极客时间

React 从入门到精通

最全面的 React 技术栈及最佳实践教程

React 出现的历史背景及特性介绍

”简单”功能一再出现 Bug

问题出现的根源

1. 传统 UI 操作关注太多细节
2. 应用程序状态分散在各处，难以追踪和维护

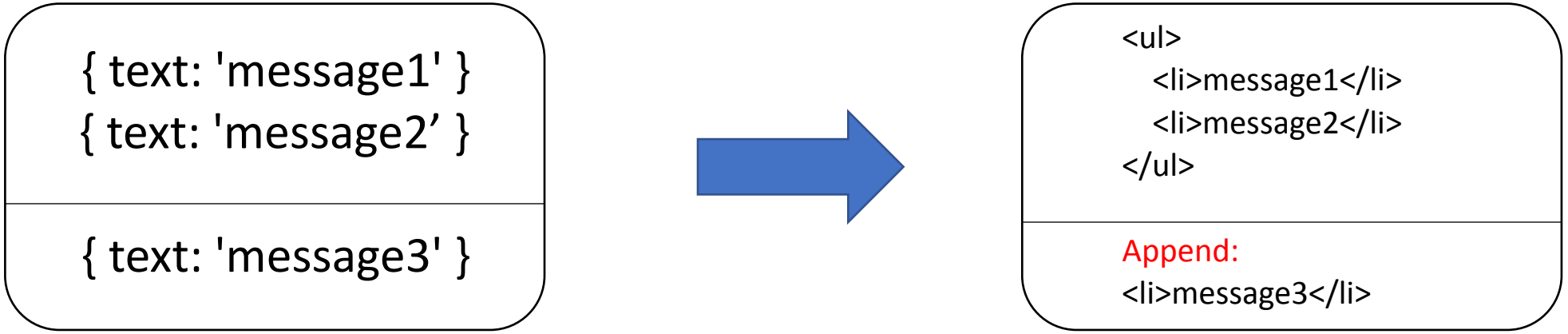
传统 DOM API 关注太多细节

Selectors	Attributes/CSS	Manipulation	Traversing
Basics * .class element #id selector1, selectorN, ... Hierarchy parent > child ancestor descendant prev + next prev ~ siblings Basic Filters :animated :eq() :even :first :gt() :header :lang()	Attributes .attr() .prop() .removeAttr() .removeProp() .val() CSS .addClass() .css() jQuery.cssHooks .hasClass() .removeClass() Dimensions .height() .innerHeight() .innerWidth() .outerHeight() .outerWidth() .width()	Copying .clone() DOM Insertion, Around .wrap() .wrapAll() .wrapInner() DOM Insertion, Inside .append() .appendTo() .html() .prepend() .prependTo() .text() DOM Removal .detach() .empty() .remove() .unwrap()	Filtering .eq() .filter() .first() .has() .is() .last() .map() .not() Miscellaneous Traversing .add() .andSelf() .contents() .each() .end() Tree Traversal .addBack() .children() .closest() .find()

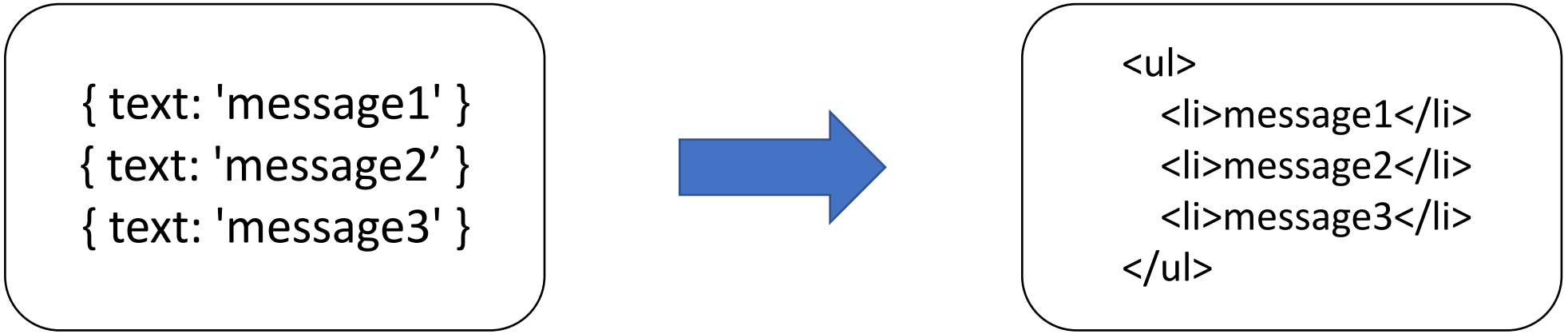
React：始终整体”刷新”页面

无需关心细节

局部刷新



React：整体刷新



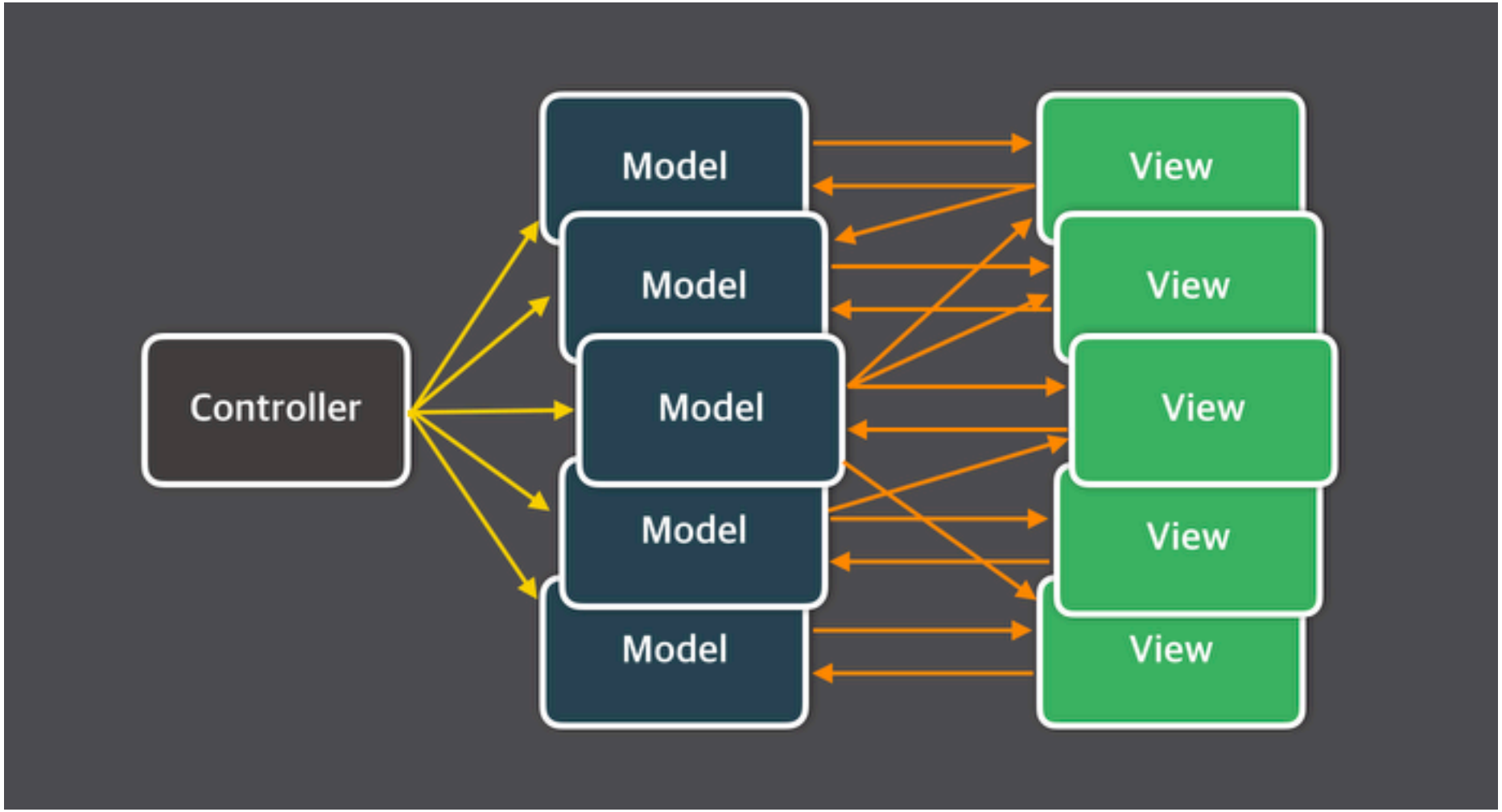
React 很简单

- 1个新概念
- 4个必须 API
- 单向数据流
- 完善的错误提示

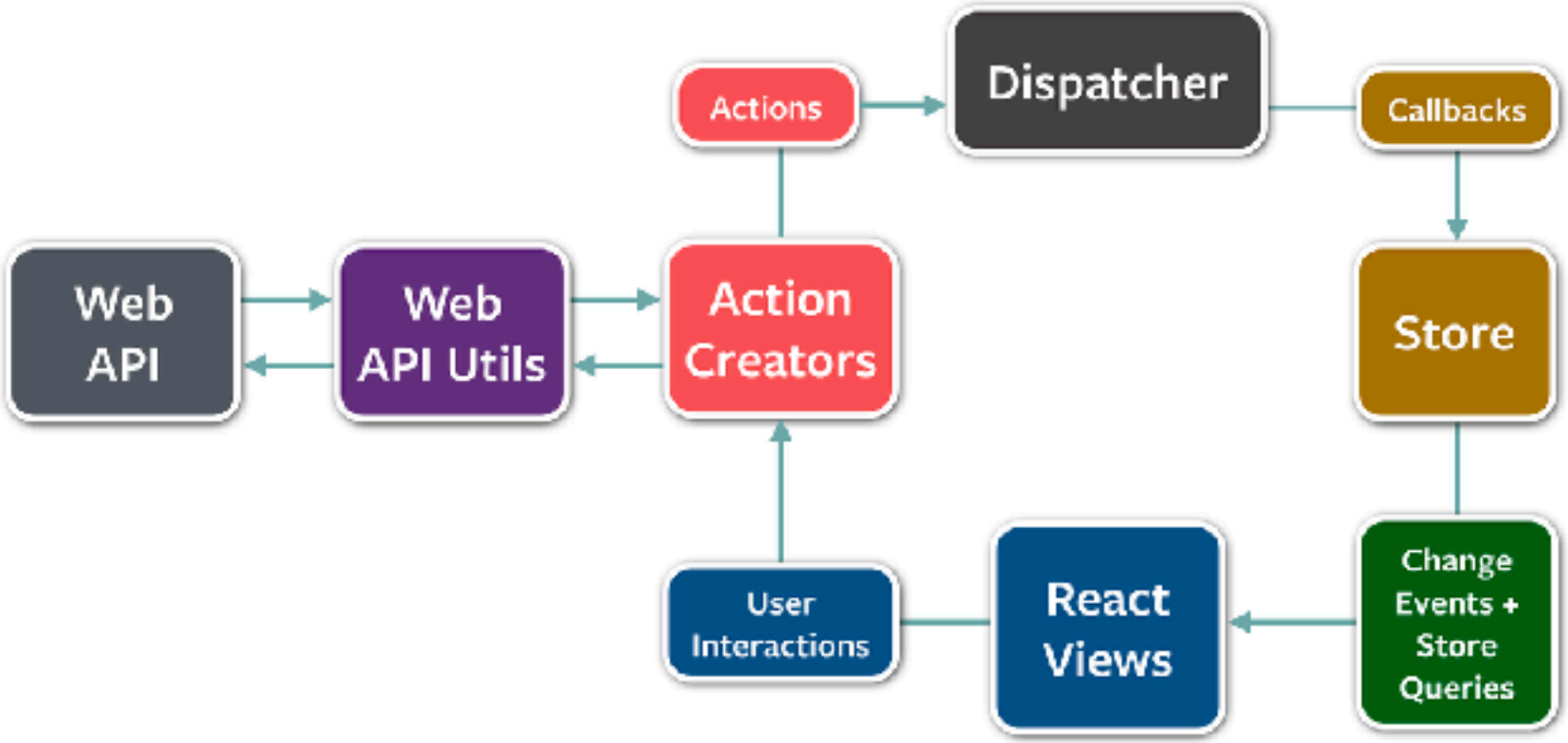
React 解决了 UI 细节问题

数据模型如何解决？

传统 MVC 难以扩展和维护



Flux架构：单向数据流



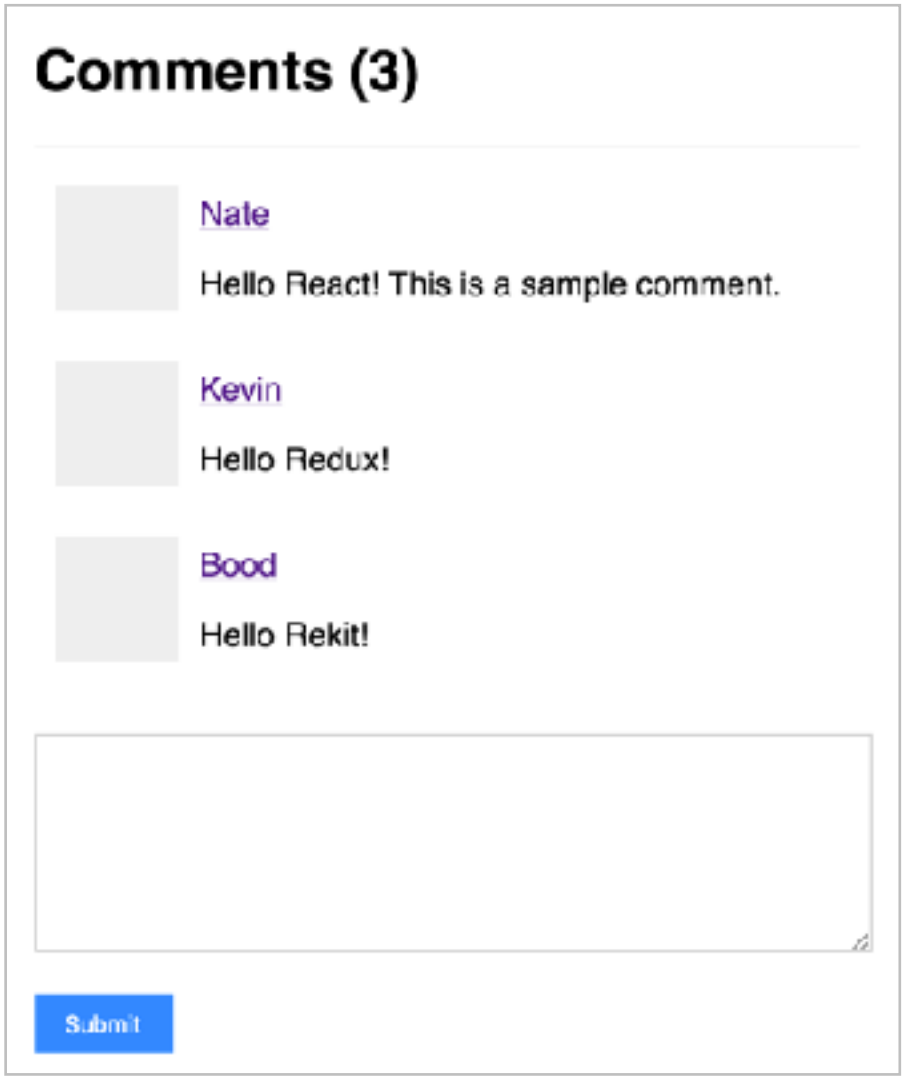
Flux 架构的衍生项目

小结

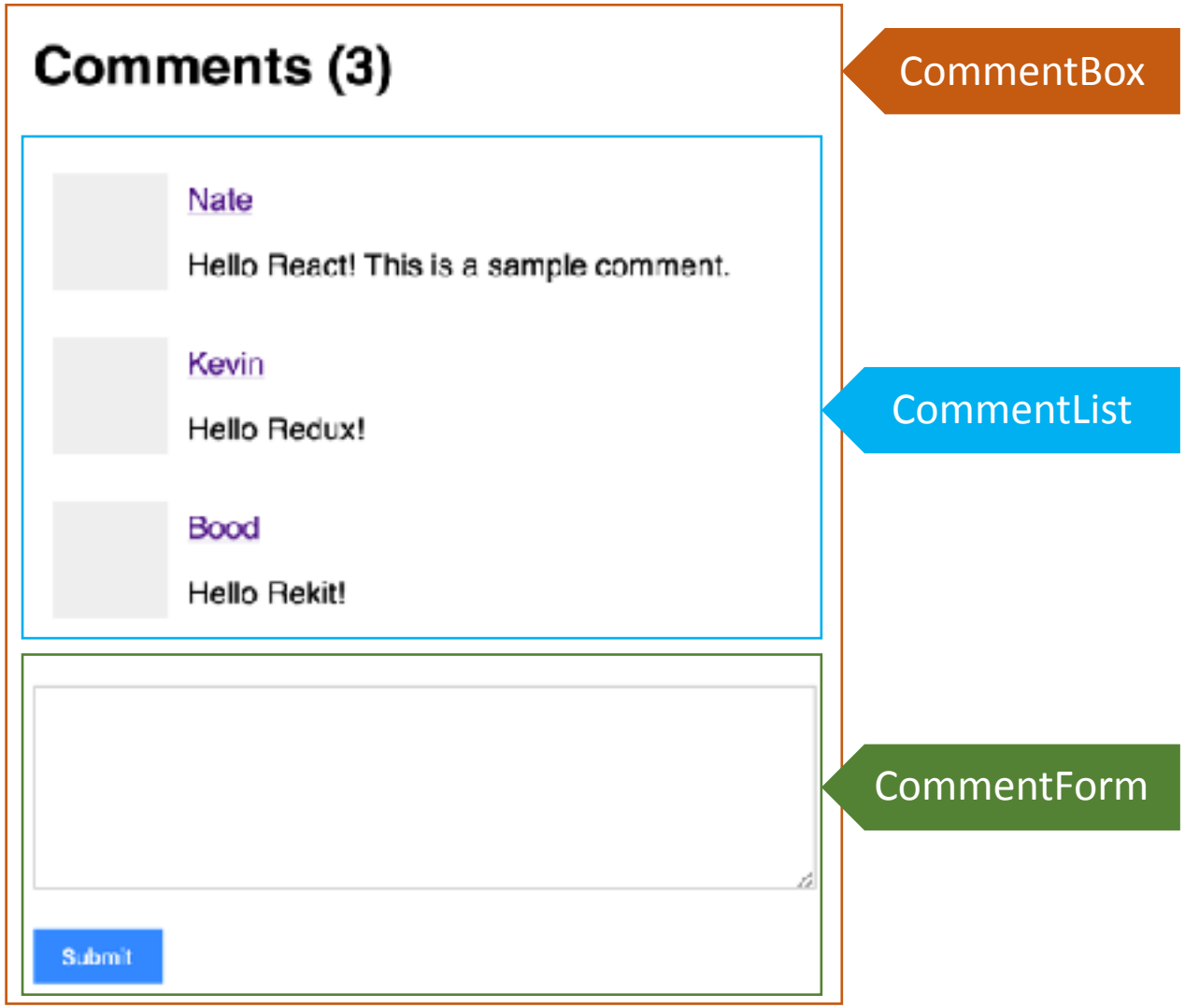
1. 传统 Web UI 开发的问题
2. React：始终整体刷新页面
3. Flux： 单向数据流

以组件方式考虑 UI 的构建

以组件方式考虑 UI 的构建



将 UI 组织成组件树的形式




```
class CommentBox extends Component {
  render() {
    return (
      <div className="comment-box">
        <h1>Comments</h1>
        <CommentList />
        <CommentForm />
      </div>
    );
  }
}
```

理解 React 组件

1.React组件一般不提供方法，而是某种状态机

2.React组件可以理解为一个纯函数

3.单向数据绑定

创建一个简单的组件：TabSelect

1.创建静态 UI

2.考虑组件的状态组成

3.考虑组件的交互方式

受控组件 vs 非受控组件

表单元素状态由使用者维护

```
<input
  type="text"
  value={this.state.value}
  onChange={evt =>
    this.setState({ value: evt.target.value})
  }
/>
```

表单元素状态 DOM 自身维护

```
<input
  type="text"
  ref={node => this.input = node}
/>
```

何时创建组件：单一职责原则

1.每个组件只做一件事

2.如果组件变得复杂，那么应该拆分成小组件

数据状态管理：DRY 原则

1.能计算得到的状态就不要单独存储

2.组件尽量无状态，所需数据通过 props 获取

小结

1. 以组件方式思考 UI 的构建
2. 单一职责原则
3. DRY 原则

理解 JSX：不是模板语言，只是一种语法糖

JSX：在 JavaScript 代码中直接写 HTML 标记

JSX 的本质：动态创建组件的语法糖

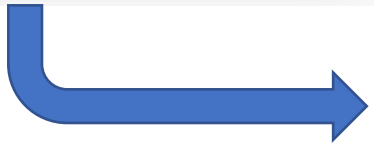
```jsx
const name = 'Nate Wang';
const element = <h1>Hello, {name}</h1>;
```

```jsx
const name = 'Josh Perez';
const element = React.createElement(
  'h1',
  null,
  'Hello, ',
  name
);
```

JSX 的本质：动态创建组件的语法糖

```jsx
class CommentBox extends React.Component {
  render () {
    return (
      <div className="comments">
        <h1>Comments ({this.state.items.length})</h1>
        <CommentList data={this.state.items}/>
        <CommentForm />
      </div>
    );
  }
}

ReactDOM.render(<CommentBox topicId="1" />, mountNode);
```



```jsx
class CommentBox extends React.Component {
  render() {
    return React.createElement(
      "div",
      { className: "comments" },
      React.createElement(
        "h1",
        null,
        "Comments (",
        this.state.items.length,
        ")"
      ),
      React.createElement(CommentList,{ data: this.state.items }),
      React.createElement(CommentForm, null)
    );
  }
}

ReactDOM.render(
  React.createElement(CommentBox, { topicId: "1" }),
  mountNode
);
```

在 JSX 中使用表达式

1. JSX 本身也是表达式

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

2. 在属性中使用表达式

```
<MyComponent foo={1 + 2 + 3 + 4} />
```

3. 延展属性

```
const props = {firstName: 'Ben', lastName: 'Hector'};
const greeting = <Greeting {...props} />;
```

4. 表达式作为子元素

```
const element = <li>{props.message}</li>;
```

对比其它模板语言

```
<html ng-app="todoApp">
  <head>
    <script src="angular.min.js"></script>
    <script src="todo.js"></script>
    <link rel="stylesheet" href="todo.css">
  </head>
  <body>
    <h2>Todo</h2>
    <div ng-controller="TodoListController as todoList">
      <span>
{{todoList.remaining()}} of {{todoList.todos.length}} remaining
      </span>
      [ <a href="" ng-click="todoList.archive()">archive</a> ]
      <ul class="unstyled">
        <li ng-repeat="todo in todoList.todos">
          <input type="checkbox" ng-model="todo.done">
          <span class="done-{{todo.done}}">{{todo.text}}</span>
        </li>
      </ul>
      <form ng-submit="todoList.addTodo()">
        <input type="text" ng-model="todoList.todoText"  size="30"
               placeholder="add new todo here">
        <input class="btn-primary" type="submit" value="add">
      </form>
    </div>
  </body>
</html>
```

