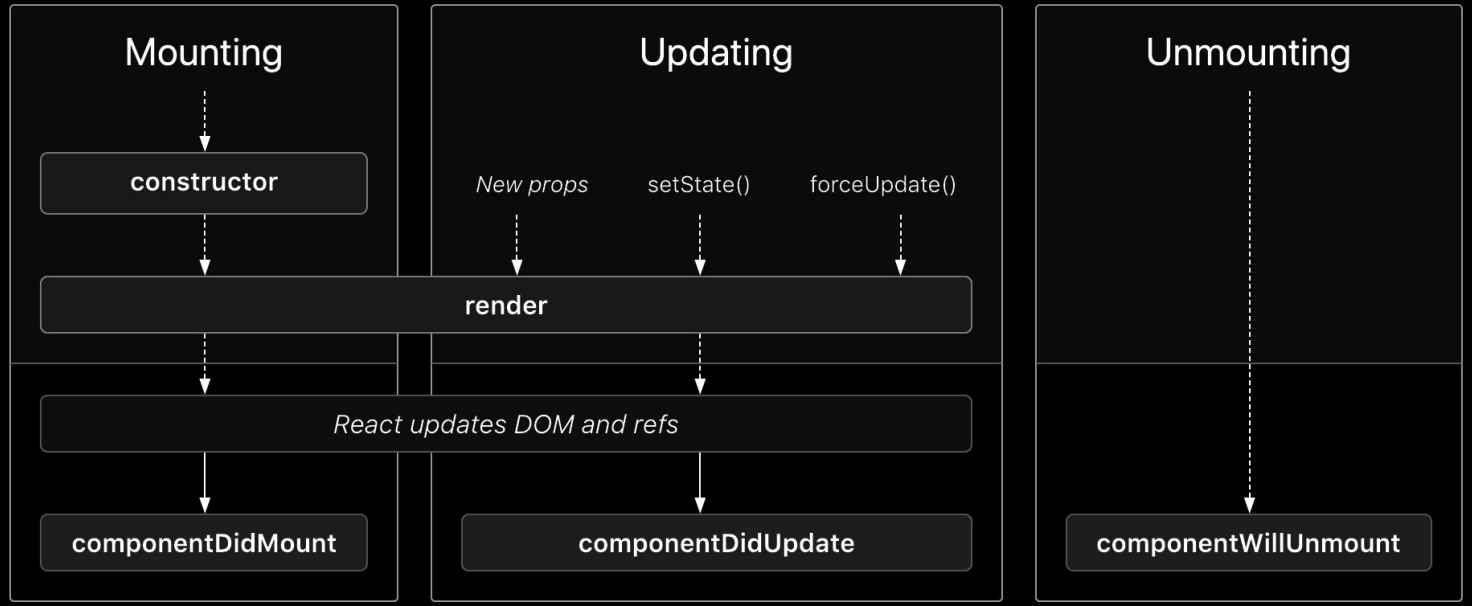
Lifecycle methods

"Render phase"

Pure and has no side effects. May be paused, aborted or restarted by React.

"Commit phase"

Can work with DOM, run side effects, schedule updates.



Conditional rendering

If statement

```
render() {
 const isLoggedIn = this.state.isLoggedIn;
 let button;

 if (isLoggedIn) {
   button = <LogoutButton onClick={this.handleLogoutClick}
/>;
 } else {
   button = <LoginButton onClick={this.handleLoginClick}
/>;
 }

 return (
   <div>
     <Greeting isLoggedIn={isLoggedIn} />
     {button}
   </div>
 );
}
```

Conditional rendering

Logical && Operator

```
function Mailbox(props) {
 const unreadMessages = props.unreadMessages;
 return (
   <div>
     <h1>Hello!</h1>
     {unreadMessages.length > 0 &&
       <h2>
         You have {unreadMessages.length} unread
messages.
       </h2>
     }
   </div>
 );
}
```