JSX 优点

1.声明式创建界面的直观

2.代码动态创建界面的灵活

3.无需学习新的模板语言

约定：自定义组件以大写字母开头

1.React 认为小写的 tag 是原生 DOM 节点，如 div

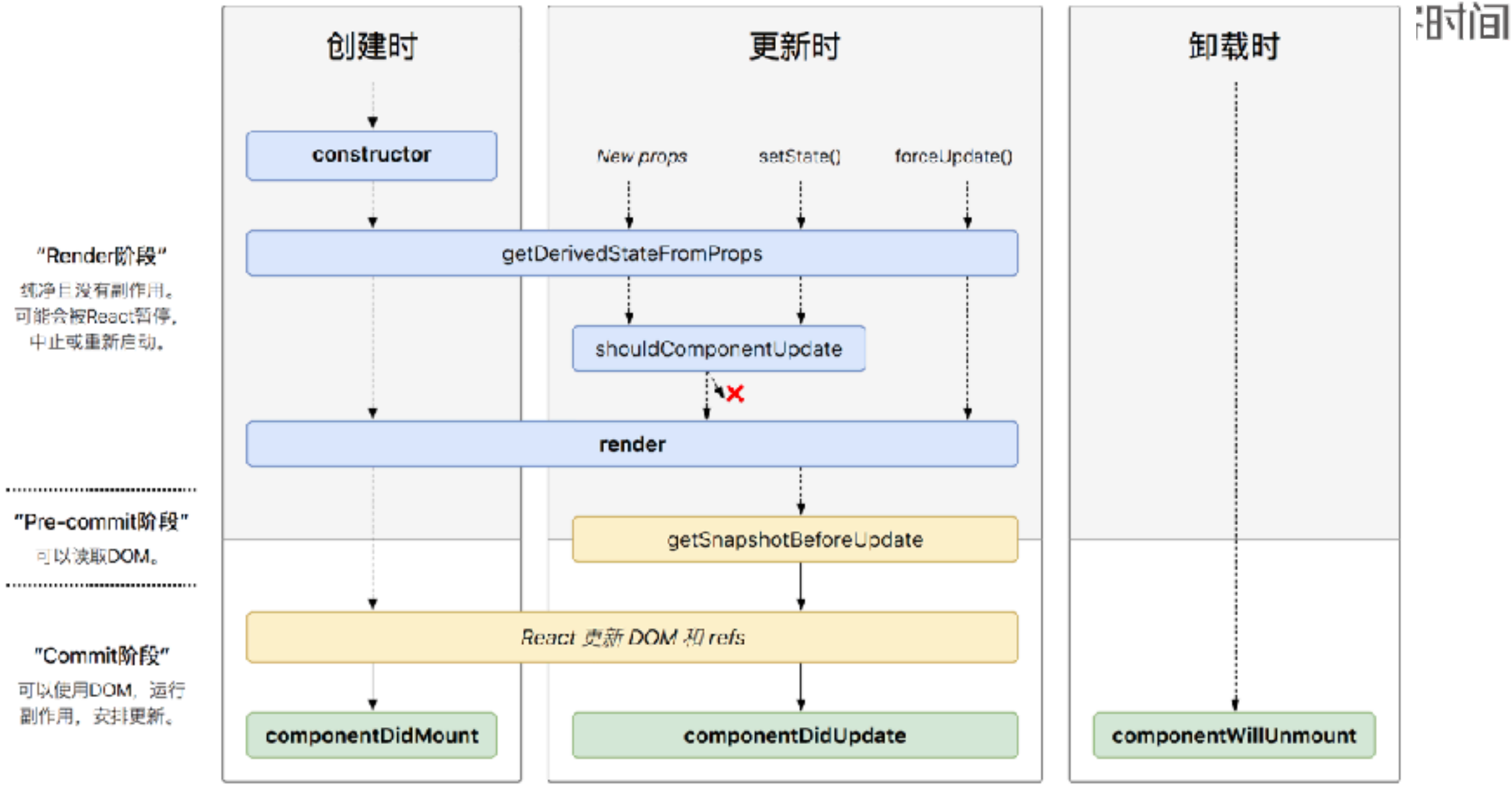
2.大写字母开头为自定义组件

3.JSX 标记可以直接使用属性语法，例如<menu.Item />

小结

1. JSX 的本质
2. 如何使用 JSX
3. JSX 的优点

React 组件的生命周期及其使用场景



图片来源：http://projects.wojtekmaj.pl/react-lifecycle-methods-diagram/

constructor

1.用于初始化内部状态，很少使用

2.唯一可以直接修改 state 的地方

getDerivedStateFromProps

1.当 state 需要从 props 初始化时使用

2.尽量不要使用：维护两者状态一致性会增加复杂度

3.每次 render 都会调用

4.典型场景：表单控件获取默认值

componentDidMount

1.UI 渲染完成后调用

2.只执行一次

3.典型场景：获取外部资源

componentWillUnmount

1.组件移除时被调用

2.典型场景：资源释放

getSnapshotBeforeUpdate

1.在页面 render 之前调用，state 已更新

2.典型场景：获取 render 之前的 DOM 状态

componentDidUpdate

1.每次 UI 更新时被调用

2.典型场景：页面需要根据 props 变化重新获取数据

shouldComponentUpdate

1.决定 Virtual DOM 是否要重绘

2.一般可以由 PureComponent 自动实现

3.典型场景：性能优化

DEMO

小结

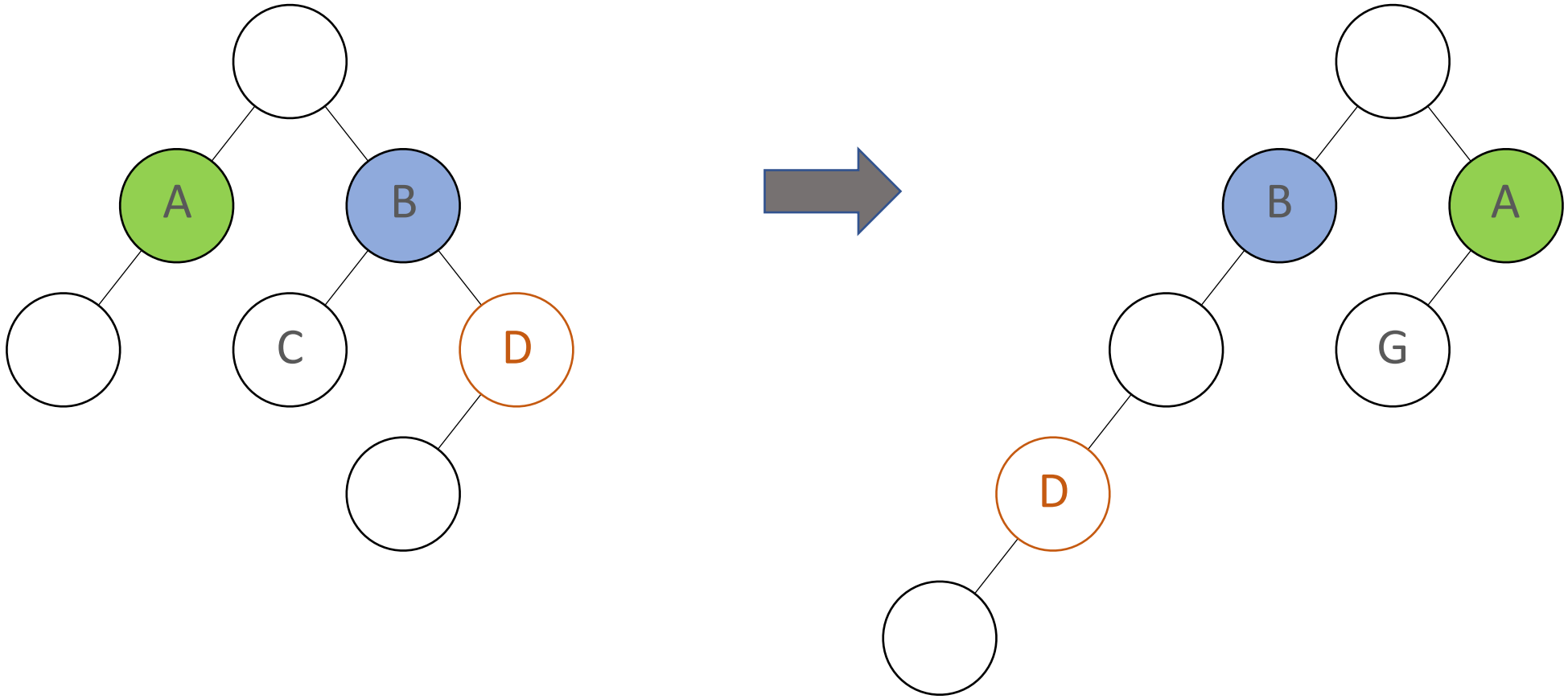
1. 理解 React 组件的生命周期方法
2. 理解生命周期的使用场景

理解 Virtual DOM 的工作原理，

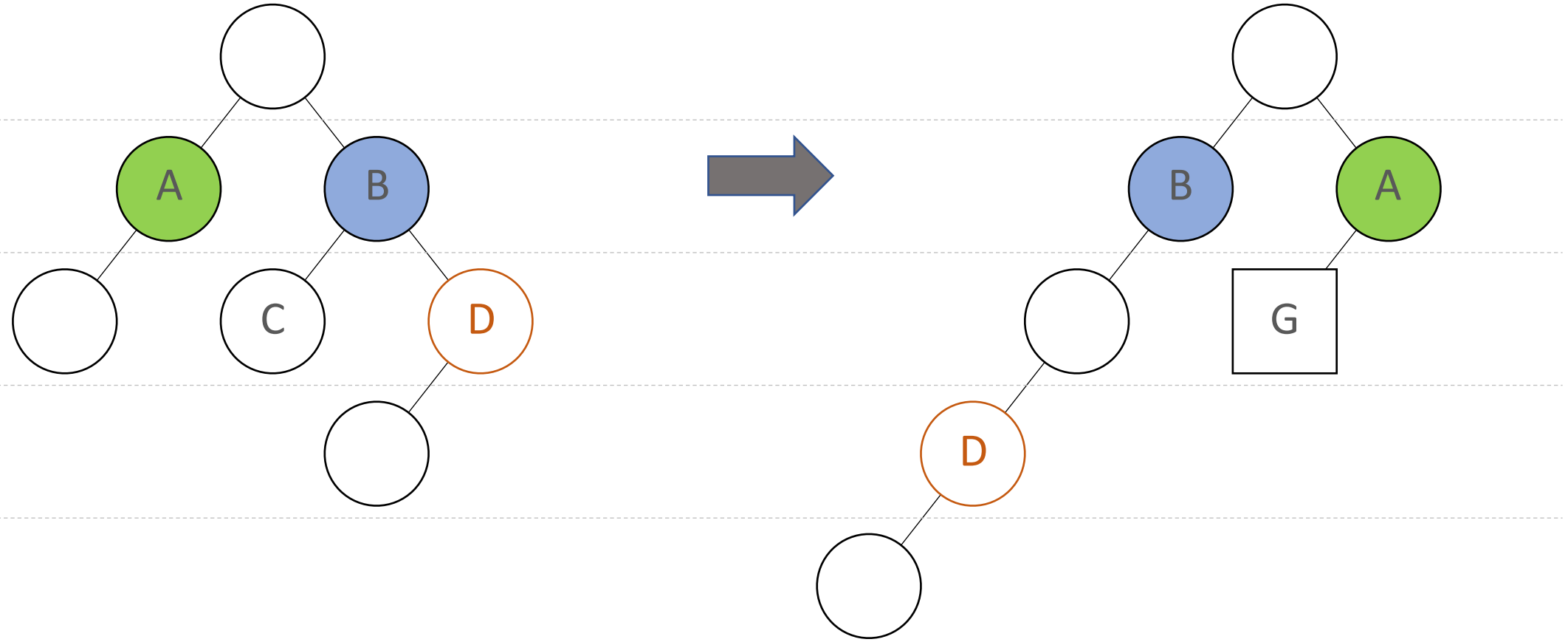
理解 key 属性的作用

JSX 的运行基础：Virtual DOM

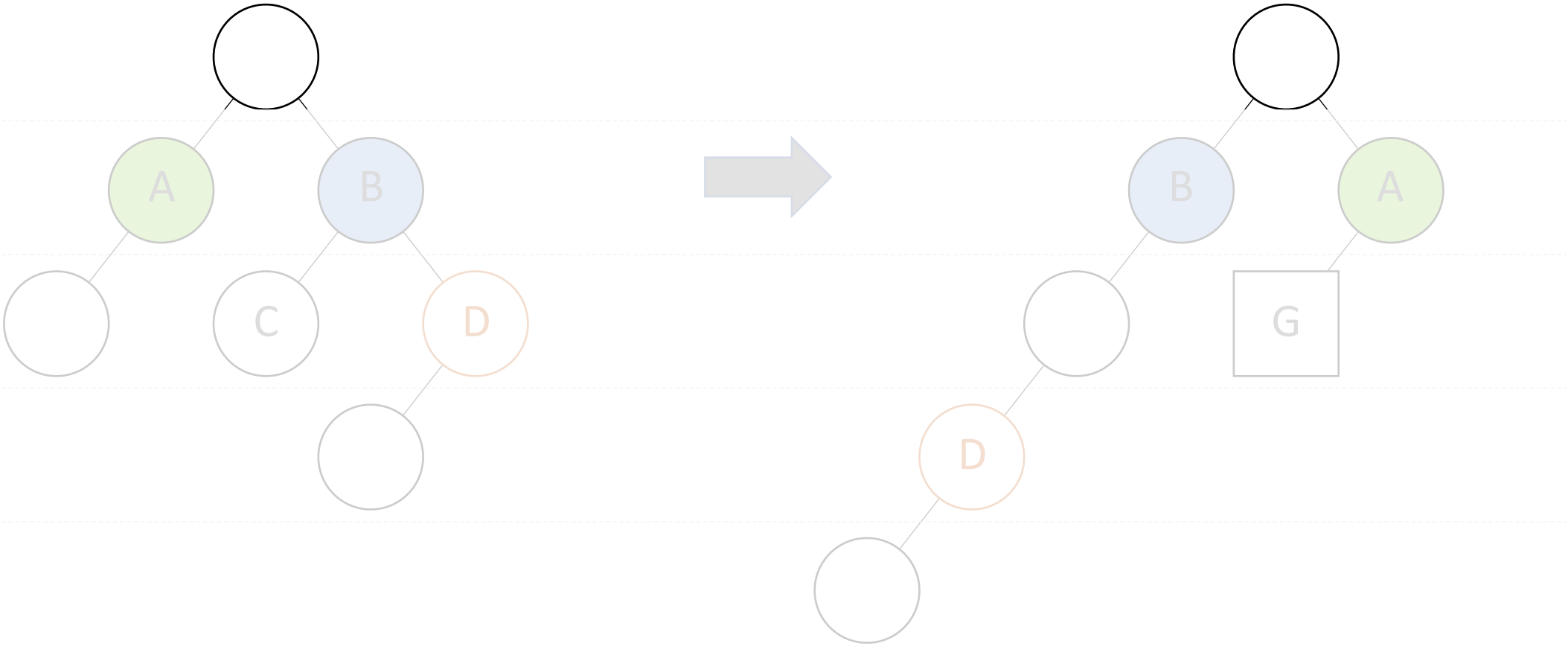
虚拟 DOM 是如何工作的



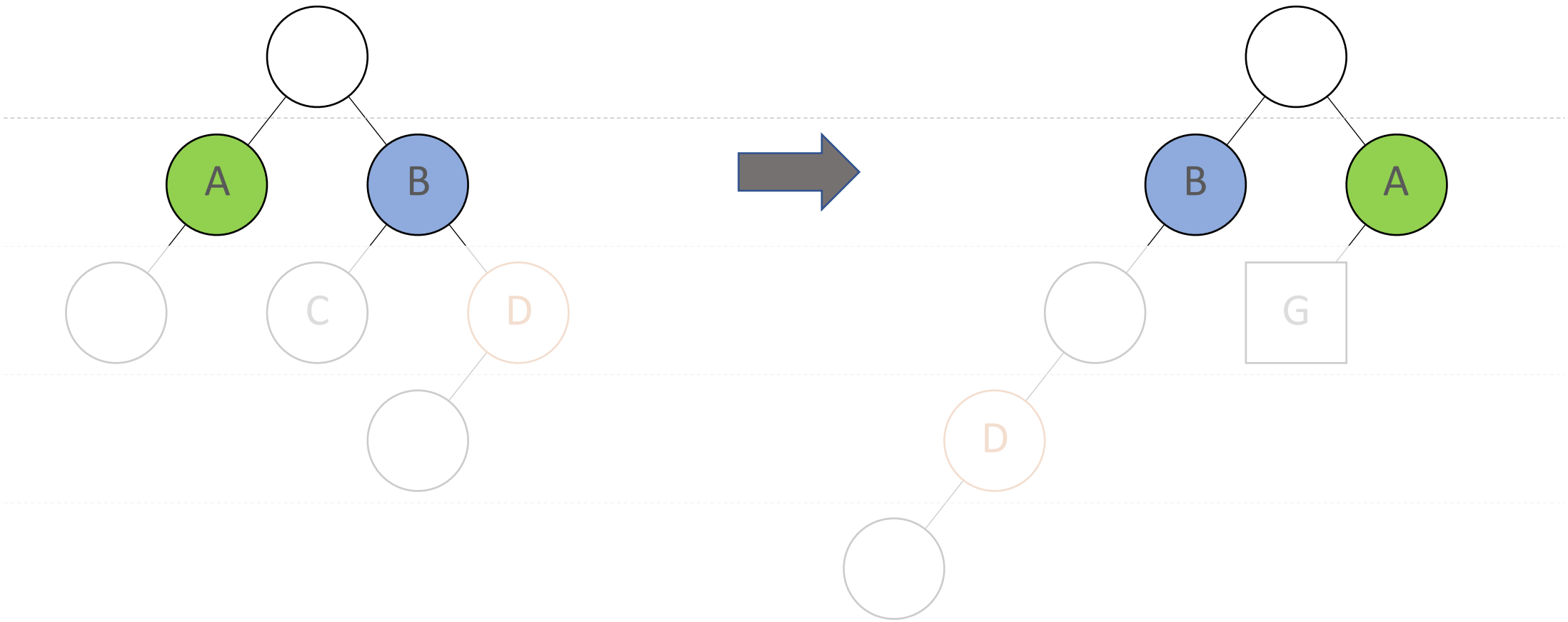
广度优先分层比较



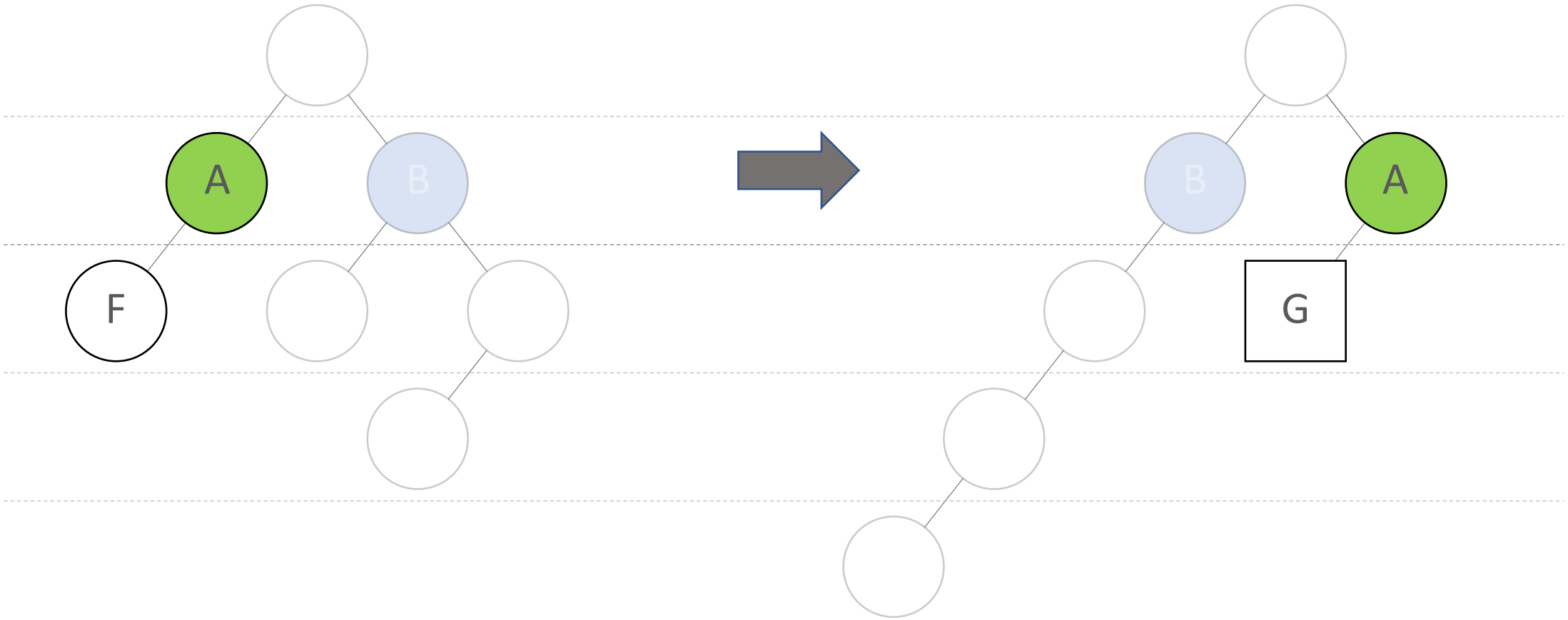
根节点开始比较



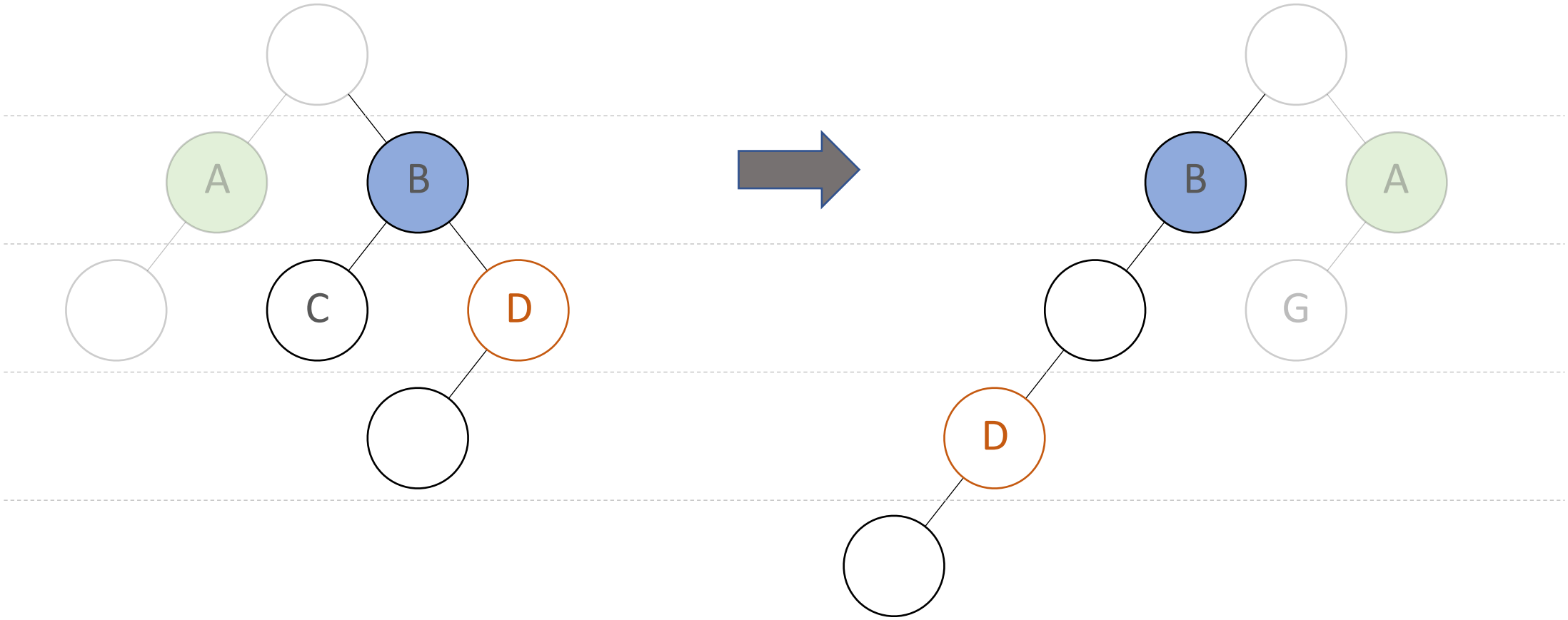
属性变化及顺序



节点类型发生变化



节点跨层移动



虚拟 DOM 的两个假设

1.组件的 DOM 结构是相对稳定的

2.类型相同的兄弟节点可以被唯一标识

DEMO

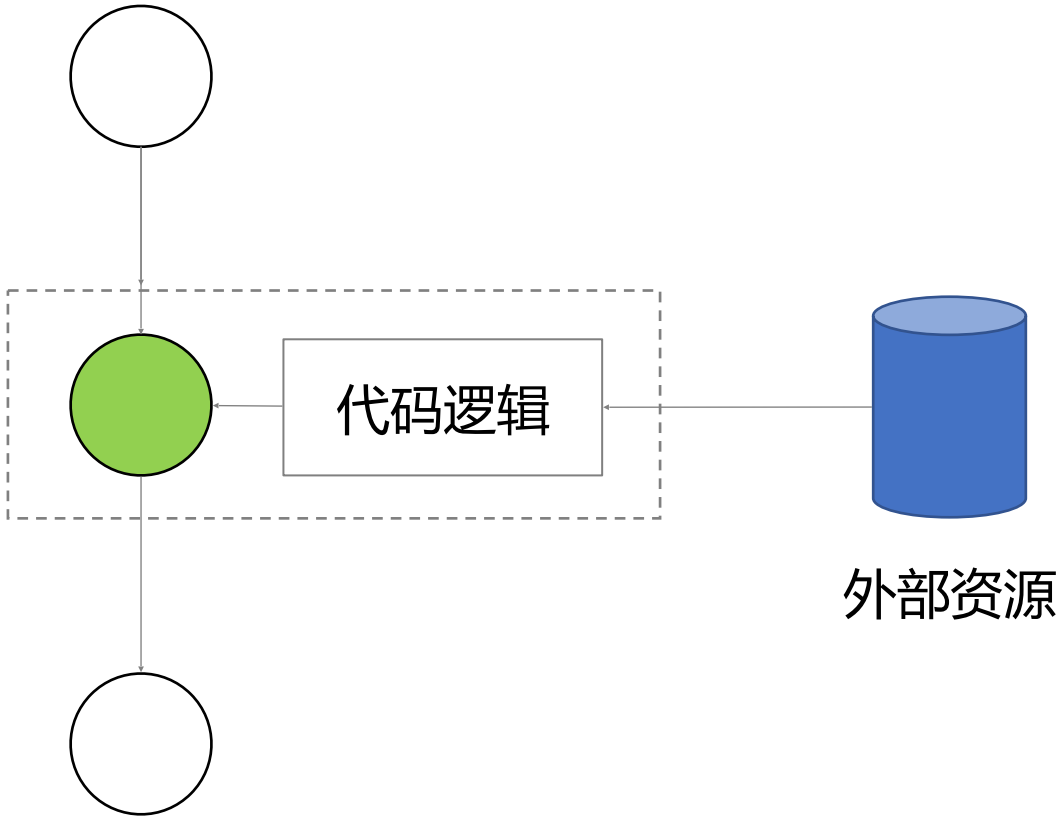
小结

1. 算法复杂度为 O(n)
2. 虚拟 DOM 如何计算 diff
3. key 属性的作用

组件复用的另外两种形式：

高阶组件和函数作为子组件

高阶组件（HOC）




```
const EnhancedComponent =
      higherOrderComponent(WrappedComponent);
```

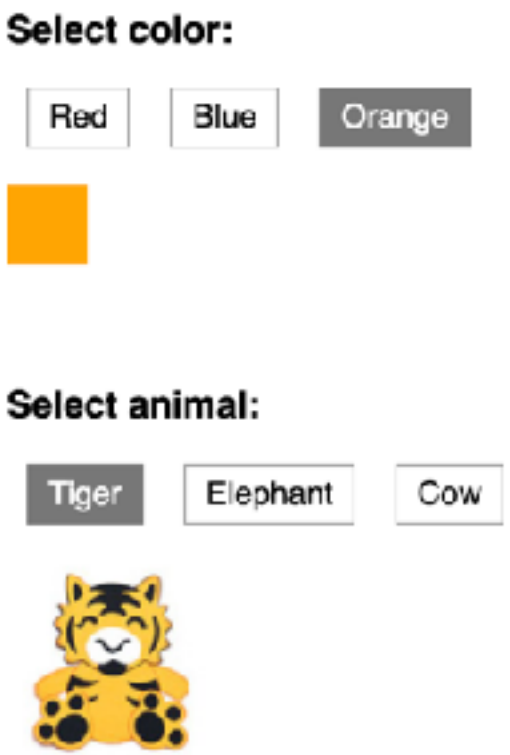
高阶组件接受组件作为参数，返回新的组件。

DEMO

函数作为子组件

```
class MyComponent extends React.Component {
  render() {
    return (
      <div>
        {this.props.children('Nate Wang')}
      </div>
    );
  }
}

<MyComponent>
  {(name) => (
    <div>{name}</div>
  )}
</MyComponent>
```



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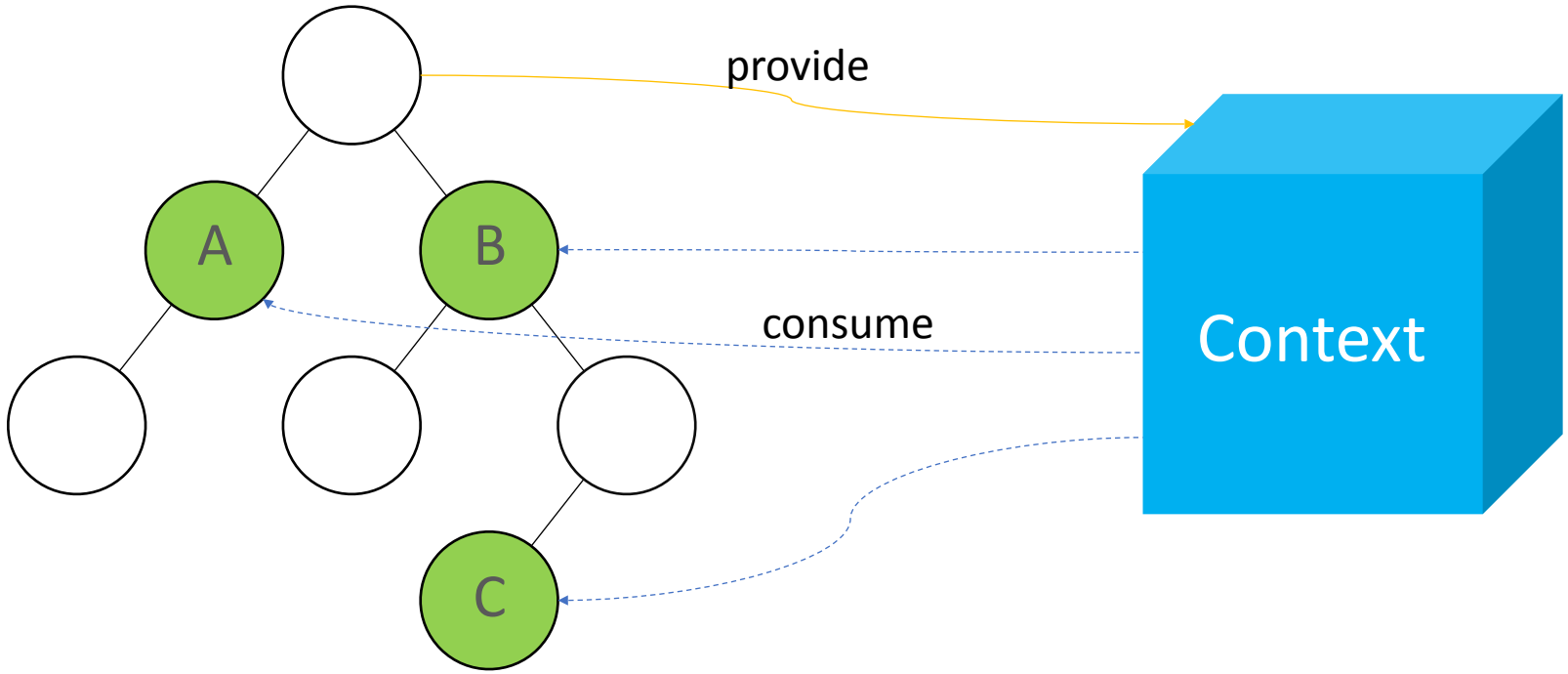
小结

1. 高阶组件和函数子组件都是设计模式
2. 可以实现更多场景的组件复用

理解 Context API 的使用场景

React 16.3 新特性：Context API



React 16.3 新特性：Context API

```
const ThemeContext = React.createContext('light');

class App extends React.Component {
  render() {
    return (
      <ThemeContext.Provider value="dark">
        <ThemedButton />
      </ThemeContext.Provider>
    );
  }
}

function ThemedButton(props) {
  return (
    <ThemeContext.Consumer>
      {theme => <Button {...props} theme={theme} />}
    </ThemeContext.Consumer>
  );
}
```

DEMO

小结

1. Conext API 的使用方法
2. 使用场景

使用脚手架工具创建 React 应用：

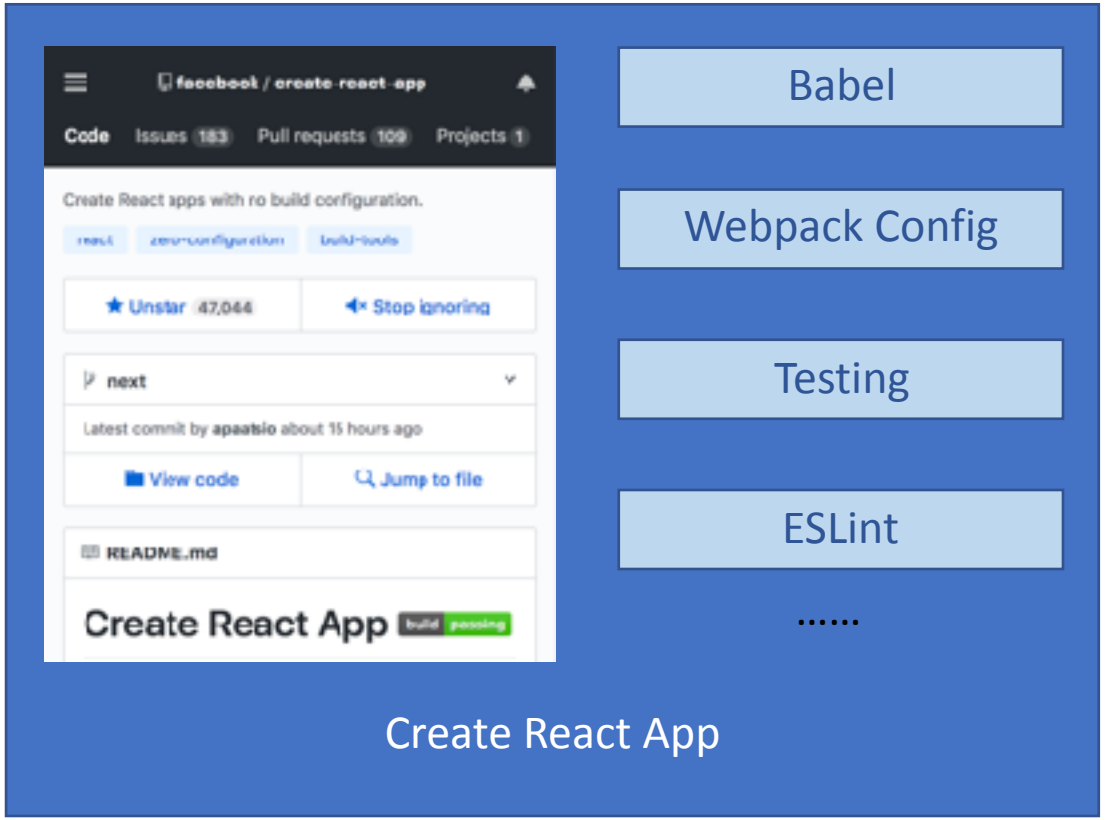
Create React App, Codesandbox, Rekit

为什么需要脚手架工具

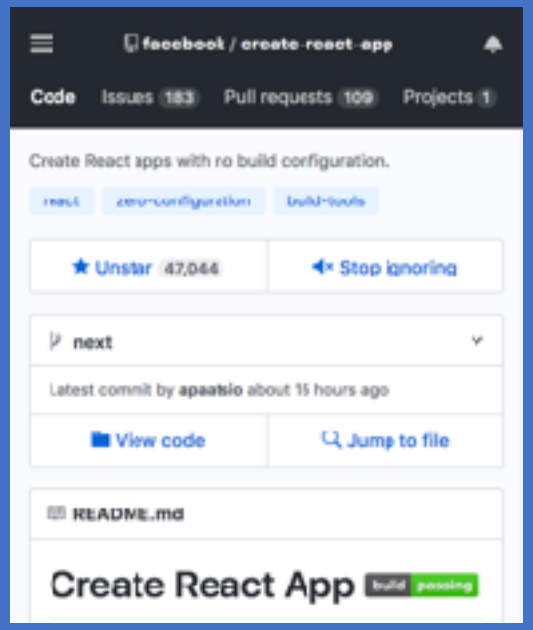
为什么需要脚手架工具

babel-polyfill	babel-preset-es2015	less
isomorphic-fetch	babel-preset-react	less-loader
lodash	babel-preset-stage-0	lodash-webpack-plugin
react	babel-register	mocha
react-dom	chai	mocha-webpack
react-redux	css-loader	nock
react-router	enzyme	node-sass
react-router-redux	eslint	npm-run
redux	eslint-config-airbnb	nyc
redux-logger	eslint-import-resolver-babel-module	react-addons-test-utils
redux-thunk	eslint-plugin-import	react-hot-loader
style-loader	eslint-plugin-jsx-a11y	redux-mock-store
argparse	eslint-plugin-react	sass-loader
babel-core	estraverse	sinon
babel-eslint	estraverse-fb	url-loader
babel-loader	express	webpack
babel-plugin-istanbul	express-history-api-fallback	webpack-dev-middleware
babel-plugin-lodash	file-loader	webpack-hot-middleware
babel-plugin-module-resolver	jsdom	webpack-node-externals

create-react-app



Rekit



Babel

Webpack Config

Testing

ESLint

.....

Create React App

+

Redux

React Router

Less/Scss

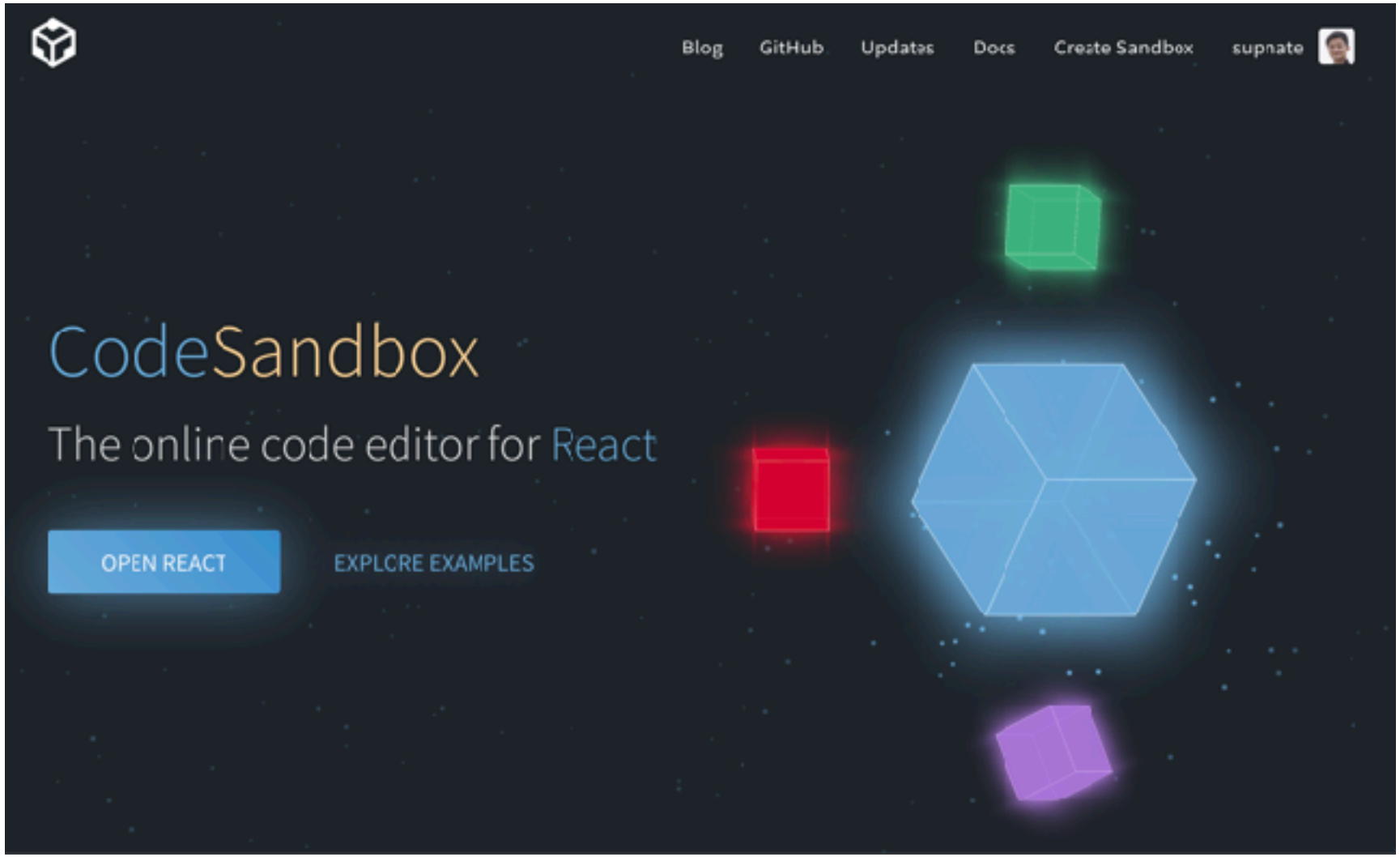
Feature Oriented Architecture

Dedicated IDE

=

Rekit

Online: Codesandbox.io



小结

介绍了3种脚手架工具及它们的使用场景。

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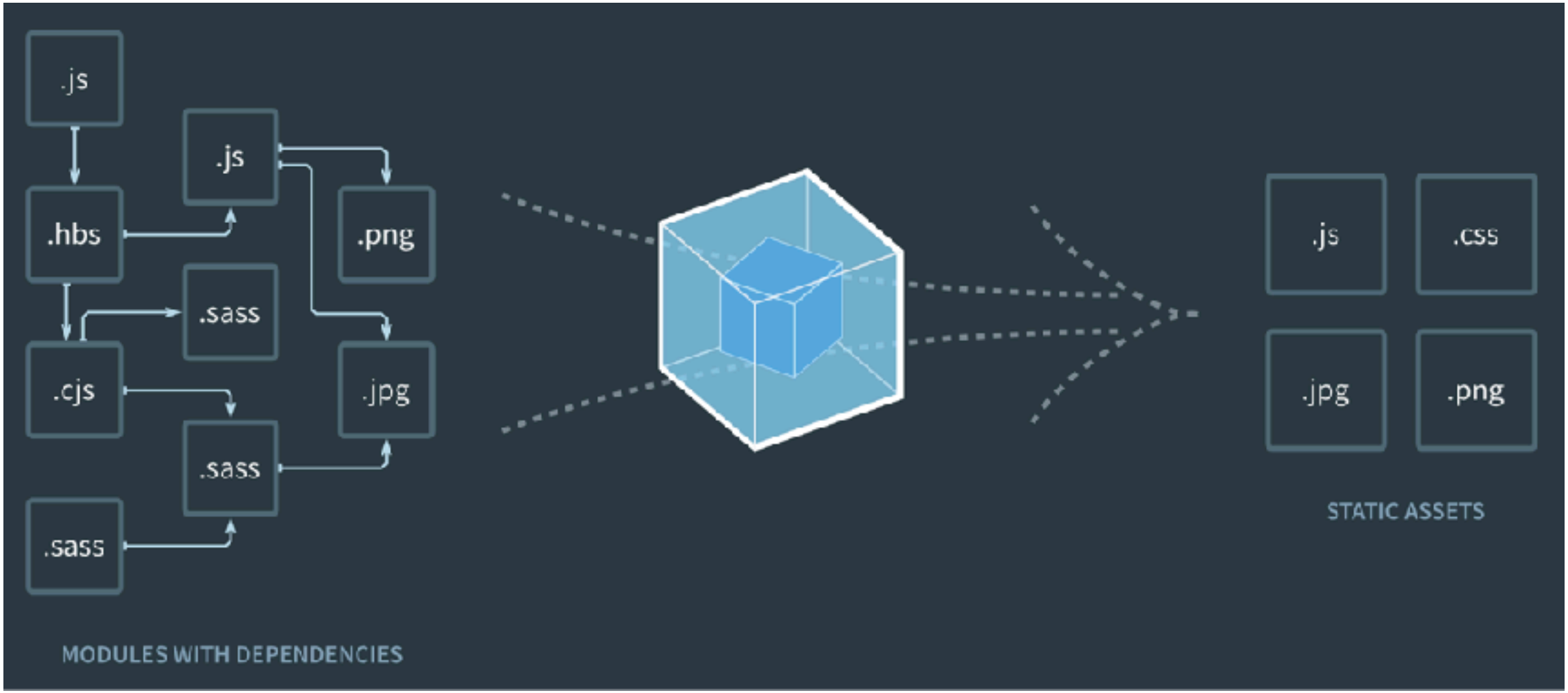
打包和部署

为什么需要打包？

1. 编译 ES6 语法特性，编译 JSX
2. 整合资源，例如图片，Less/Sass
3. 优化代码体积

使用 Webpack 进行打包



打包注意事项

1. 设置 nodejs 环境为 production
2. 禁用开发时专用代码，比如 logger
3. 设置应用根路径

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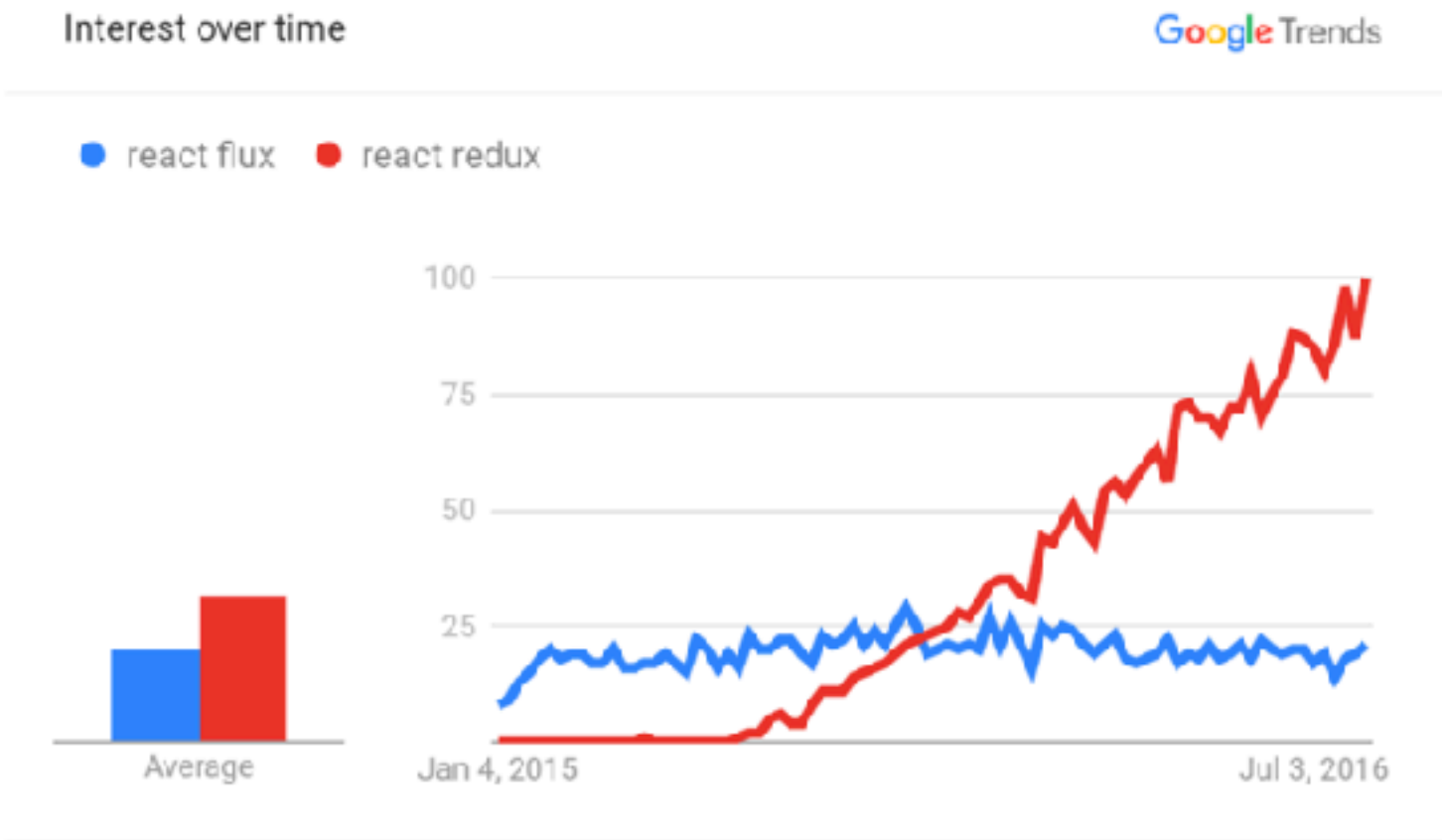
小结