Conditional rendering

Conditional Operator

condition ? true : false.

```
render() {
 const isLoggedIn = this.state.isLoggedIn;
 return (
   <div>
     The user is <b>{isLoggedIn ? 'currently' :
'not'}</b> logged in.
   </div>
 );
}
```

```
render() {
 const isLoggedIn = this.state.isLoggedIn;
 return (
   <div>
     {isLoggedIn ? (
       <LogoutButton onClick={this.handleLogoutClick} />
     ) : (
       <LoginButton onClick={this.handleLoginClick} />
     )}
   </div>
 );
}
```

Toolchain

Kind	Tools	Task
Package Manager	Yarn, npm	It lets you take advantage of a vast ecosystem of third-party packages, and easily install or update them.
Bundler	Webpack, Parcel	It lets you write modular code and bundle it together into small packages to optimize load time.
Compiler	Babel	It lets you write modern JavaScript code that still works in older browsers.

npm examples

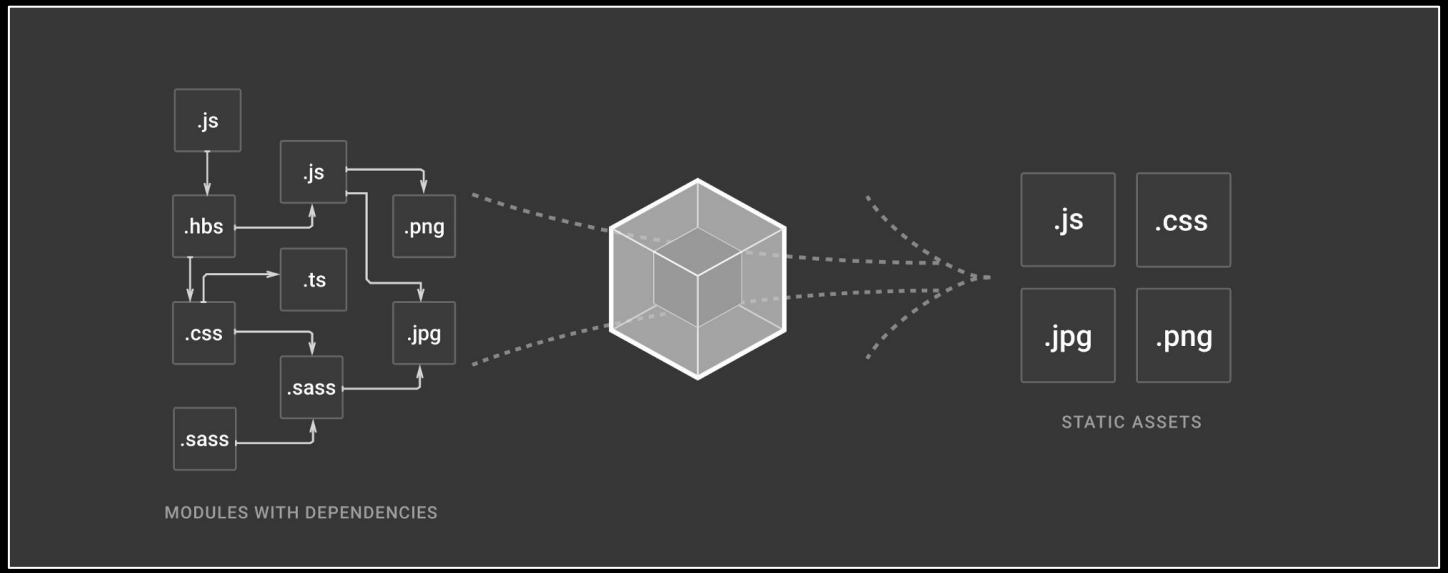
```
npm init
```

```
npm install npm@latest -g
```

```
npm install --save-dev webpack@4.19.1
```

https://docs.npmjs.com/

Webpack



https://webpack.js.org/

Babel

IN

```
// ES2015 arrow function
[1, 2, 3].map((n) => n + 1);
```

```
[1, 2, 3].map(function(n) {
 return n + 1;
});
```

OUT

https://babeljs.io/

New app

node.js + **npm** *https://nodejs.org/en/download/*

```
npx create-react-app my-app
```

```
cd my-app
```

Development

```
npm start
```

Production

```
npm run build
```

Workshop #1

Tic-tac-toe

game

Homework #1

Postcard app

reactivation

https://github.com/mackankowski/frontend-bootcamp/tree/master/playground/react/postcard-app