1. 为什么需要打包
2. 如何进行打包
3. 打包和部署的注意事项

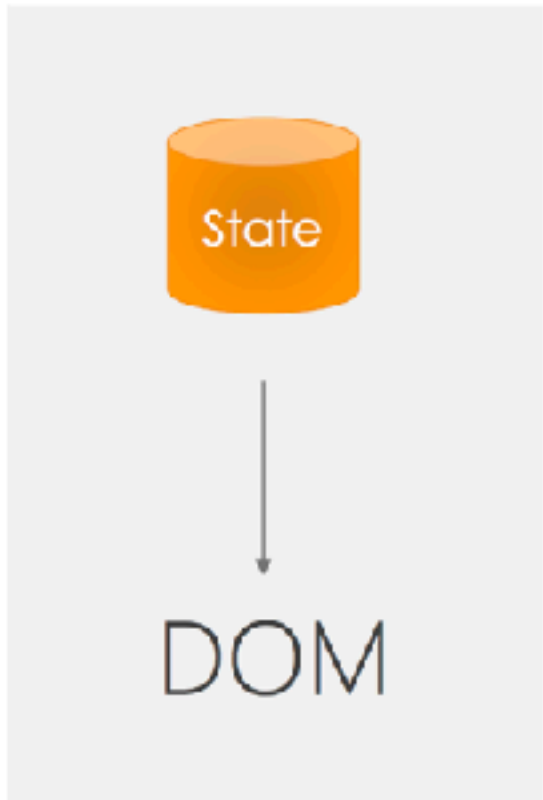
Redux（1）：JS 状态管理框架

Redux

@dan_abramov

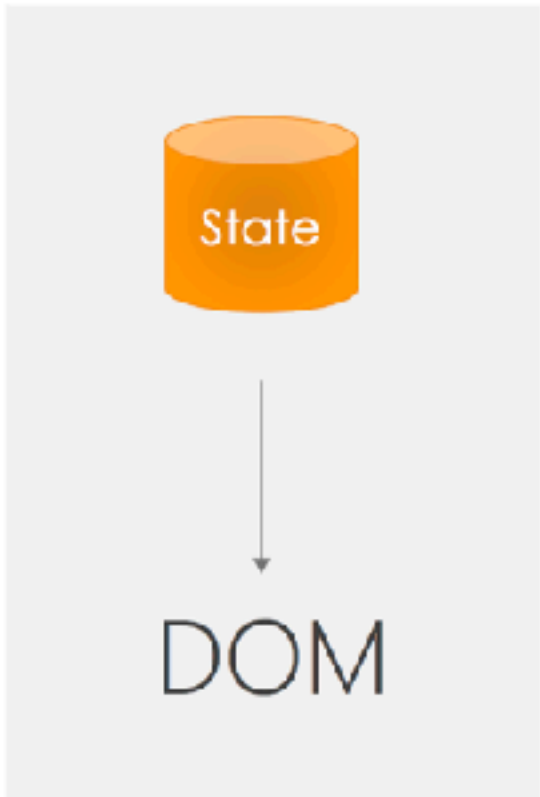


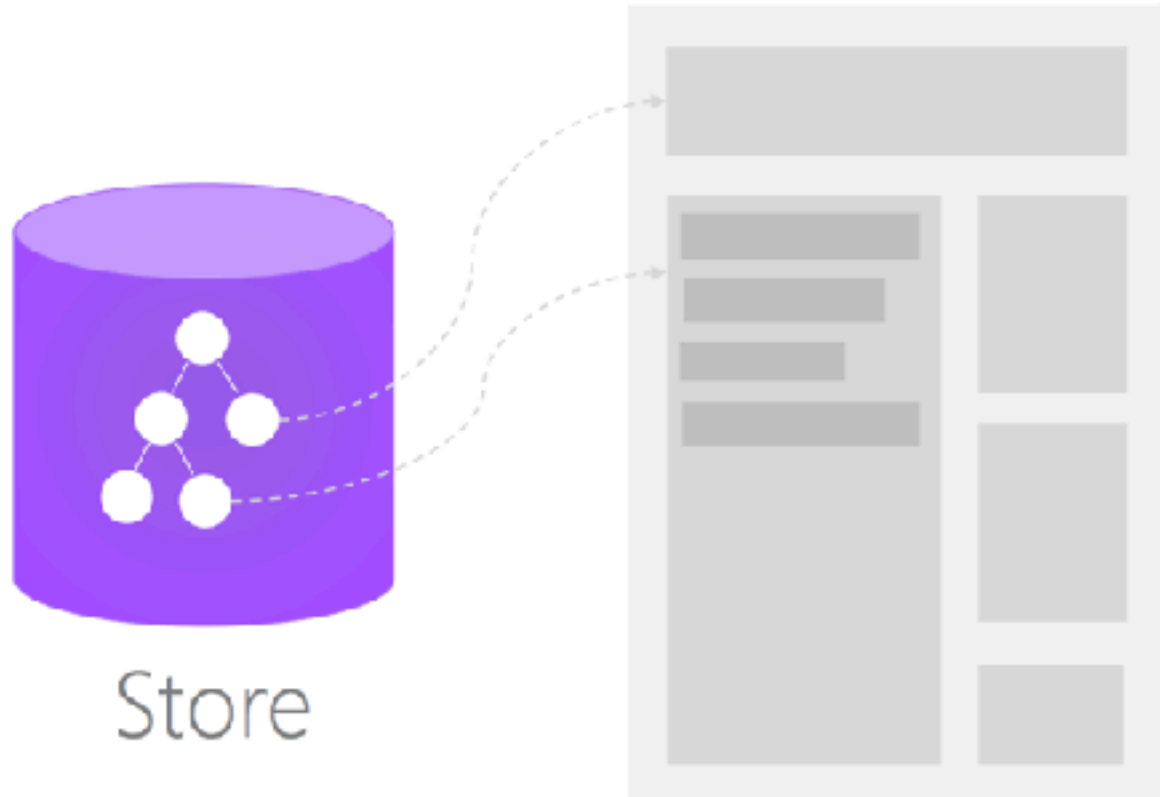
React



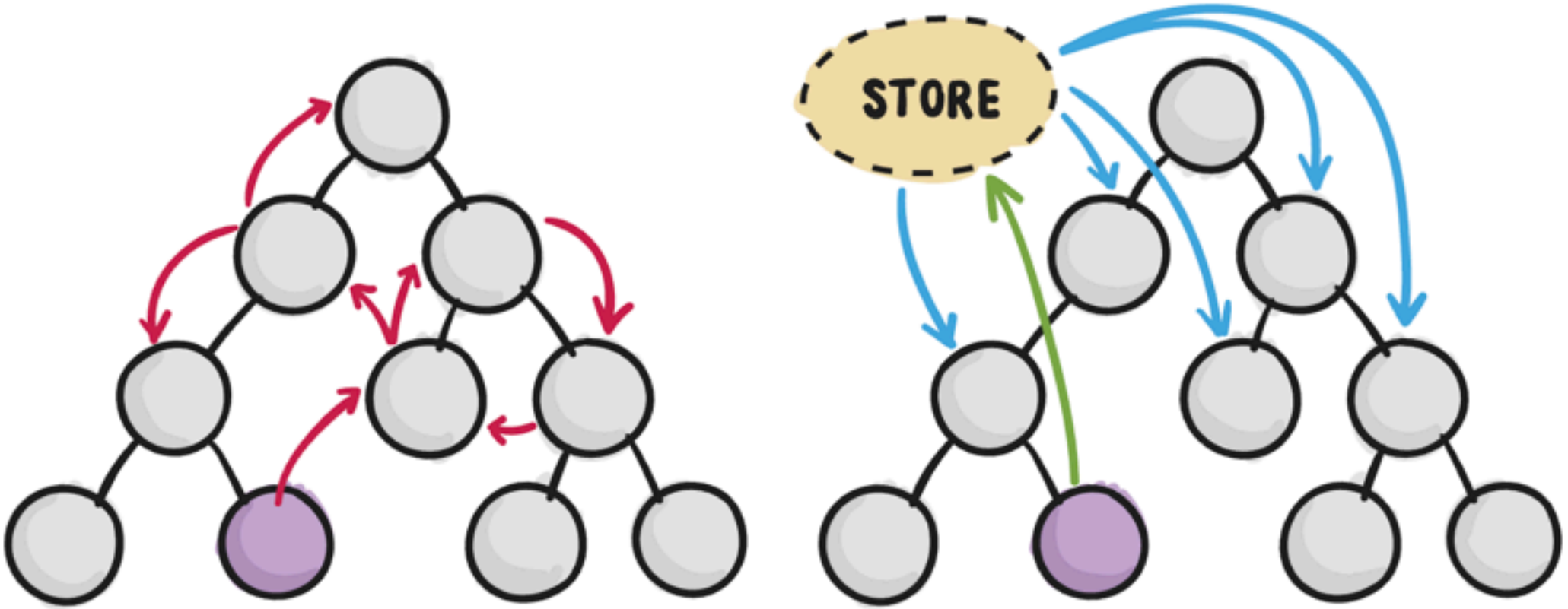
React

Redux



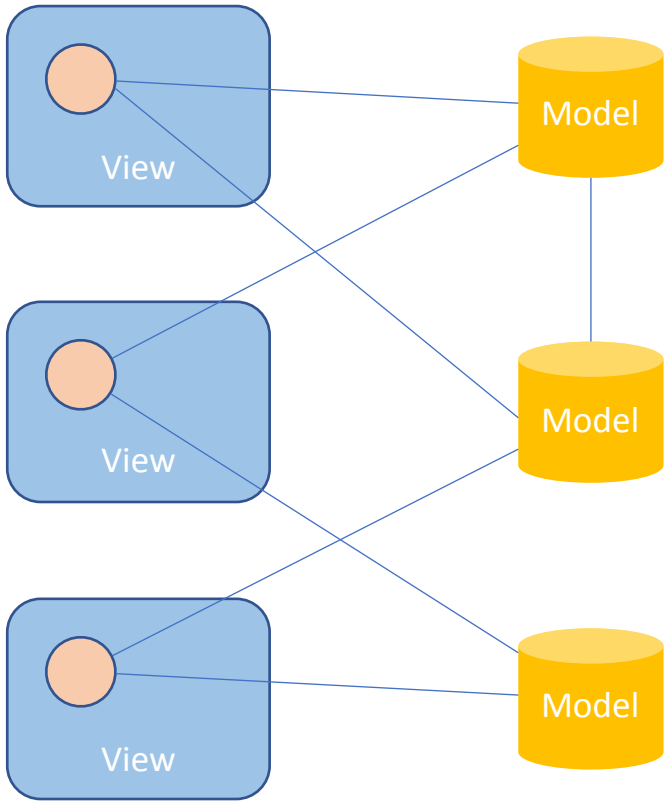


Redux 让组件通信更加容易

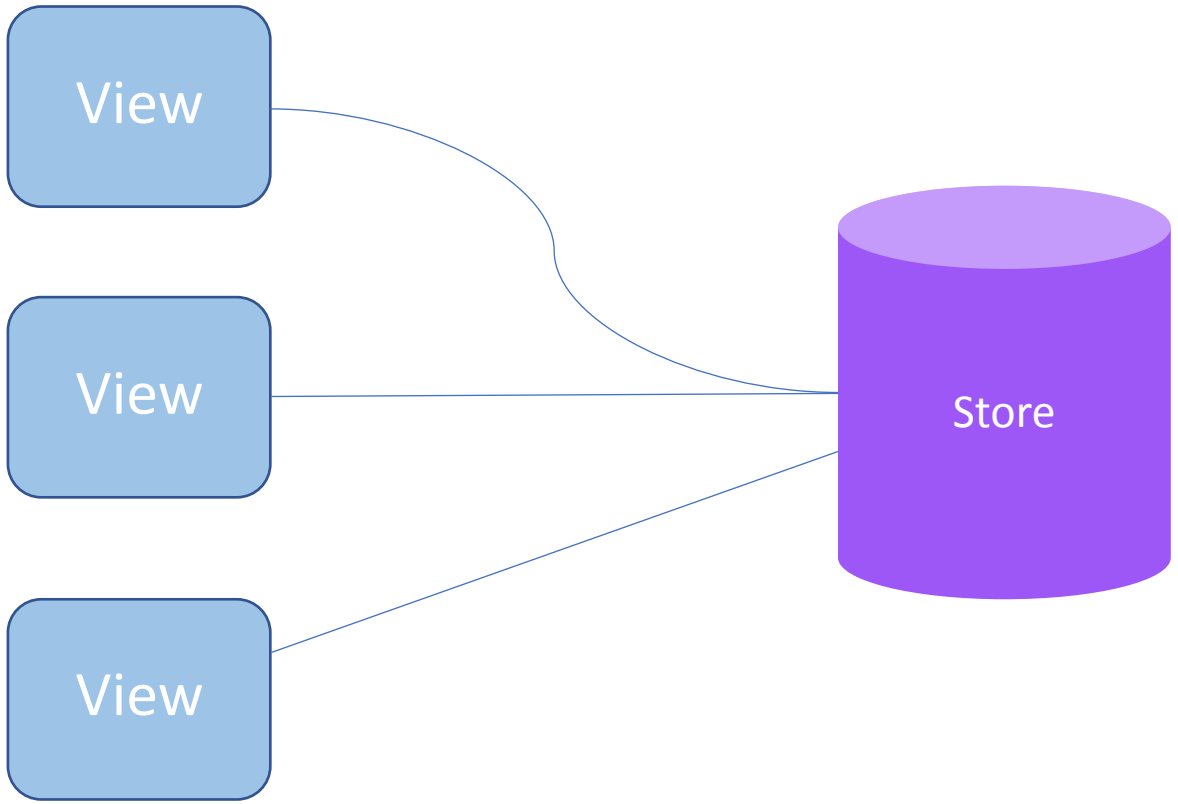


图片来源：https://css-tricks.com/learning-react-redux/

Redux 特性：Single Source of Truth



Redux 特性：Single Source of Truth



Redux 特性：可预测性

state + action = new state

Redux 特性：纯函数更新 Store

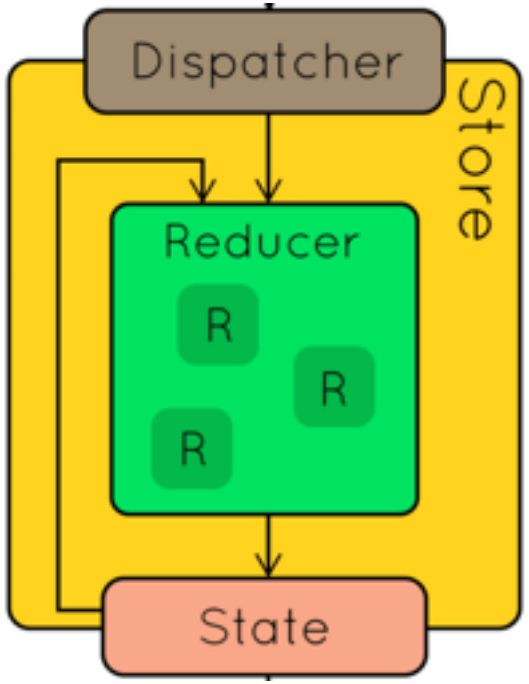
```
function todos(state = [], action) {
  switch (action.type) {
    case 'ADD_TODO':
      return state.concat([{ text: action.text, completed: false }])
    case 'TOGGLE_TODO':
      return state.map(
        (todo, index) =>
          action.index === index
            ? { text: todo.text, completed: !todo.completed }
            : todo
      )
    default:
      return state
  }
}
```

小结

1. 为什么需要 Redux
2. Redux 的三个特性

Redux（2）：深入理解 Store，Action，Reducer

理解 Store




```
const store = createStore(reducer)
```

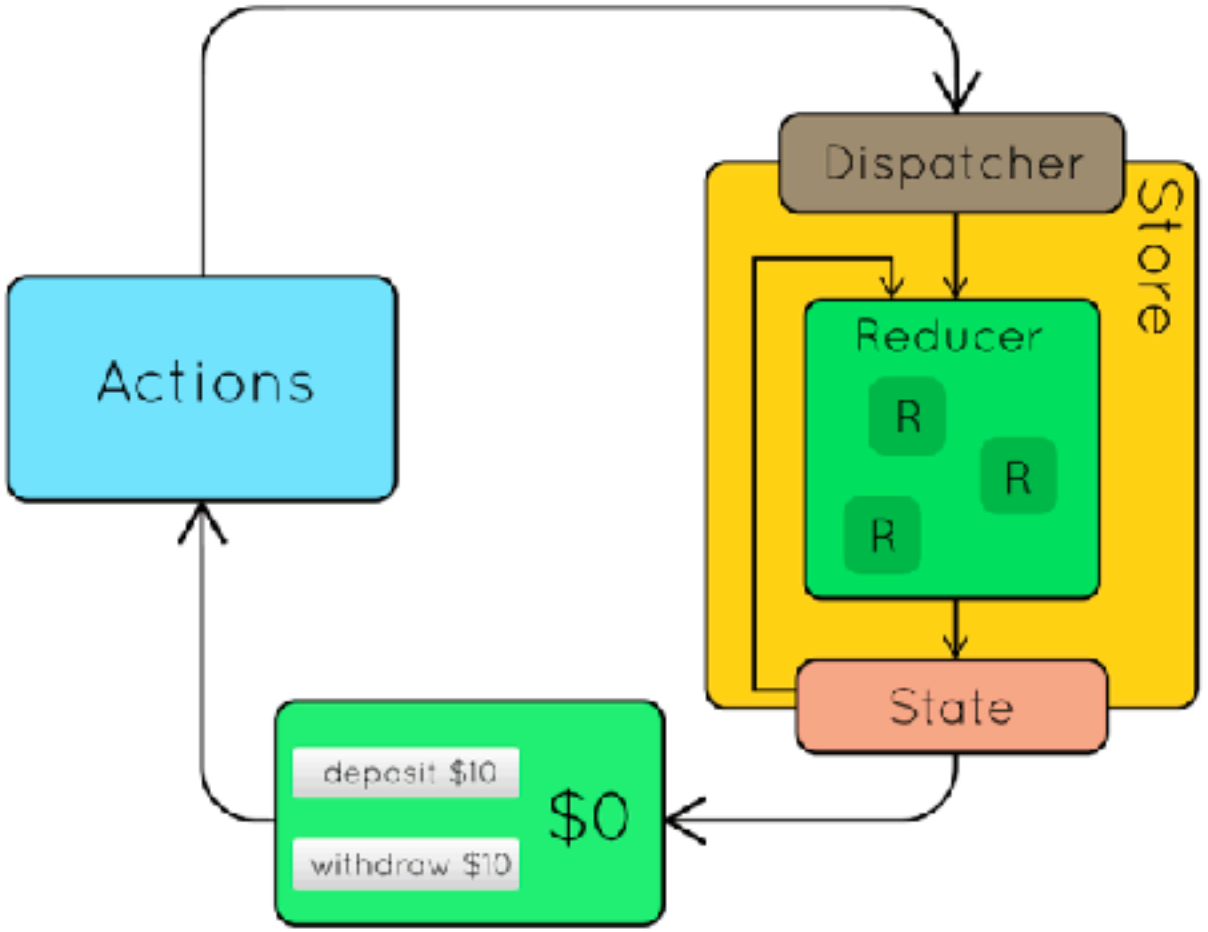
1. getState()
2. dispatch(action)
3. subscribe(listener)

理解 action

理解 reducer

```
function todoApp(state = initialState, action) {
  switch (action.type) {
    case ADD_TODO:
      return Object.assign({}, state, {
        todos: [
          ...state.todos,
          {
            text: action.text,
            completed: false
          }
        ]
      })
    default:
      return state
  }
}
```

Redux



© http://slides.com/jenyaterpil/redux-from-twitter-hype-to-production

(state, action) => new state

- Store
- Actions
- Reducer
- View

理解 combineReducers

```
export default function todos(state = [], action) {
  switch (action.type) {
    case 'ADD_TODO':
      return state.concat([action.text])
    default:
      return state
  }
}
```

```
export default function counter(state = 0, action) {
  switch (action.type) {
    case 'INCREMENT':
      return state + 1
    case 'DECREMENT':
      return state - 1
    default:
      return state
  }
}
```

```
import { combineReducers } from 'redux'
import todos from './todos'
import counter from './counter'

export default combineReducers({
  todos,
  counter
})
```

理解 bindActionCreators

```
function addTodoWithDispatch(text) {
  const action = {
    type: ADD_TODO,
    text
  }
  dispatch(action)
}
```

```
dispatch(addTodo(text))
dispatch(completeTodo(index))
```

```
const boundAddTodo = text => dispatch(addTodo(text))
const boundCompleteTodo = index => dispatch(completeTodo(index))
```

理解 bindActionCreators

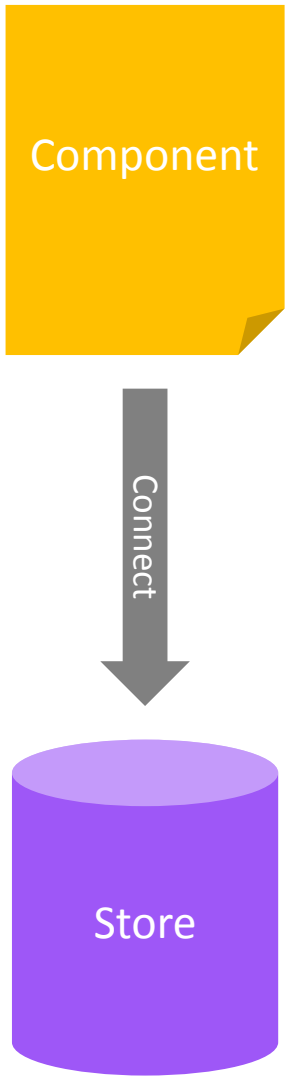
```
function bindActionCreator(actionCreator, dispatch) {
  return function() {
    return dispatch(actionCreator.apply(this, arguments))
  }
}

function bindActionCreators(actionCreators, dispatch) {
  const keys = Object.keys(actionCreators)
  const boundActionCreators = {}
  for (let i = 0; i < keys.length; i++) {
    const key = keys[i]
    const actionCreator = actionCreators[key]
    if (typeof actionCreator === 'function') {
      boundActionCreators[key] = bindActionCreator(actionCreator, dispatch)
    }
  }
  return boundActionCreators
}
```

DEMO

小结

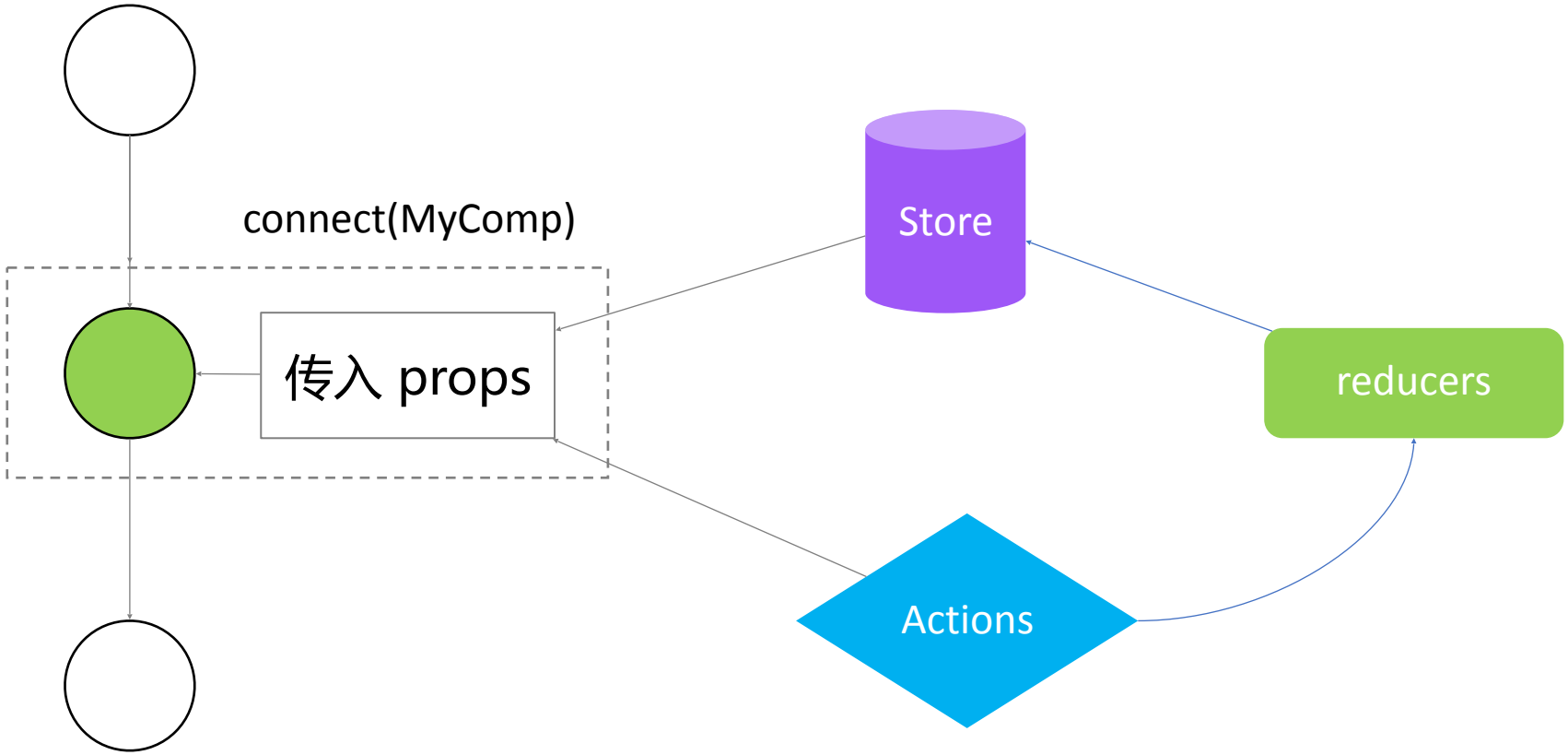
1. Redux 的基本概念
2. combineReducers
3. bindActionCreators

Redux（3）：在 React 中使用 Redux




```
import { connect } from 'react-redux';

class SidePanel extends Component {
  // ...
}

function mapStateToProps(state) {
  return {
    nextgen: state.nextgen,
    router: state.router,
  };
}

function mapDispatchToProps(dispatch) {
  return {
    actions: bindActionCreators({ ...actions }, dispatch),
  };
}

export default connect(mapStateToProps, mapDispatchToProps)(SidePanel);
```

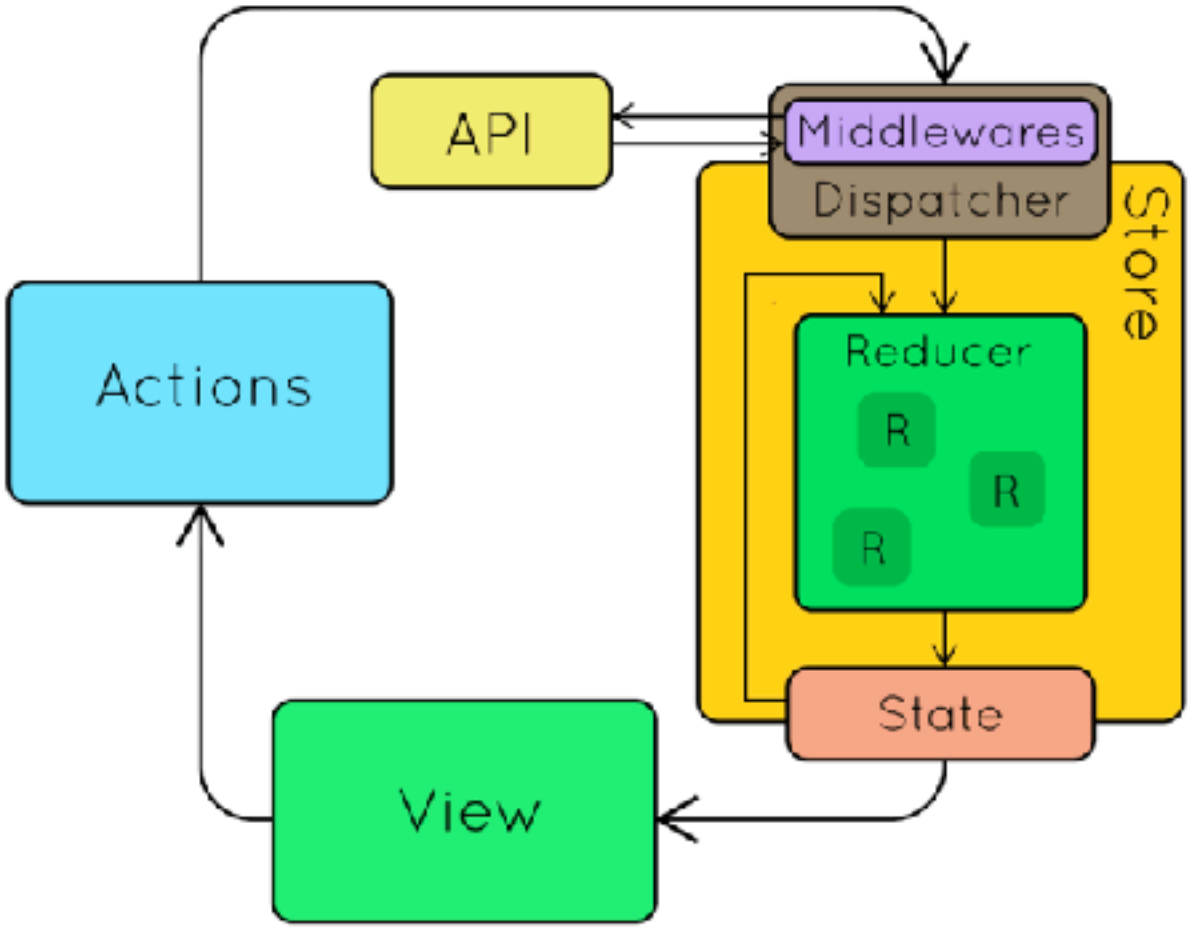
connect 的工作原理：高阶组件



DEMO

Redux（4）：理解异步 Action，Redux 中间件

Redux 异步请求



@ http://slides.com/jenyaterpil/redux-from-twitter-hype-to-production

(state, action) => new state

- Store
- Actions
- Reducer
- View
- Middlewares

Redux 中间件（Middleware）

1.截获 action

2.发出 action

DEMO

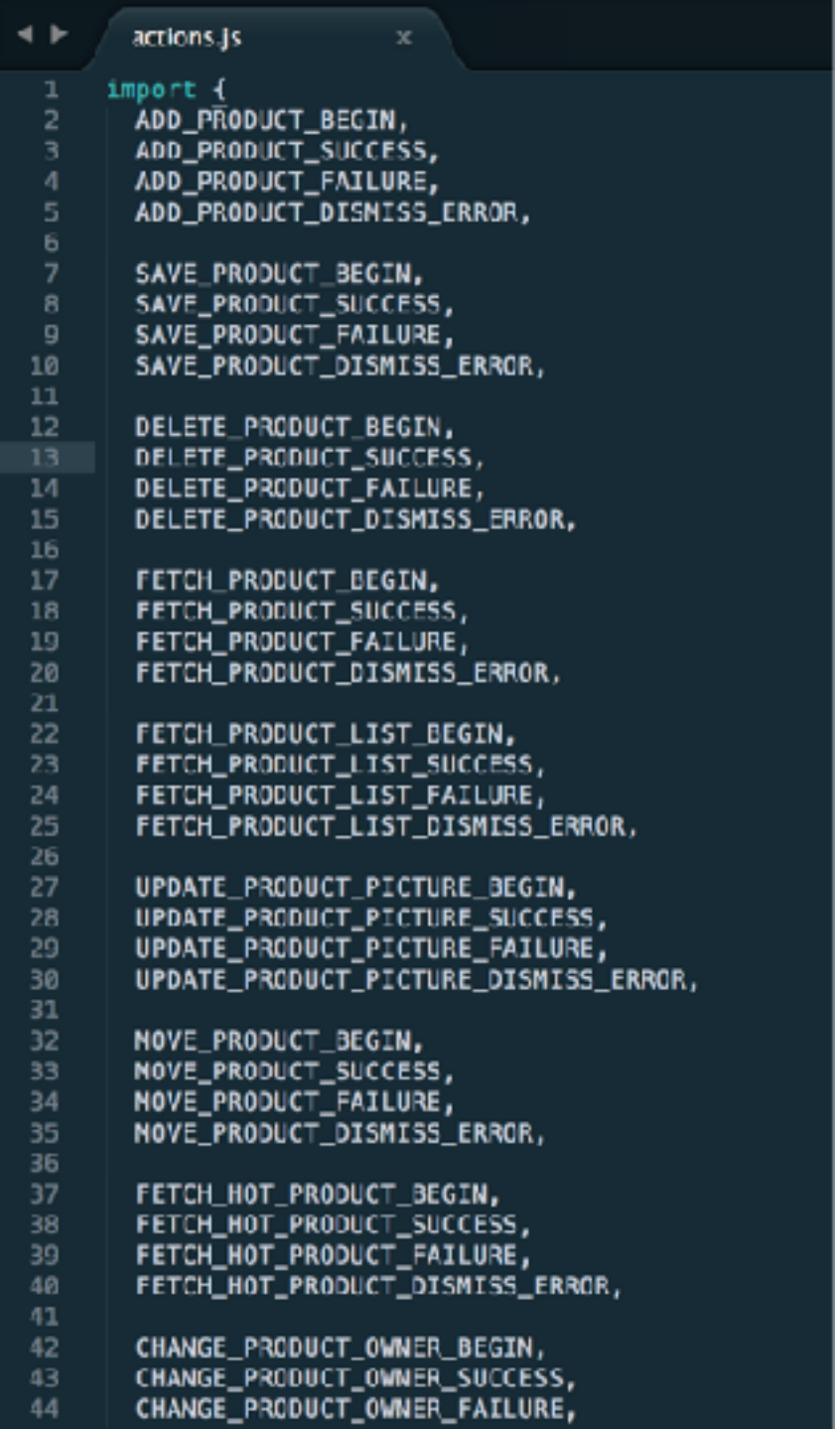
小结

1. 异步 action 不是特殊 action，

   而是多个同步 action 的组合使用

2. 中间件在 dispatcher 中截获 action 做特殊处理

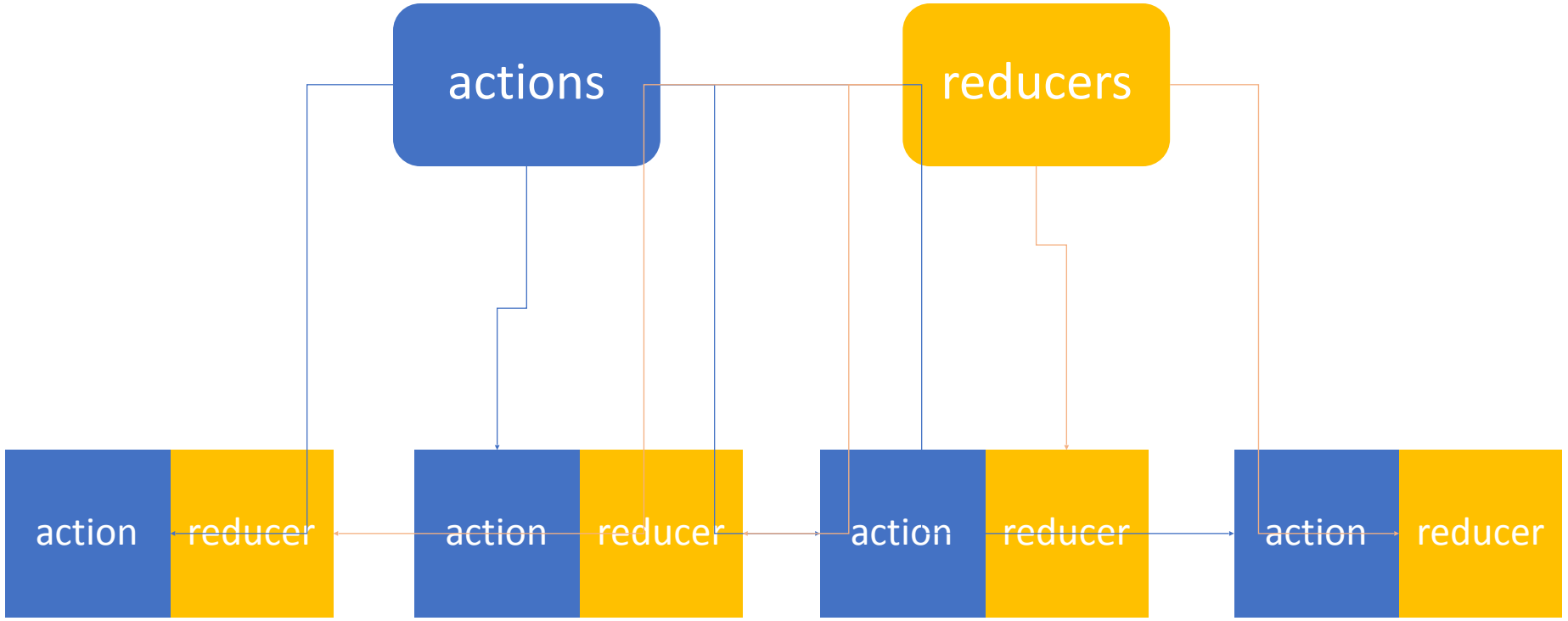
Redux（5）：如何组织 Action 和 Reducer



”标准”形式 Redux Action 的问题

1. 所有 Action 放一个文件，会无限扩展
2. Action, Reducer 分开，实现业务逻辑时需要来回切换
3. 系统中有哪些 Action 不够直观

新的方式：单个 action 和 reducer 放在同一个文件



新的方式：每个文件一个 Action

```
import {
  COUNTER_PLUS_ONE,
} from './constants';
export function counterPlusOne() {
  return {
    type: COUNTER_PLUS_ONE,
  };
}
export function reducer(state, action) {
  switch (action.type) {
    case COUNTER_PLUS_ONE:
      return {
        ...state,
        count: state.count + 1,
      };
    default:
      return state;
  }
}
```

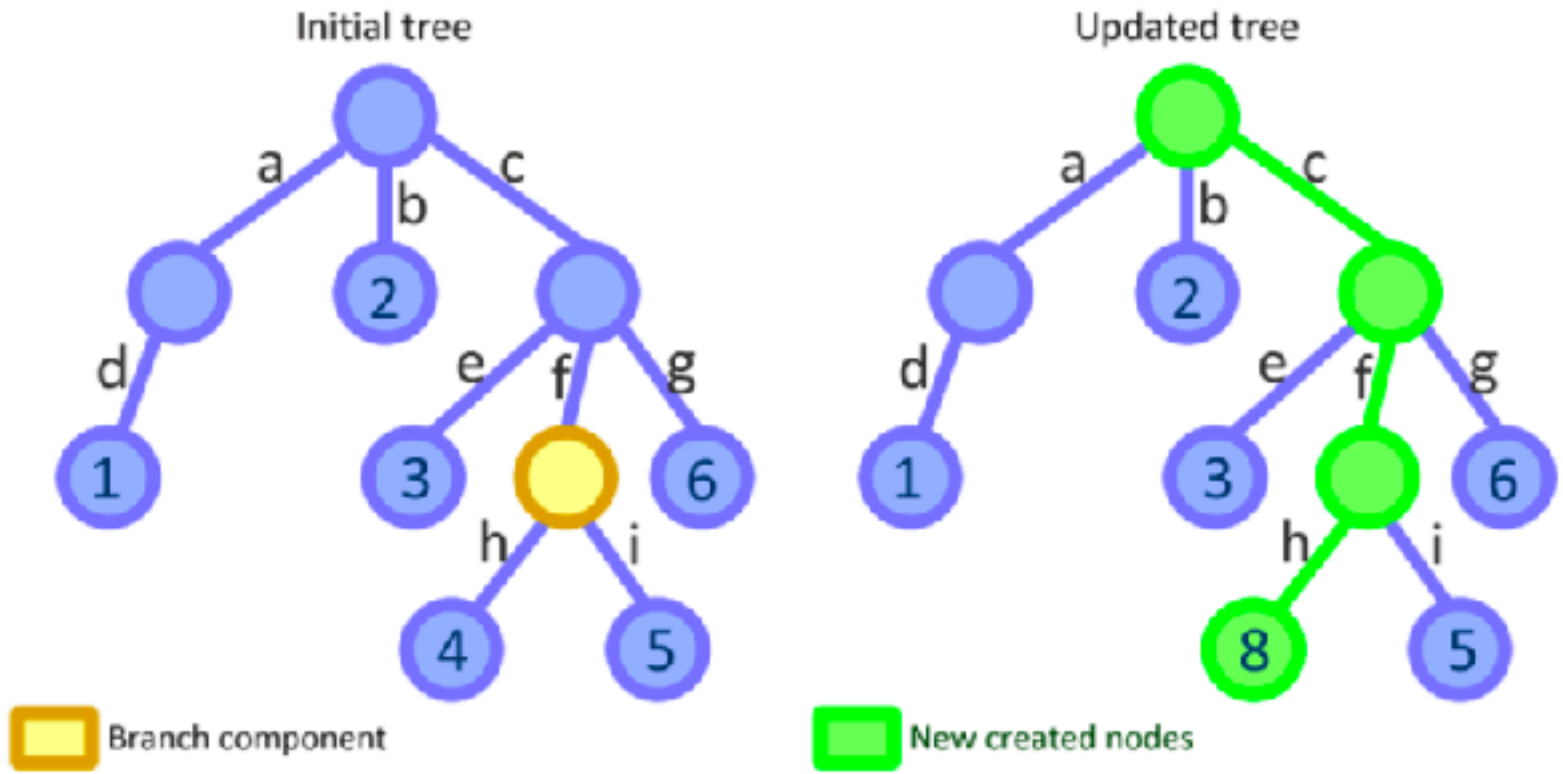
counterPlusOne.js

1. 易于开发：不用在 action 和 reducer 文件间来回切换
2. 易于维护：每个 action 文件都很小，容易理解
3. 易于测试：每个业务逻辑只需对应一个测试文件
4. 易于理解：文件名就是 action 名字，文件列表就是 action 列表

DEMO

Redux（6）：理解 Redux 的运行基础，不可变数据（Immutability）

不可变数据（immutable data)



© http://arqex.com/991/json-editor-react-immutable-data

为何需要不可变数据

1.性能优化

2.易于调试和跟踪

3.易于推测

如何操作不可变数据

1.原生写法：{ ... }, Object.assign

2.immutability-helper

3.immer

原生写法：{ ... }, Object.assign

```
const state = { filter: 'completed', todos: [
  'Learn React'
]};
const newState = { ...state, todos: [
  ...state.todos,
  'Learn Redux'
]};
const newState2 = Object.assign({}, state, { todos:
  [
    ...state.todos,
    'Learn Redux'
]});
```

immutability-helper

```
import update from 'immutability-helper';

const state = { filter: 'completed', todos: [
  'Learn React'
]};

const newState = update(state, { todos: {$push: ['Learn Redux']}});
```

https://github.com/kolodny/immutability-helper

immer

```
import produce from 'immer';

const state = { filter: 'completed', todos: [
  'Learn React'
]};

const newState = produce(state, draftState => {
    draftState.todos.push('Learn Redux.');
})
```

https://github.com/mweststrate/immer

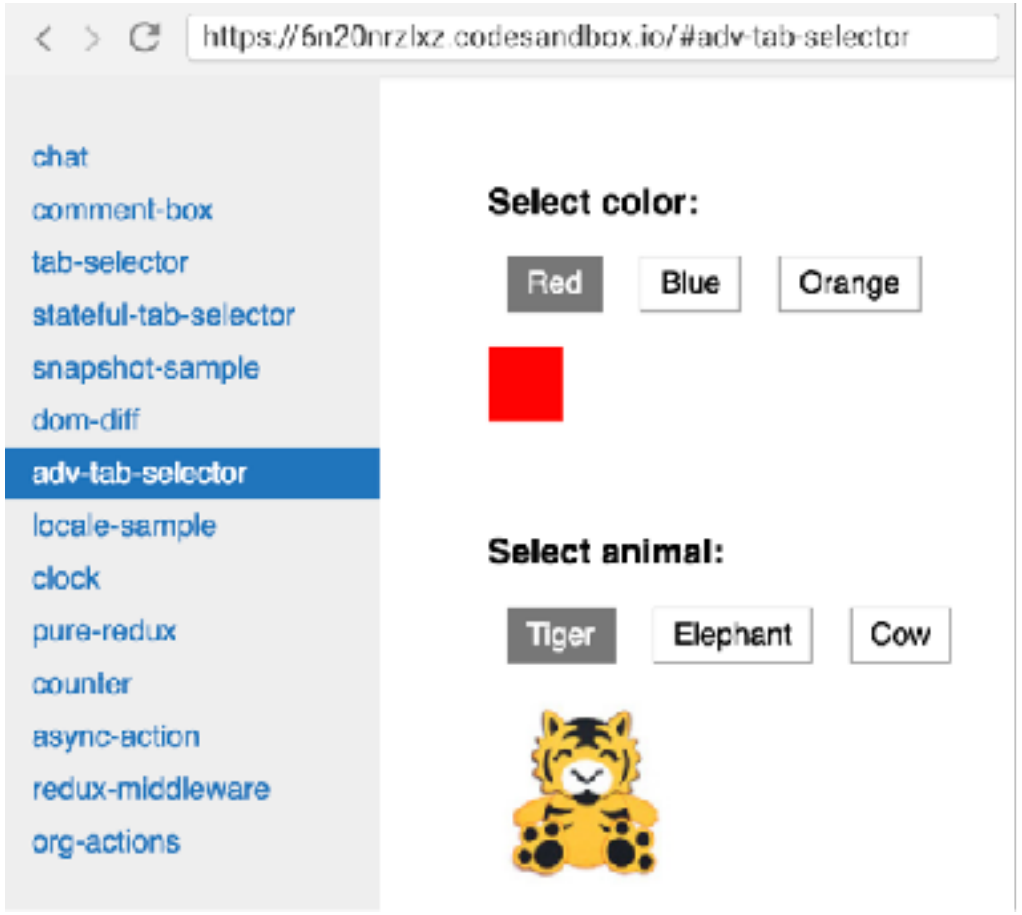
小结

1. 不可变数据的含义
2. Redux 为什么使用不可变数据
3. 如何操作不可变数据

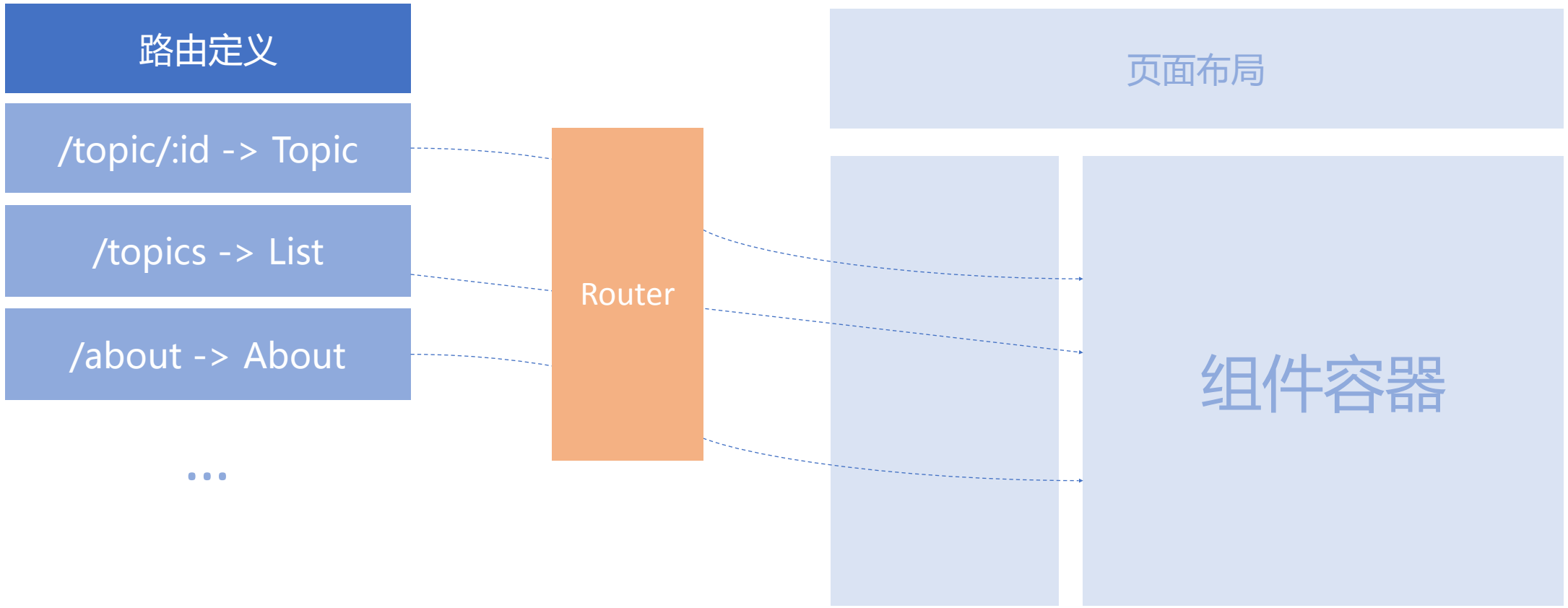
React Router (1): 路由不只是页面切换，更是代码组织方式

为什么需要路由

1. 单页应用需要进行页面切换
2. 通过 URL 可以定位到页面
3. 更有语义的组织资源



路由实现的基本架构


路由定义
/topic/:id -> Topic
/topics -> List
/about -> About
...
Router
页面布局
组件容器

React Router 的实现

```
<Router>
  <div>
    <ul id="menu">
      <li><Link to="/home">Home</Link></li>
      <li><Link to="/hello">Hello</Link></li>
      <li><Link to="/about">About</Link></li>
    </ul>

    <div id="page-container">
      <Route path="/home" component={Home} />
      <Route path="/hello" component={Hello} />
      <Route path="/about" component={About} />
    </div>
  </div>
</Router>
```

React Router 的特性

1. 声明式路由定义
2. 动态路由

```
const App = () => (
  <div>
    <nav>
      <Link to="/dashboard">Dashboard</Link>
    </nav>
    <div>
      <Route path="/dashboard" component={Dashboard}/>
    </div>
  </div>
)
```

三种路由实现方式

1. URL 路径
2. hash 路由
3. 内存路由

基于路由配置进行资源组织

1. 实现业务逻辑的松耦合
2. 易于扩展，重构和维护
3. 路由层面实现 Lazy Load

React Router API

1. <Link>：普通链接，不会触发浏览器刷新
2. <NavLink>：类似 Link 但是会添加当前选中状态
3. <Prompt>：满足条件时提示用户是否离开当前页面
4. <Redirect>：重定向当前页面，例如登录判断
5. <Route>：路由配置的核心标记，路径匹配时显示对应组件
6. <Switch>：只显示第一个匹配的路由

<Link>：普通链接，不会触发浏览器刷新

```
import { Link } from 'react-router-dom'

<Link to="/about">About</Link>
```

<NavLink>：类似 Link 但是会添加当前选中状态

```
<NavLink
  to="/faq"
  activeClassName="selected"
>FAQs</NavLink>
```

<Prompt>：满足条件时提示用户是否离开当前页面

```
import { Prompt } from 'react-router'

<Prompt
  when={formIsHalfFilledOut}
  message="Are you sure you want to leave?"
/>
```

<Redirect>：重定向当前页面，例如登录判断

```
import { Route, Redirect } from 'react-router'

<Route exact path="/" render={() => (
  loggedIn ? (
    <Redirect to="/dashboard"/>
  ) : (
    <PublicHomePage/>
  )
)}/>
```

<Route>：路径匹配时显示对应组件

```
import { BrowserRouter as Router, Route } from 'react-router-dom'

<Router>
  <div>
    <Route exact path="/" component={Home}/>
    <Route path="/news" component={NewsFeed}/>
  </div>
</Router>
```

<Switch>：只显示第一个匹配的路由

```
import { Switch, Route } from 'react-router'

<Switch>
  <Route exact path="/" component={Home}/>
  <Route path="/about" component={About}/>
  <Route path="/:user" component={User}/>
  <Route component={NoMatch}/>
</Switch>
```

小结

1. 前端路由是什么
2. React Router 如何实现路由
3. 基于路由思考资源的组织
4. React Router 核心 API

React Router (2): 参数定义，嵌套路由的使用场景

通过 URL 传递参数

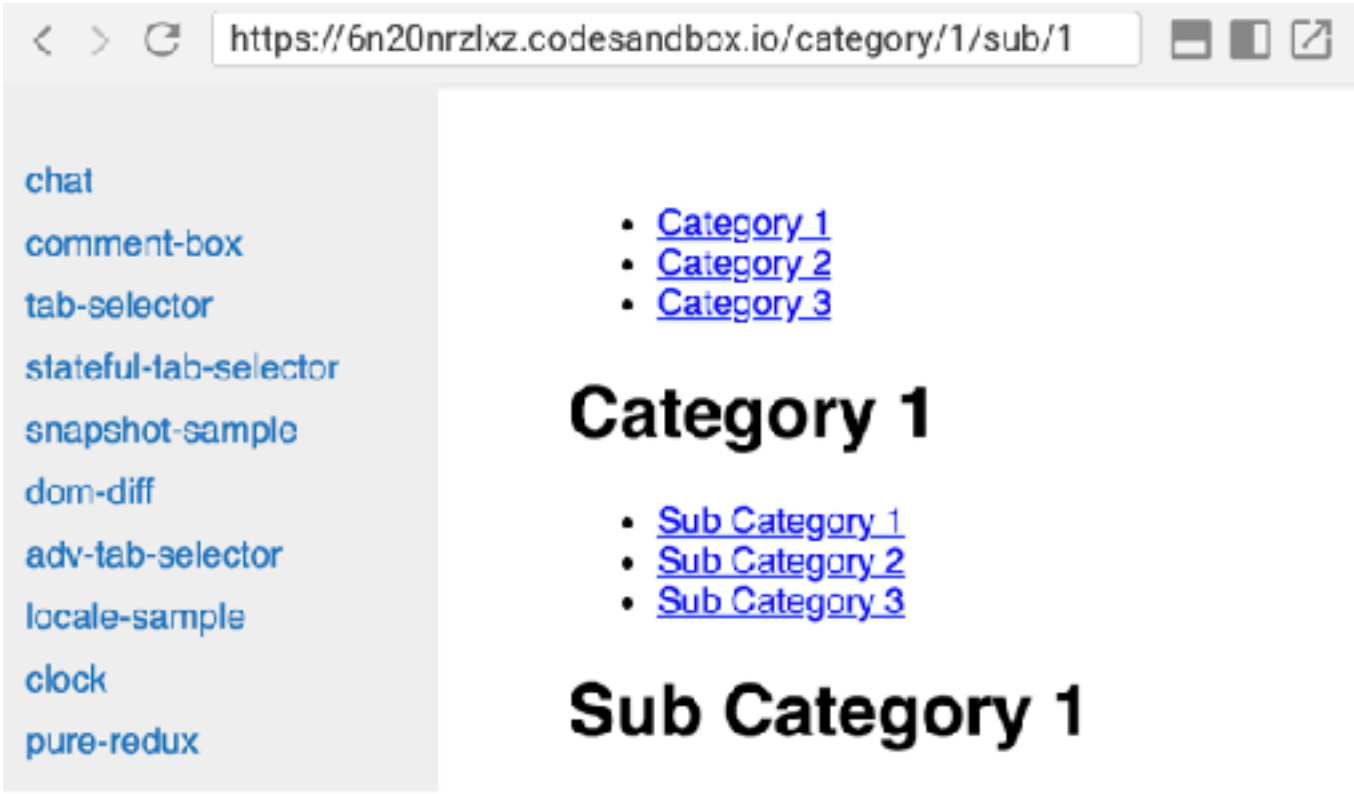
1. 如何通过 URL 传递参数：<Route path=“/topic/:id” … />
2. 如何获取参数：this.props.match.params
3. https://github.com/pillarjs/path-to-regexp

何时需要 URL 参数

页面状态尽量通过 URL 参数定义

嵌套路由

1. 每个 React 组件都可以是路由容器
2. React Router 的声明式语法可以方便的定义嵌套路由



小结

1. 路由参数的传递
2. 嵌套路由的实现

UI 组件库对比和介绍：Ant.Design, Material UI, Semantic UI

Ant Design

一个服务于企业级产品的设计体系，基于『确定』和『自然』的设计价值观和模块化的解决方案，让设计者专注于更好的用户体验。

开始使用　设计语言　Star 30231

足不出户

能在这个页面解决的问题，就不要去其它页面解决，因为任何页面刷新和跳转都会引起变化盲视（Change Blindness），导致用户心流（Flow）被打断。频繁的页面刷新和跳转，仅像在看戏时，演员说完一行台词就安排一次谢幕一样。

> 变化盲视（Change Blindness）：指视觉场景中的某些变化并未被观察者注意到的心理现象。产生这种现象的原因包括场景中的障碍物、眼球运动、扯点的变化，或者是缺乏注意力等。——摘自《维基百科》
> 心流（Flow）：也有别名以化境（Zone）表示，亦有人翻译为神驰状态，定义是一种将个人精神力完全投注在某种活动上的感觉；心流产生时同时会有高度的兴奋及充实感。——摘自《维基百科》

覆盖层

MATERIAL-UI

React components that implement Google's Material Design.

Contained Buttons

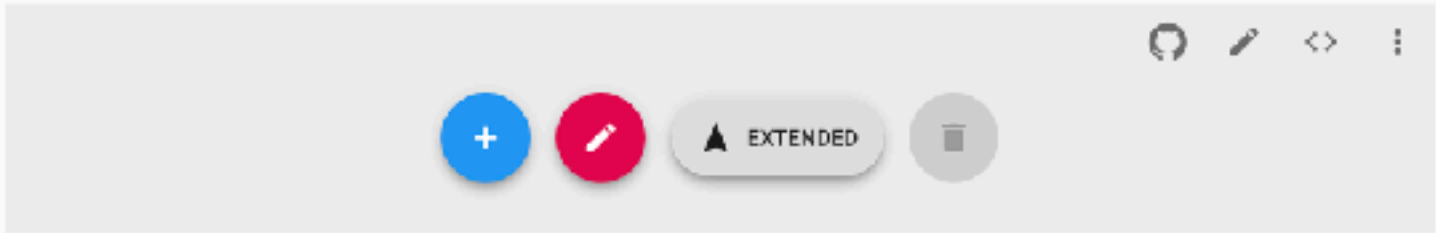
Contained buttons are high-emphasis, distinguished by their use of elevation and fill. They contain actions that are primary to your app.

Floating Action Buttons

A floating action button (FAB) performs the primary, or most common, action on a screen. It appears in front of all screen content, typically as a circular shape with an icon in its center. FABs come in three types: regular, mini, and extended.

Only use a FAB if it is the most suitable way to present a screen's primary action.

Only one floating action button is recommended per screen to represent the most common action.




Menu
Tweet
Star
41,864
English
2.3.2
Semantic UI
User Interface is the language of the web
Get Started
New in 2.3

选择 UI 库的考虑因素

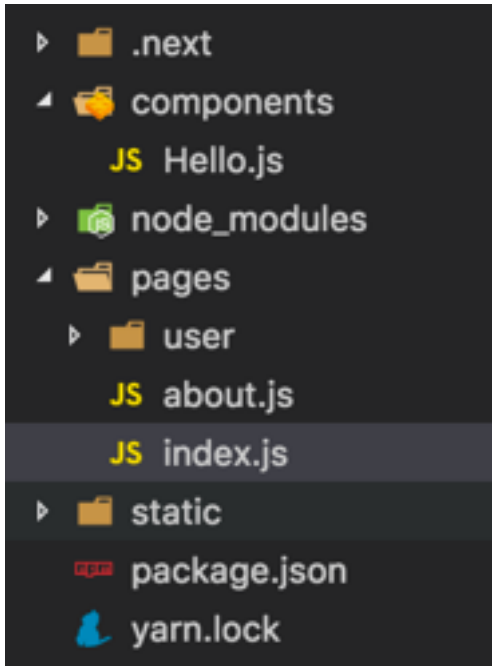
1. 组件库是否齐全
2. 样式风格是否符合业务需求
3. API 设计是否便捷和灵活
4. 技术支持是否完善
5. 开发是否活跃

DEMO

使用 Next.js 创建 React 同构应用

什么是同构应用

创建页面



1. 页面就是 pages 目录下的一个组件
2. static 目录映射静态文件
3. page 具有特殊静态方法 getInitialProps

在页面中使用其它 React 组件

1. 页面也是标准的 node 模块，可使用其它 React 组件
2. 页面会针对性打包，仅包含其引入的组件

使用 Link 实现同构路由

```
import Link from 'next/link'

export default () =>
  <div>
    Click{' '}
    <Link href="/about">
      <a>here</a>
    </Link>{' '}
    to read more
  </div>
```

1. 使用 “next/link” 定义链接
2. 点击链接时页面不会刷新
3. 使用 prefetch 预加载目标资源
4. 使用 replace 属性替换 URL

动态加载页面

极客时间

```
import dynamic from 'next/dynamic'

const DynamicComponentWithCustomLoading = dynamic(
  import('../components/hello2'),
  {
    loading: () => <p>...</p>
  }
)

export default () =>
  <div>
    <Header />
    <DynamicComponentWithCustomLoading />
    <p>HOME PAGE is here!</p>
  </div>
```

DEMO

小结

1. 同构应用的概念
2. Next.js 的基本用法

使用 Jest, Enzyme 等工具进行单元测试

React 让前端单元测试变得容易

1. React 应用很少需要访问浏览器 API
2. 虚拟 DOM 可以在 NodeJS 环境运行和测试
3. Redux 隔离了状态管理，纯数据层单元测试

单元测试涉及的工具

1. Jest: Facebook 开源的 JS 单元测试框架
2. JS DOM: 浏览器环境的 NodeJS 模拟
3. Enzyme： React 组件渲染和测试
4. nock: 模拟 HTTP 请求
5. sinon: 函数模拟和调用跟踪
6. istanbul: 单元测试覆盖率

Jest

Delightful JavaScript Testing

```
1  const add = require('./add');
2  describe('add', () => {
3    it('should add two numbers', () => {
4      expect(add(1, 2)).toBe(3);
5    });
6  });
```

```
PASS  ./add-test.js
 add
   ✓ should add two numbers (6ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:   0 total
Time:        0.903s
Ran all test suites.
```

jsdom

```
const JSDOM = require('jsdom').JSDOM;

global.window = new JSDOM('<!DOCTYPE html><div id="react-root"></div>').window;
global.document = window.document;
global.navigator = window.navigator;
global.HTMLElement = window.HTMLElement;
```

Enzyme

```
import React from 'react';
import { shallow } from 'enzyme';
import { DefaultPage } from 'src/features/home/DefaultPage';

describe('home/DefaultPage', () => {
  it('renders node with correct class name', () => {
    const pageProps = {
      home: {},
      actions: {},
    };
    const renderedComponent = shallow(
      <DefaultPage {...pageProps} />
    );

    expect(
      renderedComponent.find('.home-default-page').getElement()
    ).to.exist;
  });
});
```

Shallow Rendering

```
import { shallow } from 'enzyme';

const wrapper = shallow(<MyComponent />);
// ...
```

Full Rendering

```
import { mount } from 'enzyme';

const wrapper = mount(<MyComponent />);
// ...
```

Static Rendering

```
import { render } from 'enzyme';

const wrapper = render(<MyComponent />);
// ...
```

Nock

```
it('handles fetchRedditReactjsList failure', () => {
  nock('http://www.reddit.com/')
    .get('/r/reactjs.json')
    .reply(500, null);
  const store = mockStore({ redditReactjsList: [] });

  return store.dispatch(fetchRedditReactjsList())
    .catch(() => {
      const actions = store.getActions();
      expect(actions[0]).to.have.property('type', HOME_FETCH_REDDIT_REACTJS_LIST_BEGIN);
      expect(actions[1]).to.have.property('type', HOME_FETCH_REDDIT_REACTJS_LIST_FAILURE);
      expect(actions[1]).to.have.nested.property('data.error').that.exist;
    });
});
```

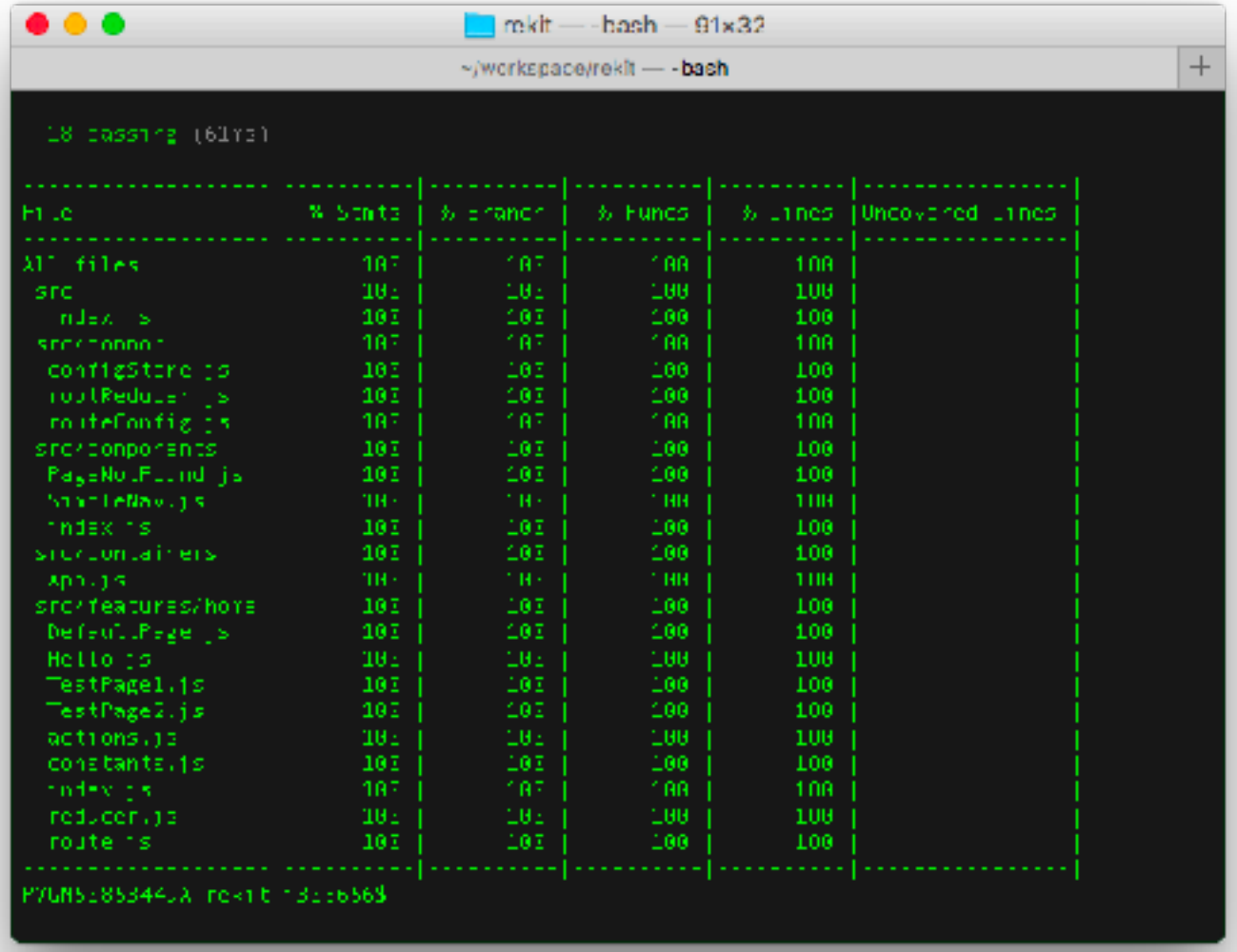
Sinon


```
it('counter actions are called when buttons clicked', () => {
    const pageProps = {
      home: {},
      actions: {
        counterPlusOne: sinon.spy(),
        counterMinusOne: sinon.spy(),
        resetCounter: sinon.spy(),
        fetchRedditReactjsList: sinon.spy(),
      },
    };
    const renderedComponent = shallow(
      <DefaultPage {...pageProps} />
    );
    renderedComponent.find('.btn-plus-one').simulate('click');
    renderedComponent.find('.btn-minus-one').simulate('click');
    renderedComponent.find('.btn-reset-counter').simulate('click');
    renderedComponent.find('.btn-fetch-reddit').simulate('click');
    expect(pageProps.actions.counterPlusOne).to.have.property('callCount', 1);
    expect(pageProps.actions.counterMinusOne).to.have.property('callCount', 1);
    expect(pageProps.actions.resetCounter).to.have.property('callCount', 1);
    expect(pageProps.actions.fetchRedditReactjsList).to.have.property('callCount', 1);
  });
```

Istanbul

```
$ npm install -g istanbul
$ cd /path/to/your/source/root
$ istanbul cover test.js
```

```
function meaningOfLife() {
  return 42;
}

function meaningOfLife() {
  __cov_ECtND6oq6U5QiIaViK8Qyw.f['1']++;
  __cov_ECtND6oq6U5QiIaViK8Qyw.s['2']++;
  return 42;
}
```



DEMO

小结

1. React 让单元测试变得更容易
2. 单元测试所涉及的工具和技术

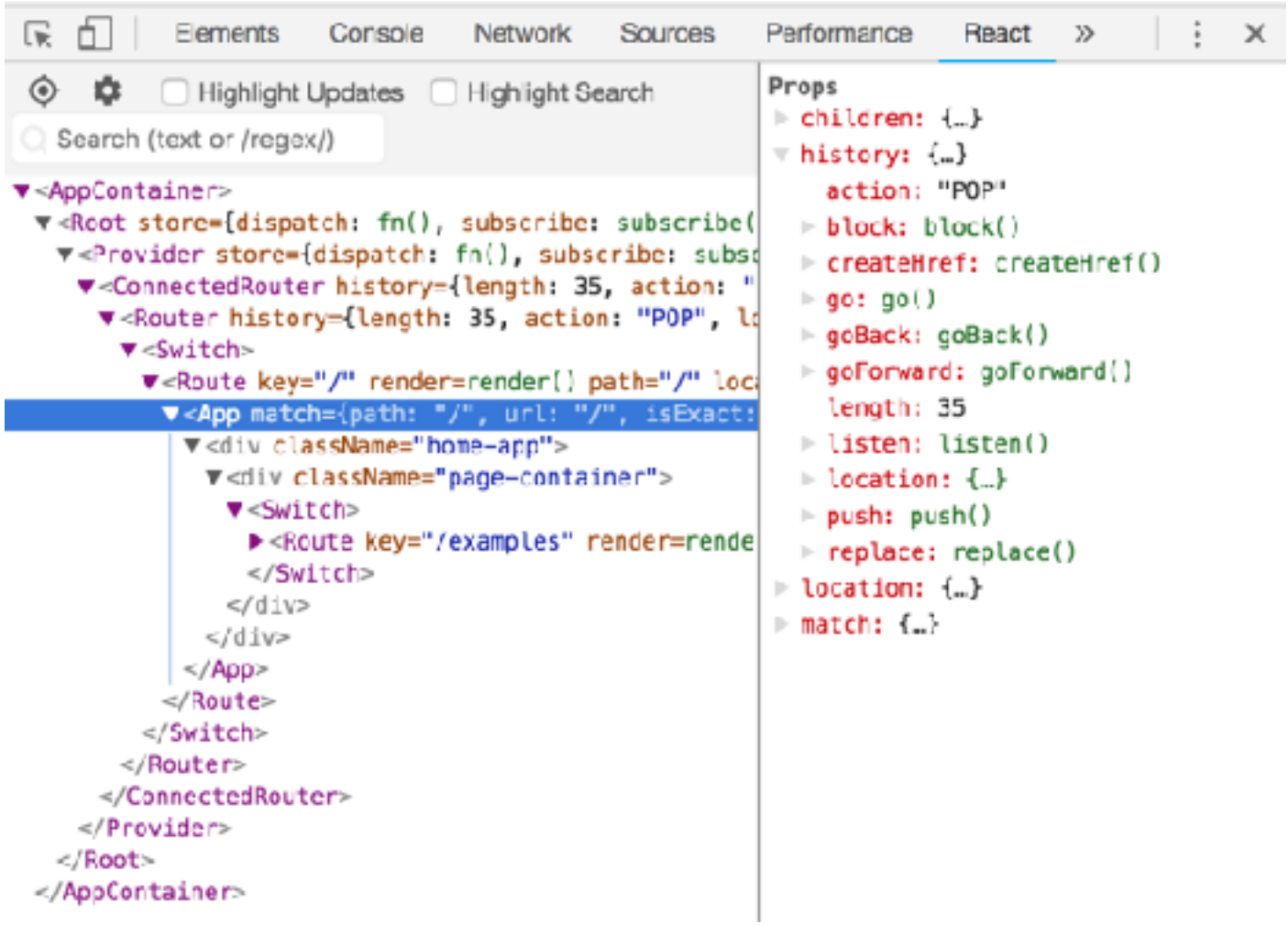
常用开发调试工具：ESLint, Prettier, React DevTool, Redux DevTool

1. 使用 .eslintrc 进行规则的配置
2. 使用 airbnb 的 JavaScript 代码风格

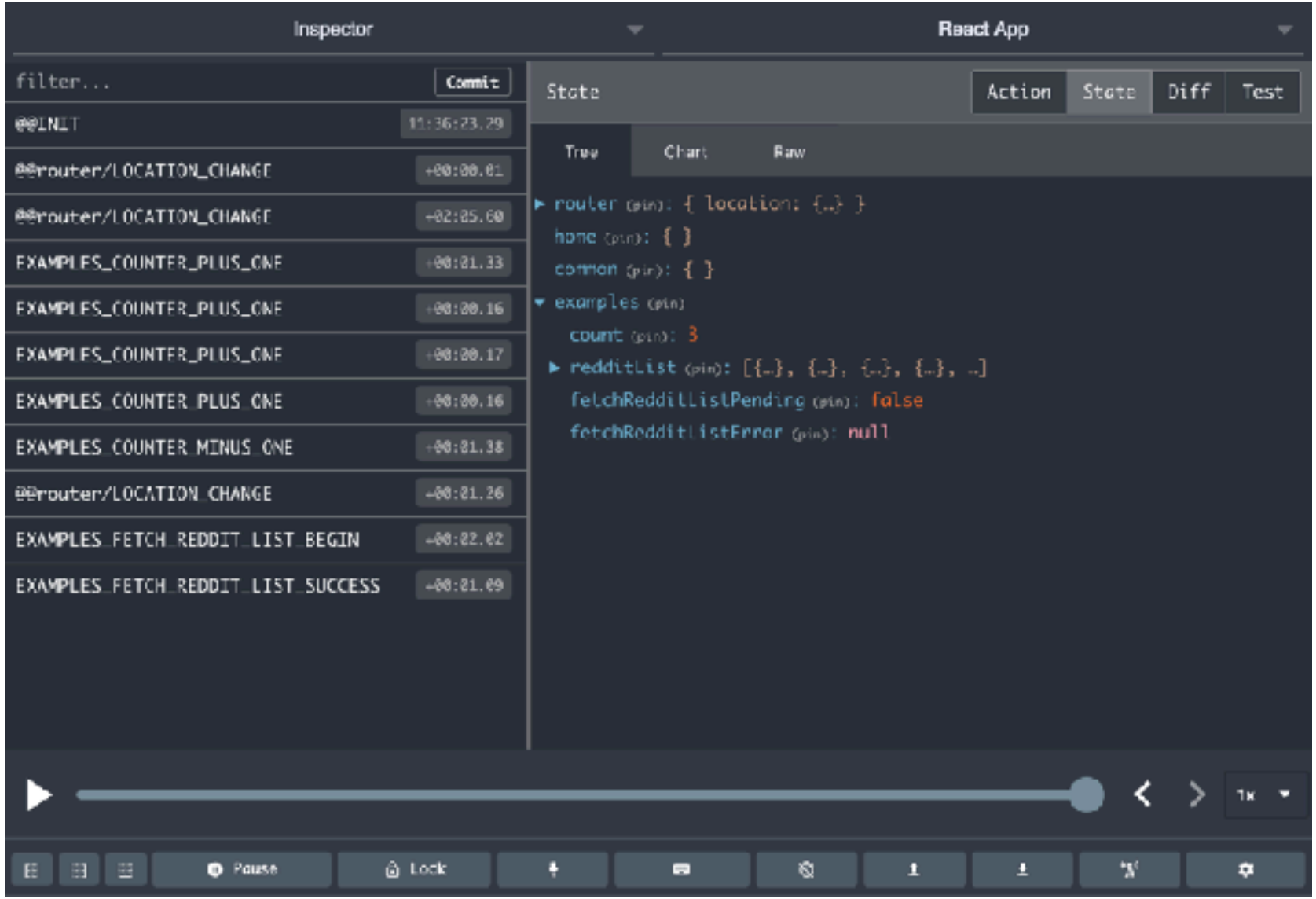
Prettier

1. 代码格式化的神器
2. 保证更容易写出风格一致的代码

React Dev Tools



Redux Dev Tools

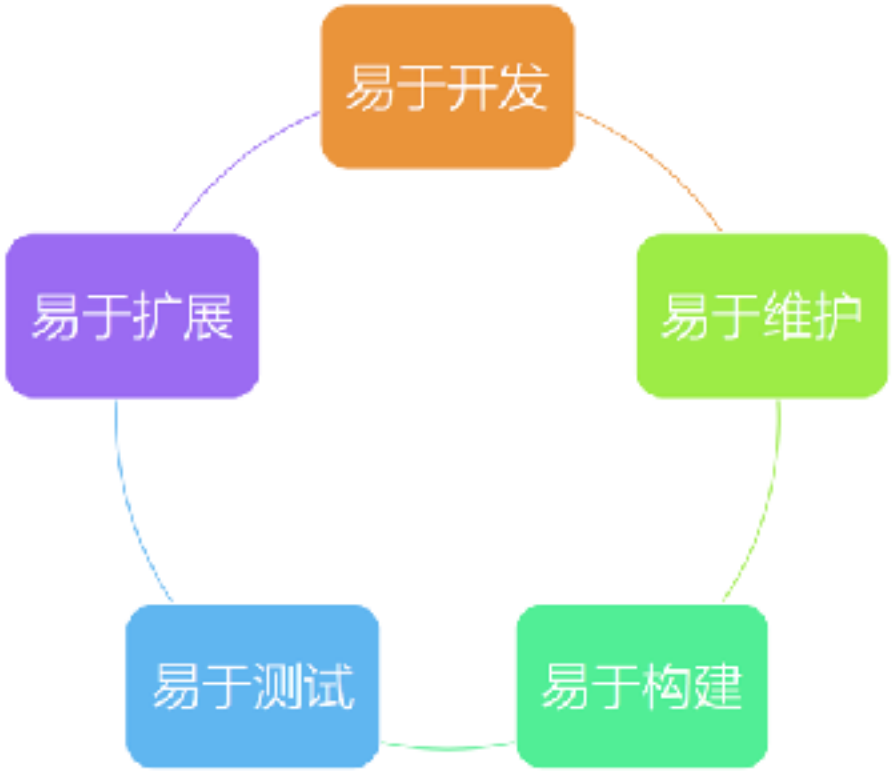


DEMO

前端项目的理想架构：

可维护，可扩展，可测试，易开发，易构建

理想架构



易于开发

1. 开发工具是否完善
2. 生态圈是否繁荣
3. 社区是否活跃

易于扩展

1. 增加新功能是否容易
2. 新功能是否会显著增加系统复杂度

易于维护

1. 代码是否容易理解
2. 文档是否健全

易于测试

1. 功能的分层是否清晰
2. 副作用少
3. 尽量使用纯函数

易于构建

1. 使用通用技术和架构
2. 构建工具的选择

拆分复杂度（1）：

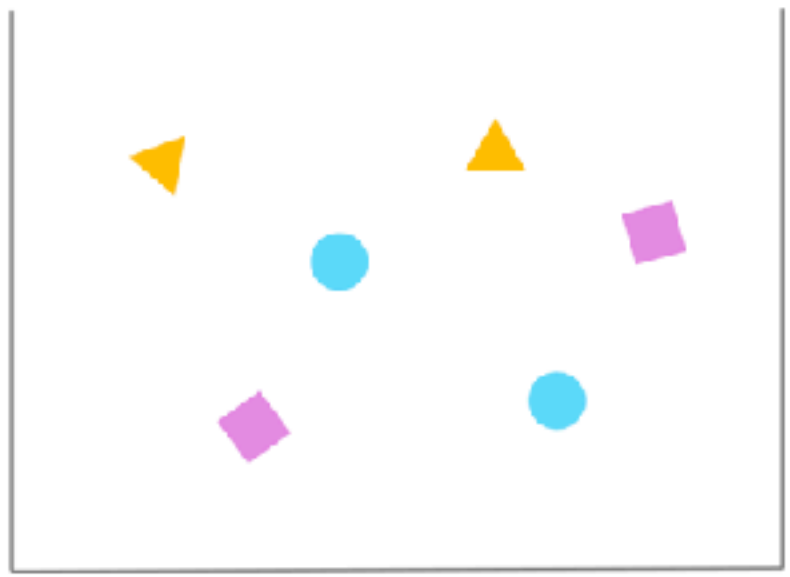
按领域模型（feature）组织代码，降低耦合度

项目初期：规模小，模块关系清晰

Reducer

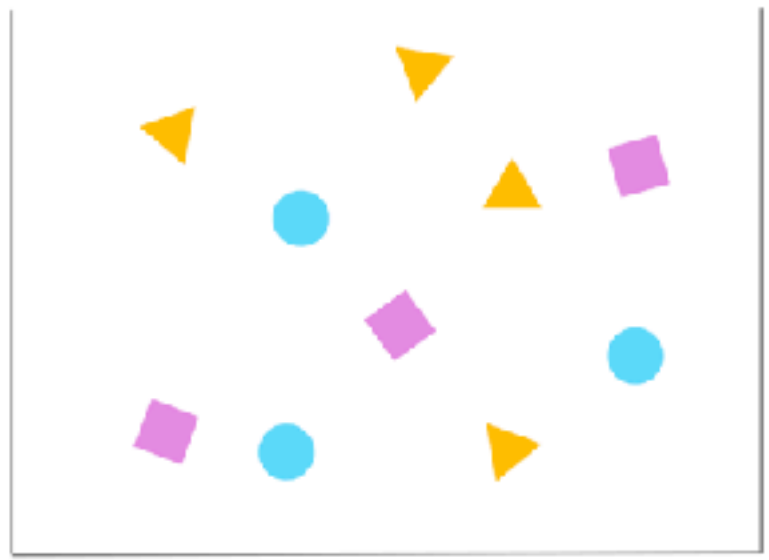
Action

Component

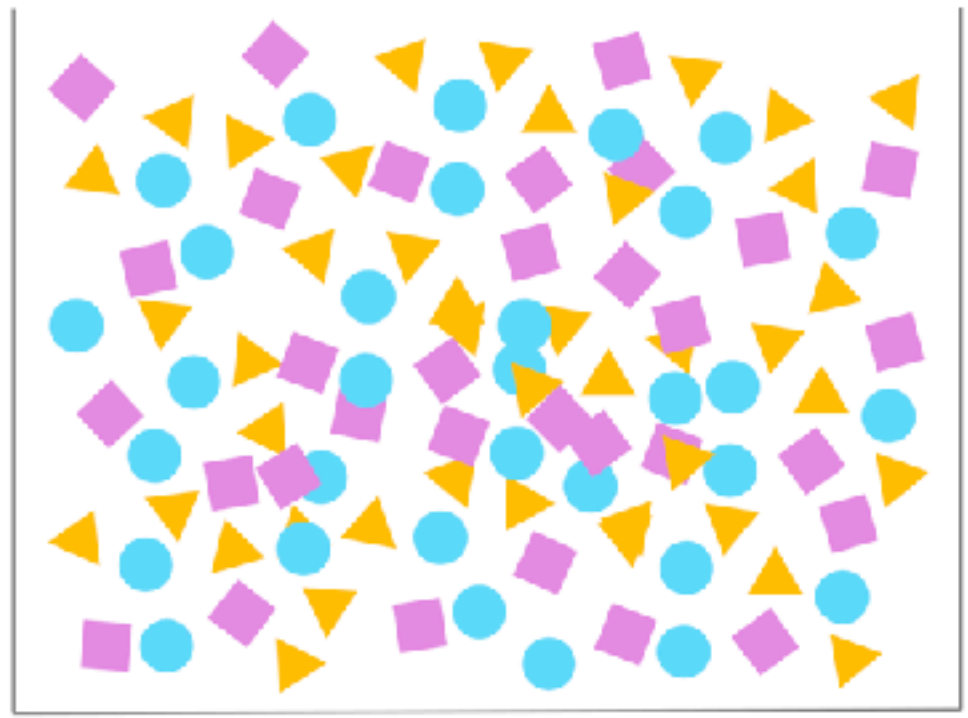


Application

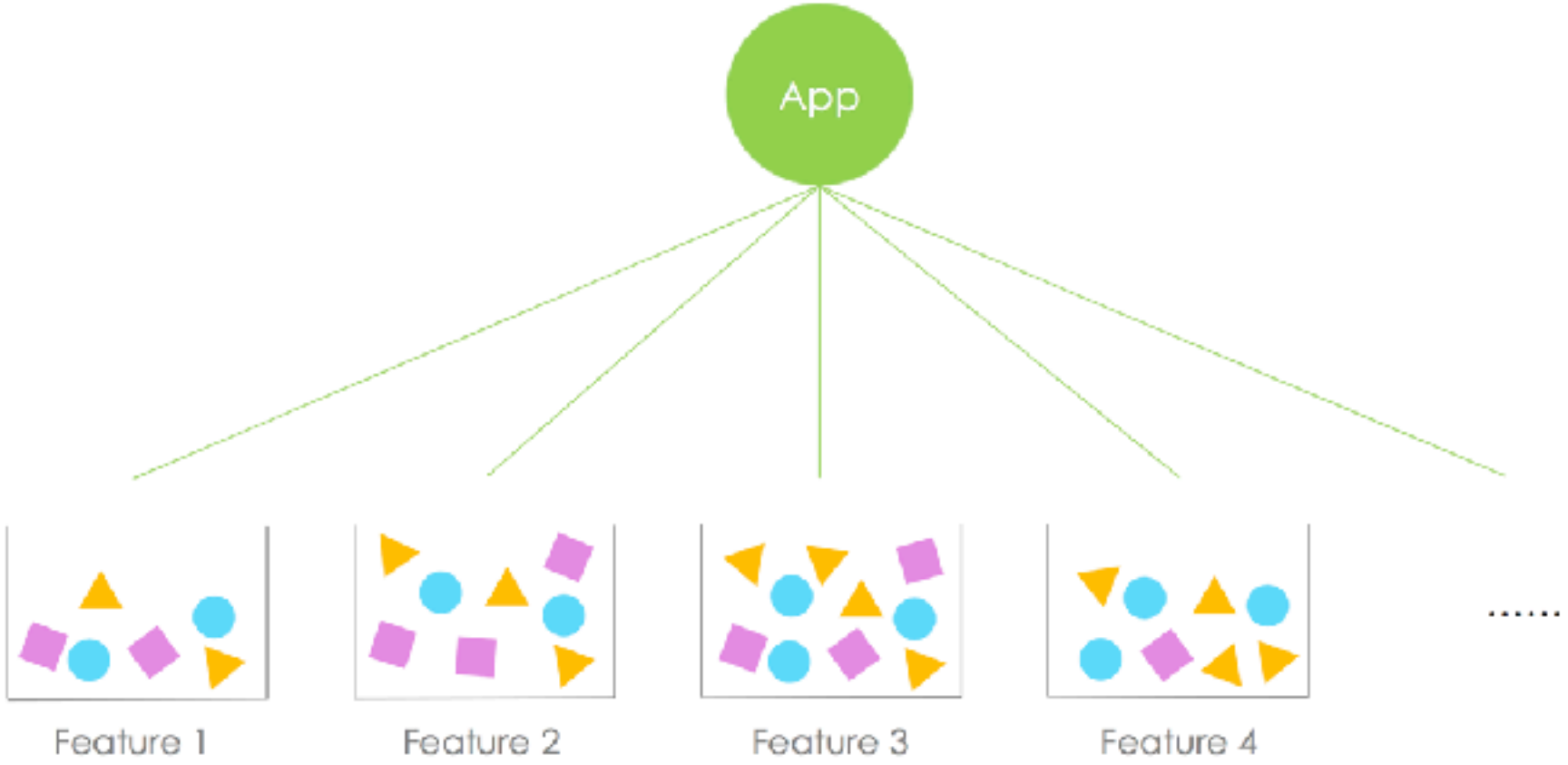
项目逐渐复杂，添加了更多组件和其他元素



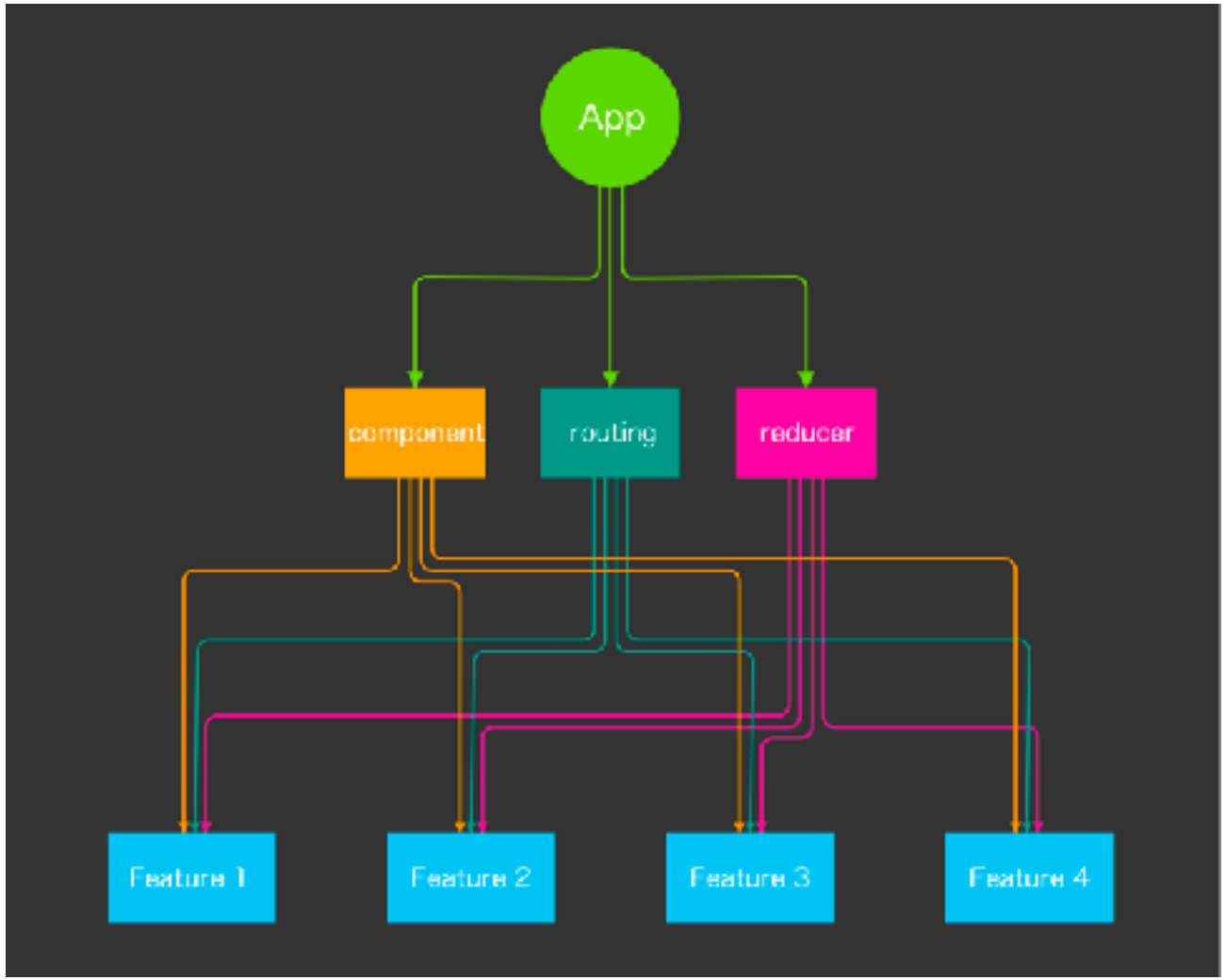
项目收尾：文件结构，模块依赖错综复杂



将业务逻辑拆分成高内聚松耦合的模块



通过 React 技术栈实现

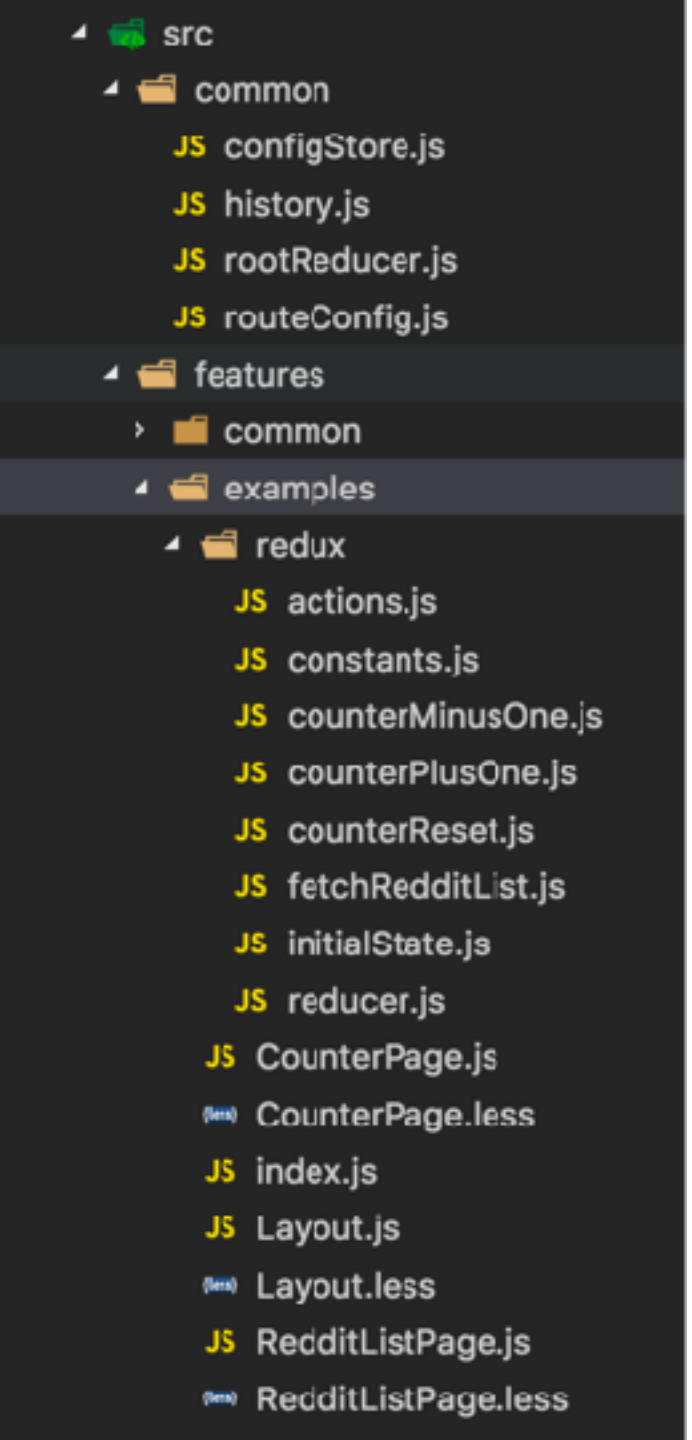


小结

1. 大型前端应用需要拆分复杂度
2. 使用 React 技术栈如何实现

拆分复杂度（2）：

如何组织 component, action 和 reducer

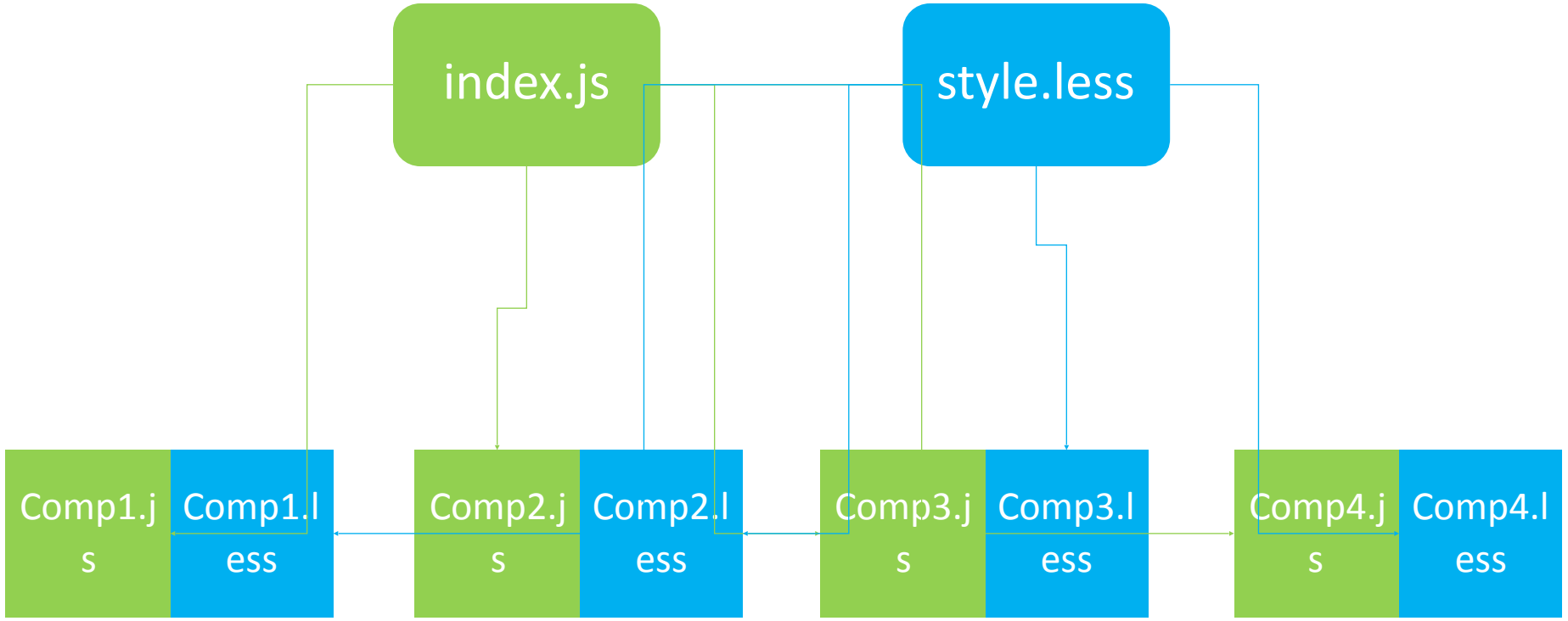


文件夹结构

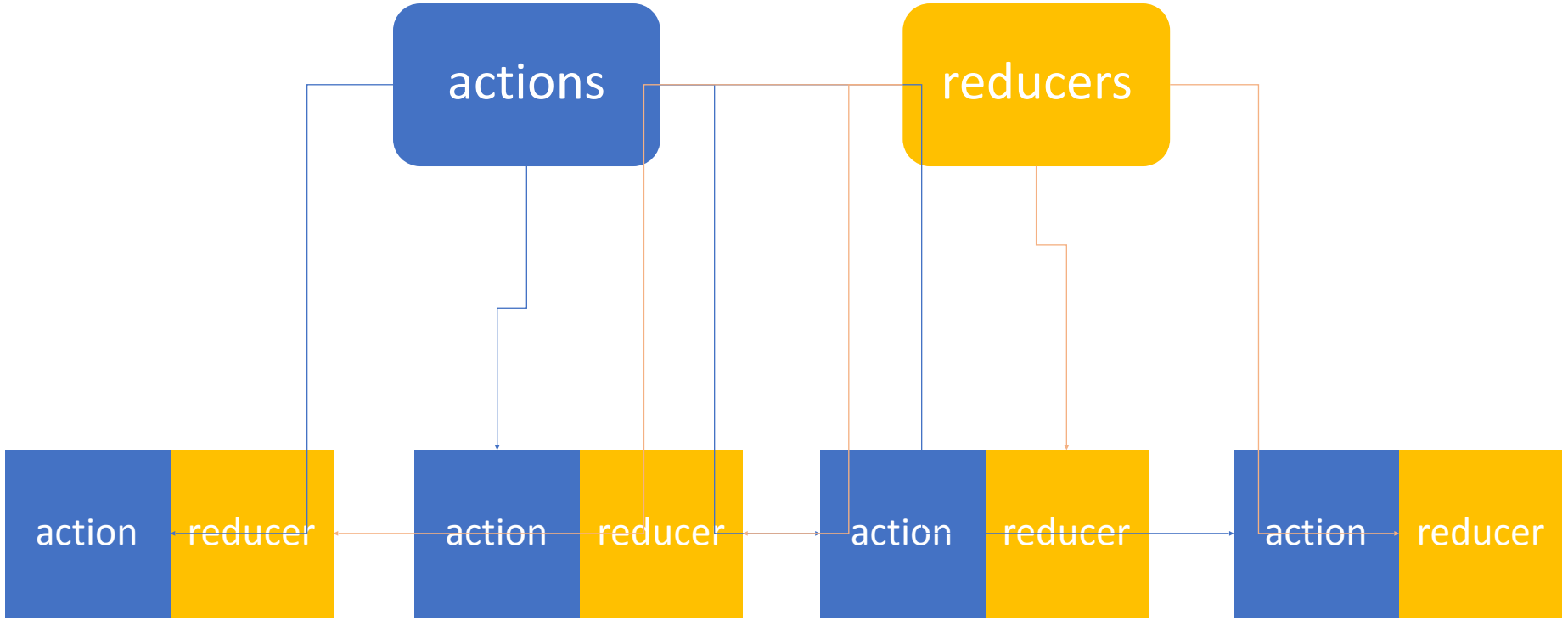
极客时间

- 按 feature 组织源文件
- 组件和样式文件同一级
- Redux 单独文件夹
- 单元测试保持同样目录结构放在 tests 文件夹

组件和样式


index.js
style.less
Comp1.js
Comp1.less
Comp2.js
Comp2.less
Comp3.js
Comp3.less
Comp4.js
Comp4.less

组织 Action 和 Reducer



counterPlusOne.js

```
import { EXAMPLES_COUNTER_PLUS_ONE } from './constants';

export function counterPlusOne() {
  return {
    type: EXAMPLES_COUNTER_PLUS_ONE,
  };
}

export function reducer(state, action) {
  switch (action.type) {
    case EXAMPLES_COUNTER_PLUS_ONE:
      return {
        ...state,
        count: state.count + 1,
      };

    default:
      return state;
  }
}
```

constants.js

```
export const EXAMPLES_COUNTER_PLUS_ONE = 'EXAMPLES_COUNTER_PLUS_ONE';
export const EXAMPLES_COUNTER_MINUS_ONE = 'EXAMPLES_COUNTER_MINUS_ONE';
export const EXAMPLES_COUNTER_RESET = 'EXAMPLES_COUNTER_RESET';
export const EXAMPLES_FETCH_REDDIT_LIST_BEGIN = 'EXAMPLES_FETCH_REDDIT_LIST_BEGIN';
export const EXAMPLES_FETCH_REDDIT_LIST_SUCCESS = 'EXAMPLES_FETCH_REDDIT_LIST_SUCCESS';
export const EXAMPLES_FETCH_REDDIT_LIST_FAILURE = 'EXAMPLES_FETCH_REDDIT_LIST_FAILURE';
export const EXAMPLES_FETCH_REDDIT_LIST_DISMISS_ERROR = 'EXAMPLES_FETCH_REDDIT_LIST_DISMISS_ERROR';
```

reducer.js

```
import initialState from './initialState';
import { reducer as counterPlusOneReducer } from './counterPlusOne';
import { reducer as counterMinusOneReducer } from './counterMinusOne';
import { reducer as counterResetReducer } from './counterReset';
import { reducer as fetchRedditListReducer } from './fetchRedditList';

const reducers = [
  counterPlusOneReducer,
  counterMinusOneReducer,
  counterResetReducer,
  fetchRedditListReducer,
];

export default function reducer(state = initialState, action) {
  let newState;
  switch (action.type) {
    // Handle cross-topic actions here
    default:
      newState = state;
      break;
  }
  return reducers.reduce((s, r) => r(s, action), newState);
}
```

actions.js

```
export { counterPlusOne } from './counterPlusOne';
export { counterMinusOne } from './counterMinusOne';
export { counterReset } from './counterReset';
export { fetchRedditList, dismissFetchRedditListError } from './fetchRedditList';
```

rootReducer.js

```
import { combineReducers } from 'redux';
import { routerReducer } from 'react-router-redux';
import homeReducer from '../features/home/redux/reducer';
import commonReducer from '../features/common/redux/reducer';
import examplesReducer from '../features/examples/redux/reducer';

const reducerMap = {
  router: routerReducer,
  home: homeReducer,
  common: commonReducer,
  examples: examplesReducer,
};

export default combineReducers(reducerMap);
```

DEMO

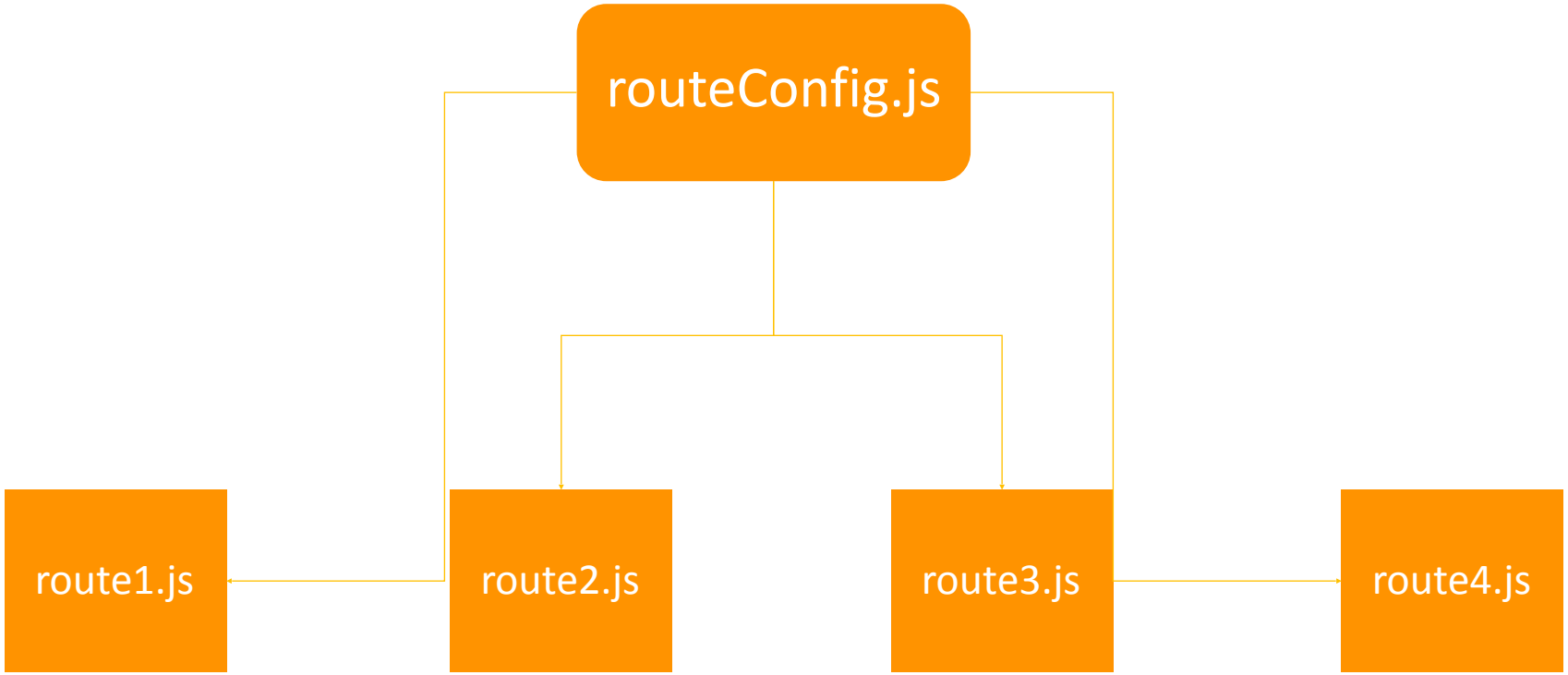
小结

1. 按 feature 组织组件，action 和 reducer
2. 使用 root loader 加载 feature 下的各个资源
3. 做到高内聚松耦合

拆分复杂度（3）：

如何组织 React Router 的路由配置

在每个 feature 中单独定义自己的路由



使用 JSON 定义顶层路由

```
import { WelcomePage, CounterPage, RedditListPage, Layout } from './';

export default {
  path: 'examples',
  name: 'Examples',
  component: Layout,
  childRoutes: [
    { path: '', name: 'Welcome page', component: WelcomePage },
    { path: 'counter', name: 'Counter page', component: CounterPage },
    { path: 'reddit', name: 'Reddit list page', protected: true, component: RedditListPage },
  ],
};
```

解析 JSON 路由到 React Router 语法


```
function renderRouteConfigV3(routes, contextPath) {
  // Resolve route config object in React Router v3.
  const children = []; // children component list

  const renderRoute = (item, routeContextPath) => {
    let newContextPath;
    if (/^\//.test(item.path)) {
      newContextPath = item.path;
    } else {
      newContextPath = `${routeContextPath}/${item.path}`;
    }
    newContextPath = newContextPath.replace(/\/+/g, '/');
    if (item.component && item.childRoutes) {
      const childRoutes = renderRouteConfigV3(item.childRoutes, newContextPath);
      children.push(
        <Route
          key={newContextPath}
          render={props => <item.component {...props}>{childRoutes}</item.component>}
          path={newContextPath}
        />
      );
    } else if (item.component) {
      children.push(<Route key={newContextPath} component={item.component} path={newContextPath} exact />);
    } else if (item.childRoutes) {
      item.childRoutes.forEach(r => renderRoute(r, newContextPath));
    }
  };
```

DEMO

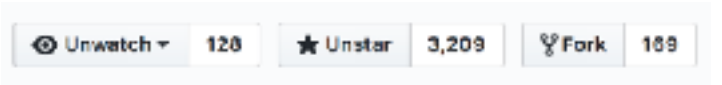
小结

1. 每个 feature 都有自己的专属路由配置
2. 顶层路由使用 JSON 配置更易维护和理解
3. 如何解析 JSON 配置到 React Router 语法

使用 Rekit（1）：创建项目，代码生成和重构

Rekit

React 专属 IDE 和工具集



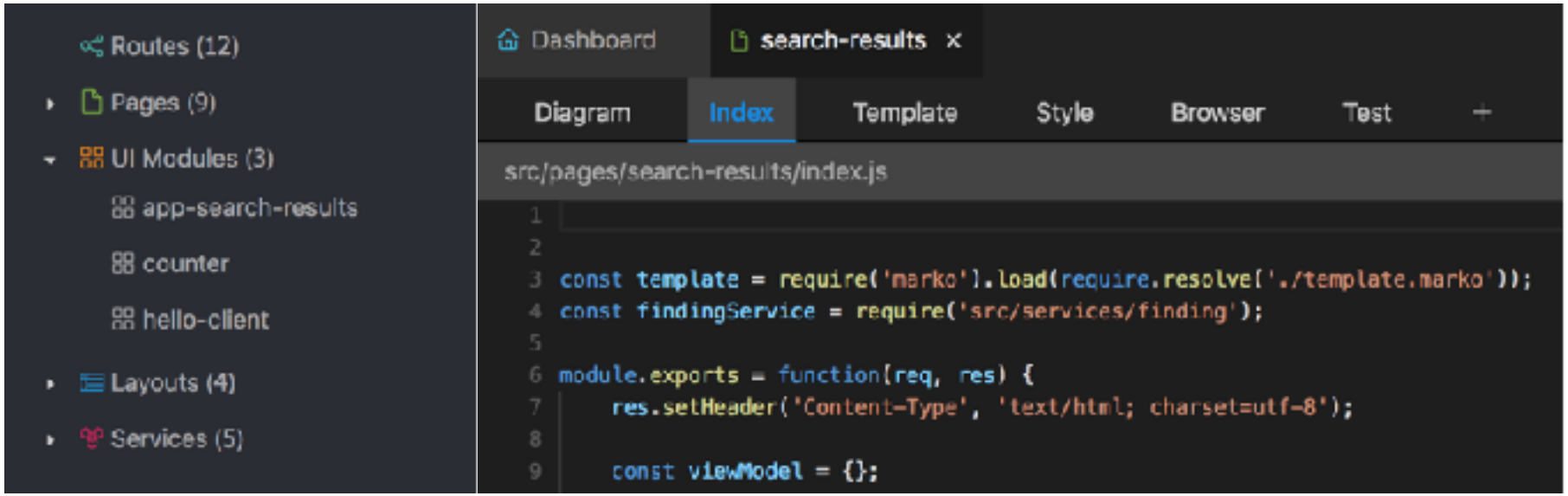
背景

前端技术功能越来越强大 → 开发变得越来越复杂

- 一个独立功能通常需要多个文件组成
- 代码模板很复杂
- 重构极为困难
- 项目复杂后很难理解和维护

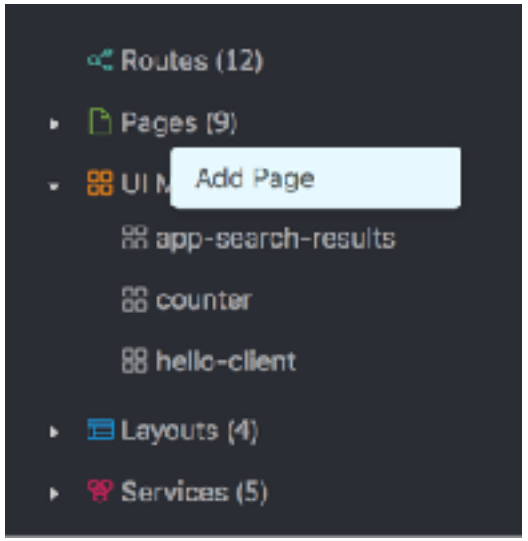
Rekit: 更好的代码导航

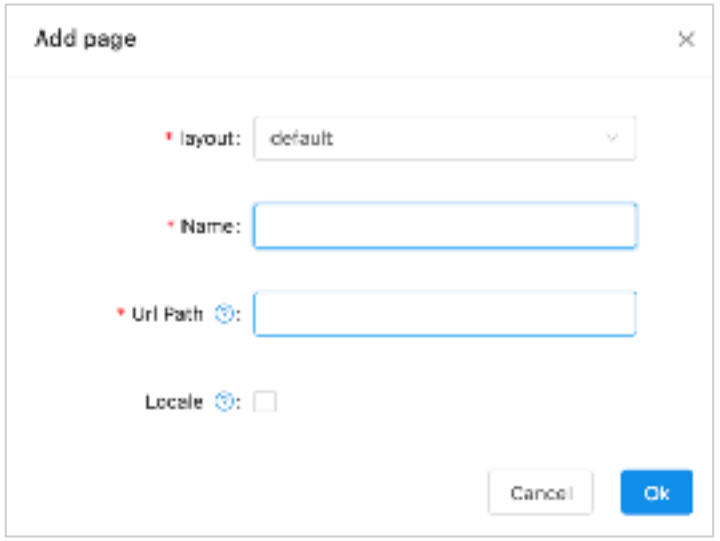
1. 语义化的组织源代码文件
2. 使用子 Tab 来展示项目元素的各个部分
3. 直观的显示和导航某个功能的所有依赖



Rekit: 一键生成项目元素

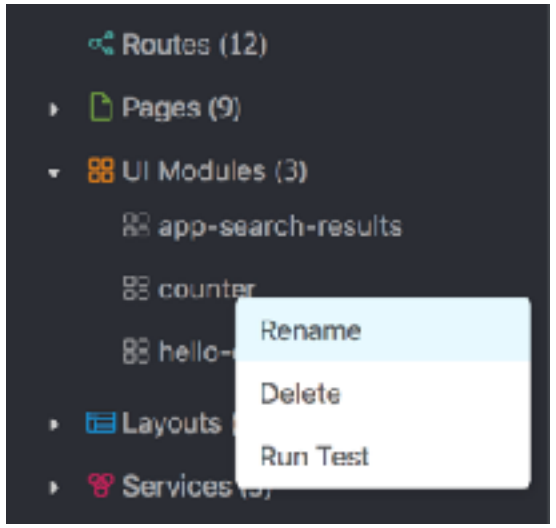
1. 直观的 UI 用于生成组件，action，reducer 等
2. 模板代码遵循最佳实践
3. 支持命令行方式创建项目元素





Rekit: 重构非常容易

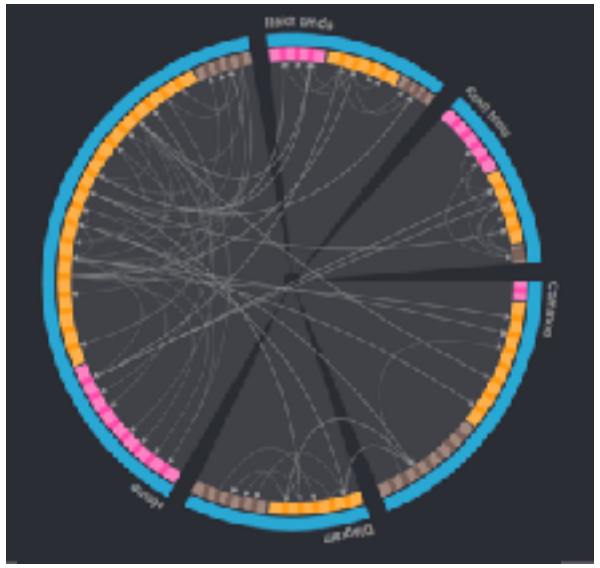
1. 右键菜单重命名或者删除某个项目元素
2. 所有相关代码都会一次性重构从而保证一致性
3. 详细的 log 信息显示重构的完整修改

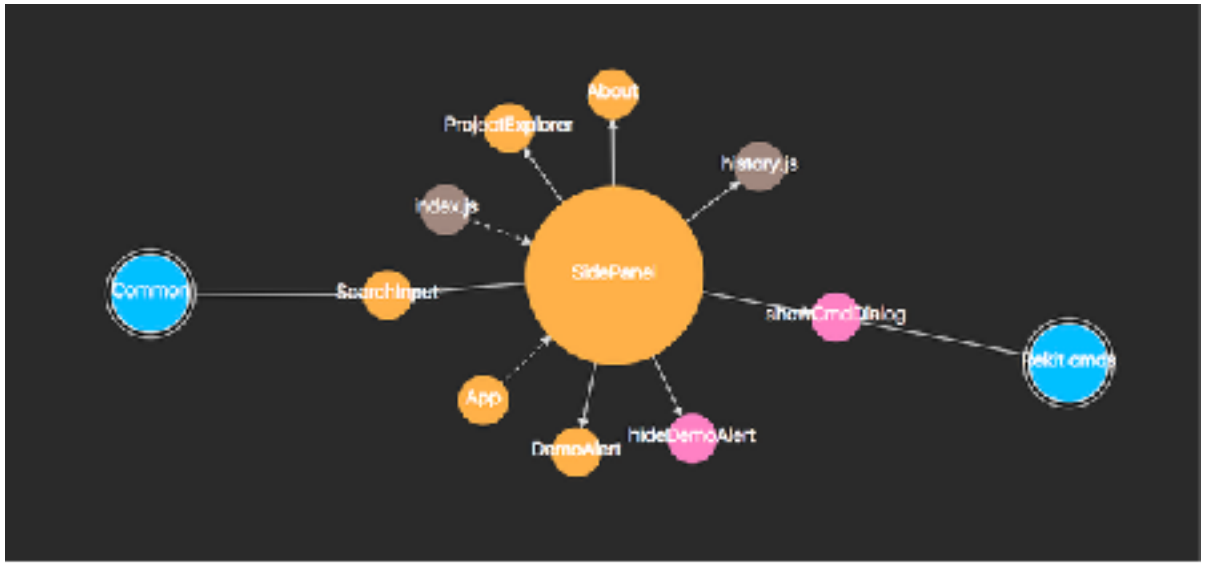



```
Moved: src/features/examples/redux/counterMinusOne.js
Moved: tests/features/examples/redux/counterMinusOne.test.js
Updated: src/features/examples/redux/counterDecrement.js
  --- import { EXAMPLES_COUNTER_MINUS_ONE } from './constants';
  +++ import { EXAMPLES_COUNTER_DECREMENT } from './constants';
  --- export function counterMinusOne() {
  +++ export function counterDecrement() {
  ---   type: EXAMPLES_COUNTER_MINUS_ONE,
  +++   type: EXAMPLES_COUNTER_DECREMENT,
  ---   case EXAMPLES_COUNTER_MINUS_ONE:
  +++   case EXAMPLES_COUNTER_DECREMENT:
Updated: src/features/examples/redux/actions.js
  --- export { counterMinusOne } from './counterMinusOne';
```

Rekit: 可视化的项目架构

1. 项目总体架构的可视化图表
2. 项目依赖关系的图表

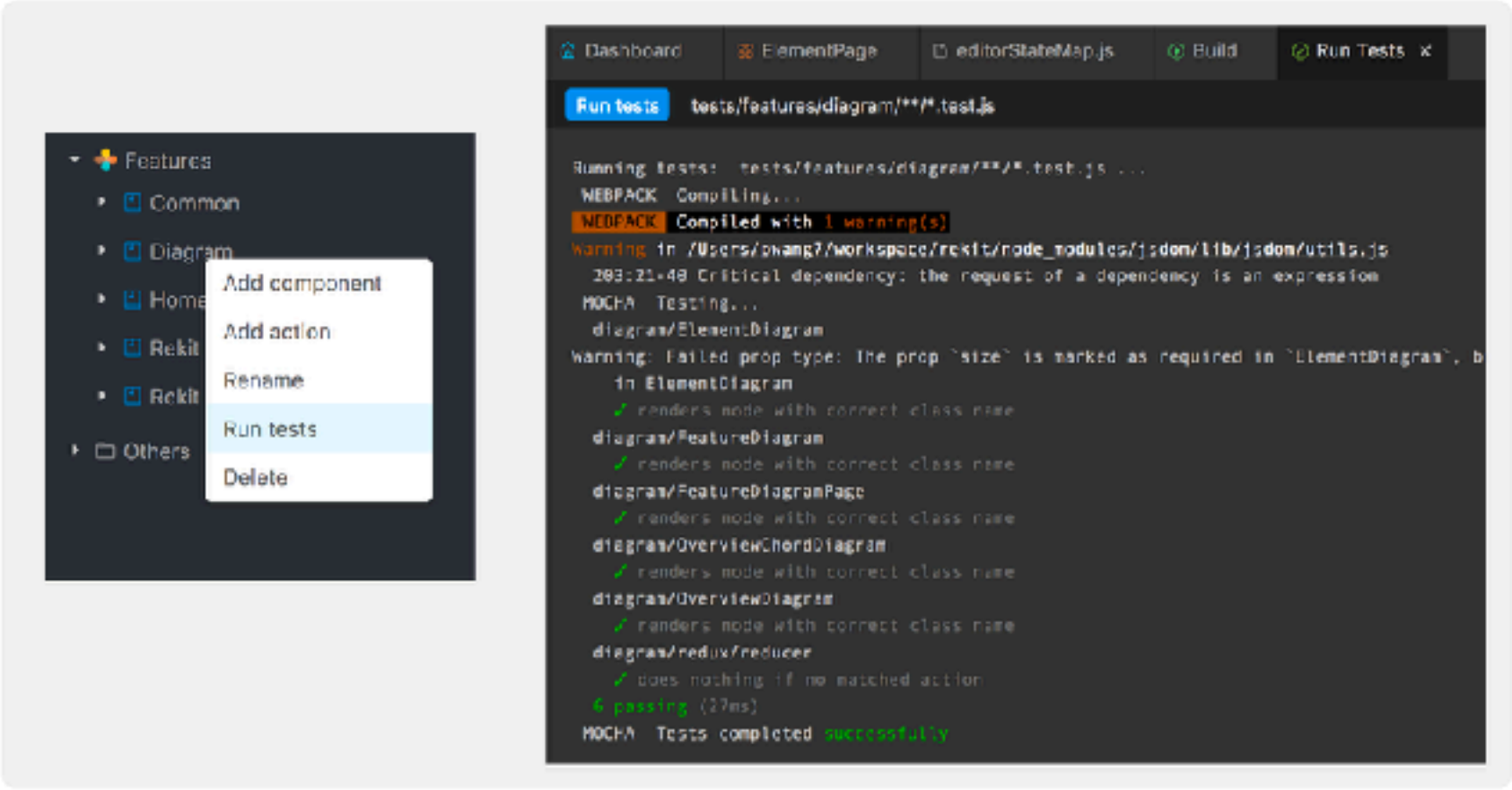




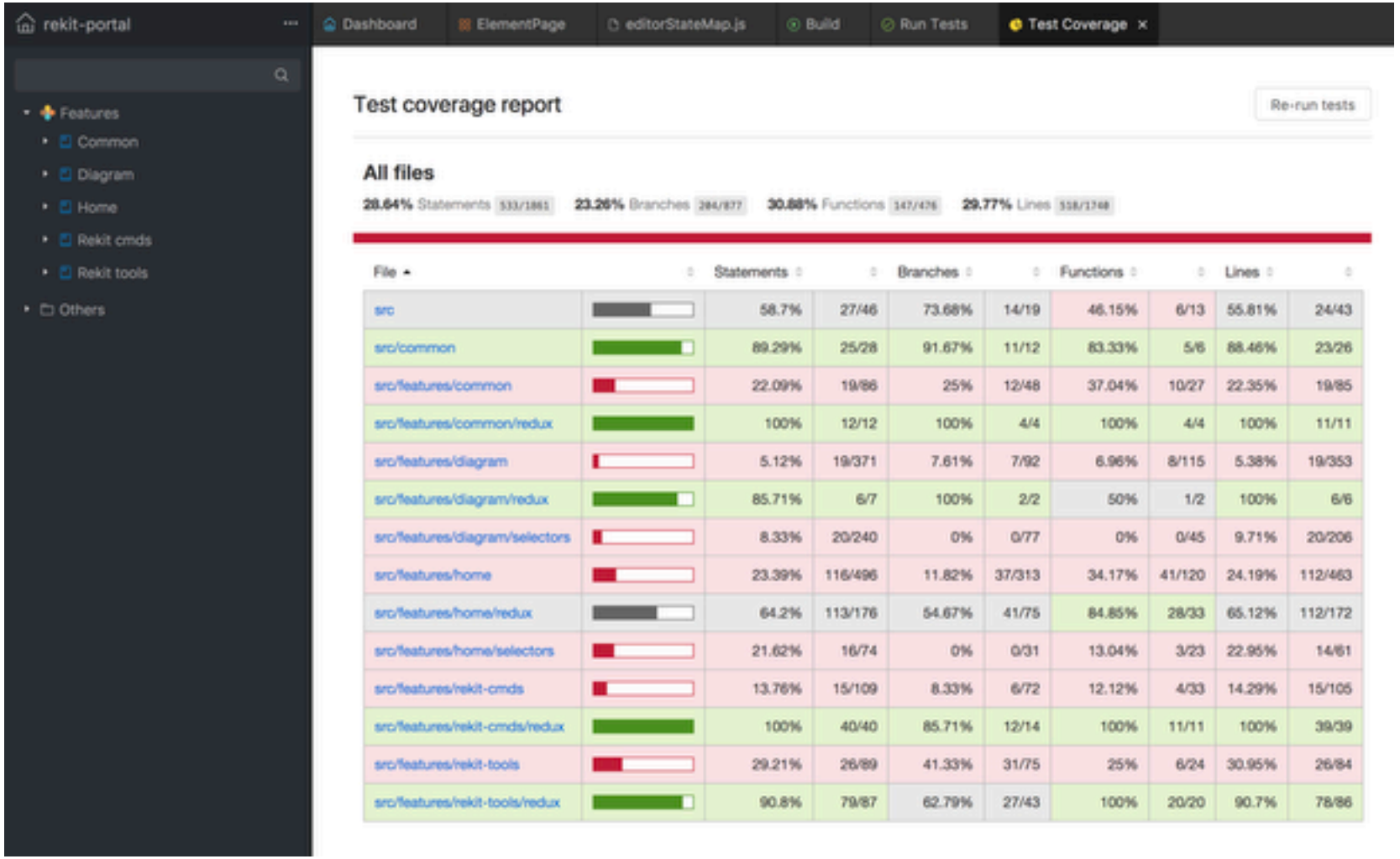
Rekit 是如何工作的？

1. 定义了基于 feature 的可扩展文件夹结构
2. 基于最佳实践生成代码和管理项目元素
3. 提供工具和 IDE 确保代码和文件夹结构遵循最佳实践

集成单元测试


Features
Common
Diagram
Home
Rekit
Rekit
Others
Add component
Add action
Rename
Run tests
Delete
Dashboard
ElementPage
editorStateMap.js
Build
Run Tests
Run tests
tests/features/diagram/**/*.test.js
Running tests: tests/features/diagram/**/*.test.js ...
WEBPACK Compiling...
WEBPACK Compiled with 1 warning(s)
Warning in /Users/pwang7/workspace/rekit/node_modules/jsdom/lib/jsdom/utils.js
203:21-40 Critical dependency: the request of a dependency is an expression
MOCHA Testing...
diagram/ElementDiagram
Warning: Failed prop type: The prop `size` is marked as required in `ElementDiagram`, b
in ElementDiagram
✓ renders node with correct class name
diagram/FeatureDiagram
✓ renders node with correct class name
diagram/FeatureDiagramPage
✓ renders node with correct class name
diagram/OverviewChordDiagram
✓ renders node with correct class name
diagram/OverviewDiagram
✓ renders node with correct class name
diagram/redux/reducer
✓ does nothing if no matched action
6 passing (27ms)
MOCHA Tests completed successfully

单元测试覆盖率



File		Statements		Branches		Functions		Lines	
src		58.7%	27/46	73.68%	14/19	46.15%	6/13	55.81%	24/43
src/common		89.29%	25/28	91.67%	11/12	83.33%	5/6	88.46%	23/26
src/features/common		22.09%	19/86	25%	12/48	37.04%	10/27	22.35%	19/85
src/features/common/redux		100%	12/12	100%	4/4	100%	4/4	100%	11/11
src/features/diagram		5.12%	19/371	7.61%	7/92	6.96%	8/115	5.38%	19/353
src/features/diagram/redux		85.71%	6/7	100%	2/2	50%	1/2	100%	6/6
src/features/diagram/selectors		8.33%	20/240	0%	0/77	0%	0/45	9.71%	20/206
src/features/home		23.39%	116/496	11.82%	37/313	34.17%	41/120	24.19%	112/463
src/features/home/redux		64.2%	113/176	54.67%	41/75	84.85%	28/33	65.12%	112/172
src/features/home/selectors		21.62%	16/74	0%	0/31	13.04%	3/23	22.95%	14/61
src/features/rekit-cmds		13.76%	15/109	8.33%	6/72	12.12%	4/33	14.29%	15/105
src/features/rekit-cmds/redux		100%	40/40	85.71%	12/14	100%	11/11	100%	39/39
src/features/rekit-tools		29.21%	26/89	41.33%	31/75	25%	6/24	30.95%	26/84
src/features/rekit-tools/redux		90.8%	79/87	62.79%	27/43	100%	20/20	90.7%	78/86

小结

1. 什么是 Rekit
2. 创建 Rekit 项目的背景
3. Rekit Studio 提供的基本功能

使用 Rekit（2）：遵循最佳实践，保持代码一致性

遵循最佳实践

1. 以 feature 方式组织代码
2. 拆分组件，action 和 reducer
3. 拆分路由配置

通过代码自动生成保持一致性

1. 文件夹结构一致性
2. 文件名一致性
3. 变量名一致性
4. 代码逻辑的一致性

DEMO

使用 React Router 管理登录和授权

使用 React Router 管理路由授权

1. 实现基础：React Router 的动态路由机制
2. 区分受保护路由和公开路由
3. 访问未授权路由时重定向到登录页面

DEMO

实现表单（1）：初始数据，提交和跳转

DEMO

实现表单（2）：错误处理，动态表单元素，内容动态加载

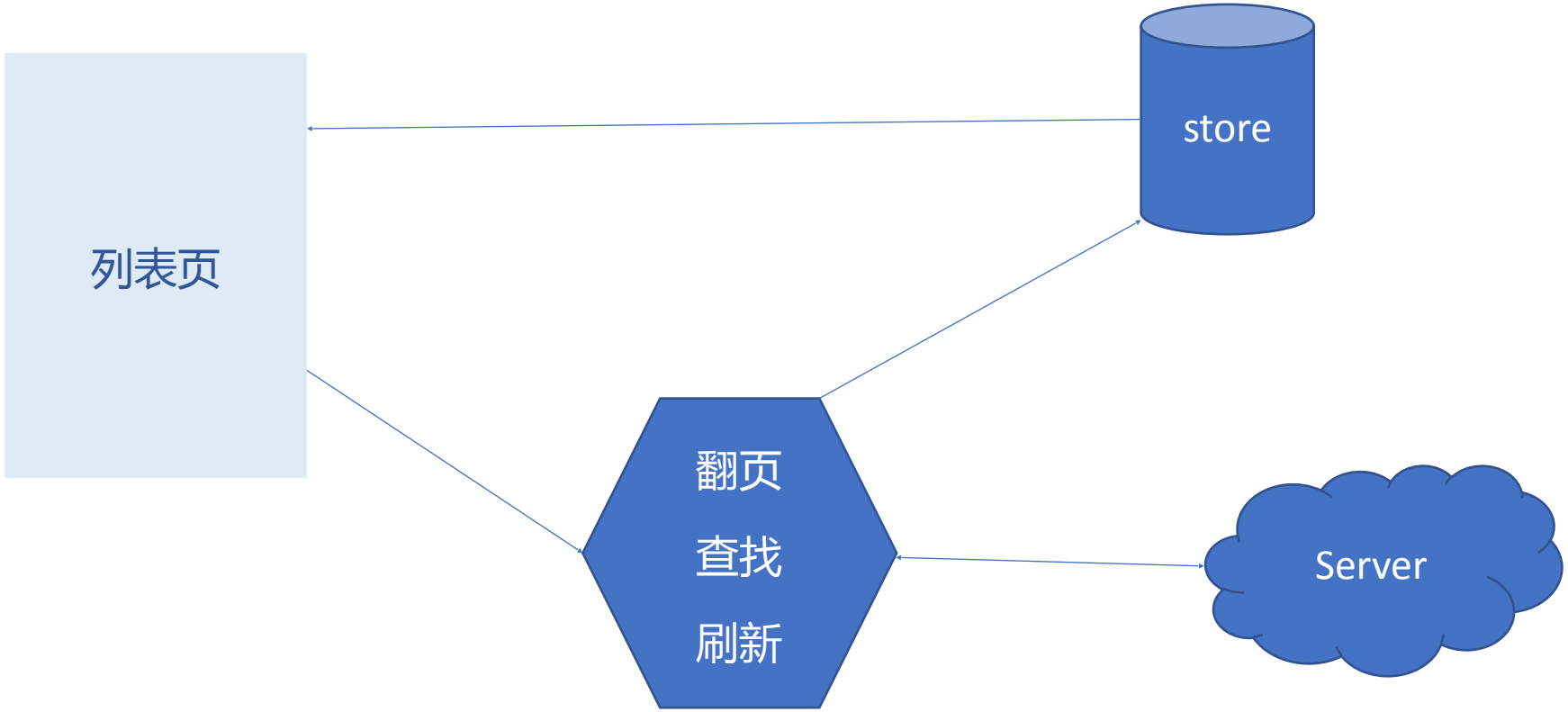
DEMO

列表页(1)：搜索，数据缓存和分页

开发列表也要考虑的技术要点

1. 如何翻页
2. 如何进行内容搜索
3. 如何缓存数据
4. 何时进行页面刷新

列表页的数据模型



设计 Redux 的 Store 模型

- listItems: array
- keyword: string
- page: number
- byId: object
- fetchListPending: bool
- fetchListError: object
- listNeedReload: bool

URL 设计以及和 Store 同步

/list/page?keyword=xxx

DEMO

小结

1. 页面数据逻辑
2. Redux Store 设计
3. URL 的设计
4. 翻页，搜索的功能的实现

列表页(2)：缓存更新，加载状态，错误处理

加载，错误信息也是 store 的状态

- listItems: array
- keyword: string
- page: number
- byId: object
- fetchListPending: bool
- fetchListError: object
- listNeedReload: bool

DEMO

页面数据需要来源多个请求的处理

页面数据来自多个请求

1. 请求之间无依赖关系，可以并发进行
2. 请求有依赖，需要依次进行
3. 请求完成之前，页面显示 Loading 状态

DEMO

内容页的加载和缓存

内容页和列表页的数据关系

1. 简单业务：列表页数据包含内容页的数据
2. 复杂业务：内容页数据需要额外获取
3. 内容页数据的缓存

DEMO

基于 React Router 实现分步操作

向导页面需要考虑的技术要点

1. 使用 URL 进行导航的好处
2. 表单内容存放的位置
3. 页面状态如何切换

DEMO

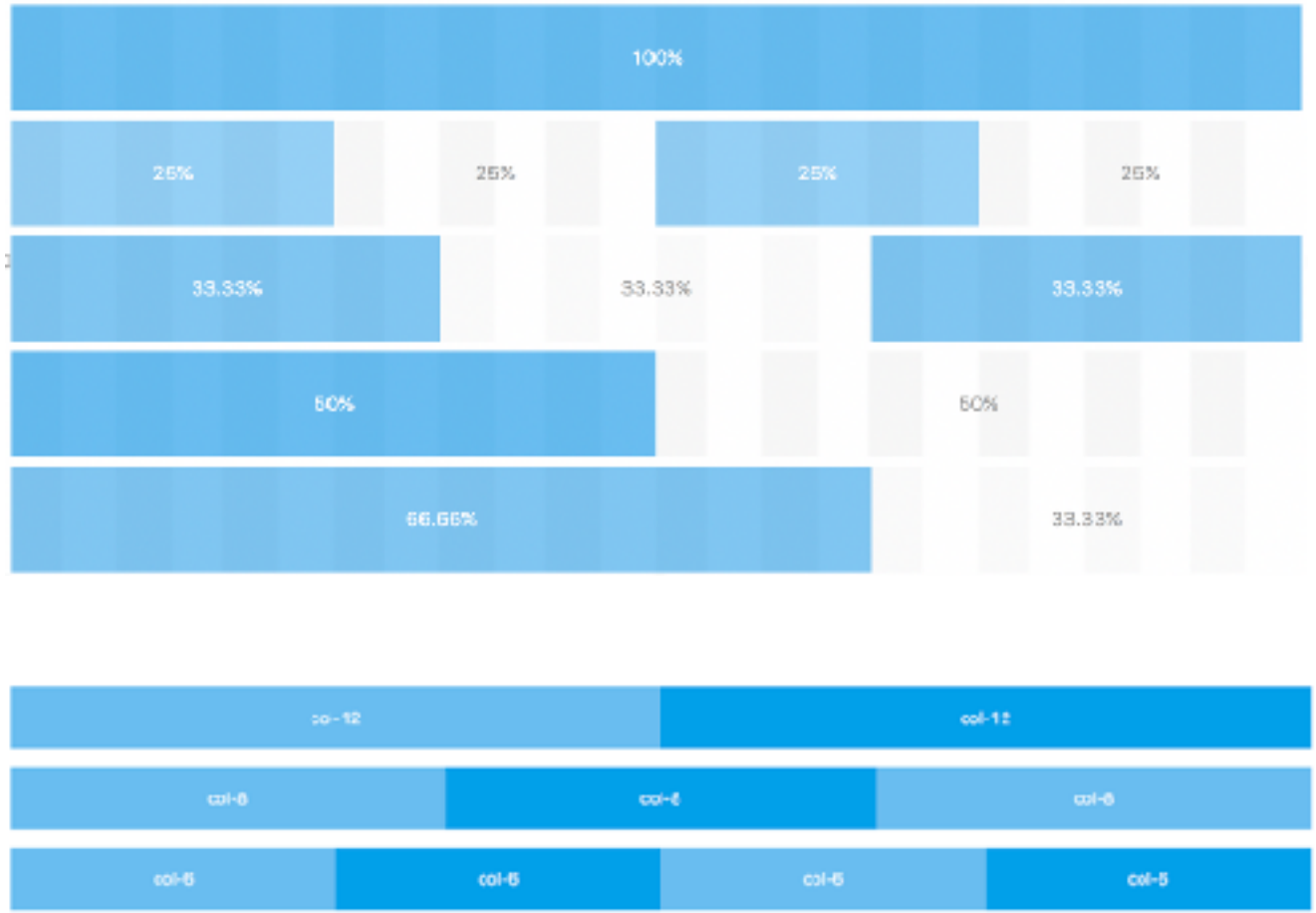
常见页面布局的实现

实现布局的几种方式

1. 从0开始用 CSS 实现
2. 使用 CSS Grid 系统
3. 使用组件库，例如 antd

Ant Design

极客时间




```
<div>
  <Row>
    <Col span={12}>col-12</Col>
    <Col span={12}>col-12</Col>
  </Row>
  <Row>
    <Col span={8}>col-8</Col>
    <Col span={8}>col-8</Col>
    <Col span={8}>col-8</Col>
  </Row>
  <Row>
    <Col span={6}>col-6</Col>
    <Col span={6}>col-6</Col>
    <Col span={6}>col-6</Col>
    <Col span={6}>col-6</Col>
  </Row>
</div>
```

布局常见场景：侧边栏宽度可调整

1. 手动实现拖放逻辑
2. 使用 local storage 存储宽度位置

DEMO

使用 React Portals 实现对话框，使用 antd 对话框

React Portals

1. React 16.3 新引入的 API
2. 可以将虚拟 DOM 映射到任何真实 DOM 节点
3. 解决了漂浮层的问题，比如：Dialog，Tooltip 等

DEMO

集成第三方 JS 库：以 d3.js 为例

集成第三方 JS 库的技术要点

1. 使用 ref 获取原生 DOM 节点引用
2. 手动将组件状态更新到 DOM 节点
3. 组件销毁时移除原生节点 DOM 事件

DEMO

基于路由实现菜单导航

技术要点

1. 菜单导航只是改变 URL 状态
2. 根据当前 URL 显示菜单的当前状态

DEMO

React 中拖放的实现

使用 React 实现拖放的技术要点

1. 如何使用 React 的鼠标事件系统
2. 如何判断拖放开始和拖放结束
3. 如何实现拖放元素的位置移动
4. 拖放状态在组件中如何维护

DEMO

性能永远是第一需求：时刻考虑性能问题

如何避免应用出现性能问题

1. 了解常见的性能问题场景
2. 时刻注意代码的潜在性能问题
3. 注重可重构的代码
4. 了解如何使用工具定位性能问题

DEMO

网络性能优化：自动化按需加载

如何在 React 中实现按需加载

1. 什么是按需加载
2. 使用 Webpack 的 import API
3. 使用 react-loadable 库实现 React 异步加载

DEMO

使用 reselect 避免重复计算

Reselect:

创建自动缓存的数据处理流程

```
import { createSelector } from 'reselect'

const shopItemsSelector = state => state.shop.items
const taxPercentSelector = state => state.shop.taxPercent

const subtotalSelector = createSelector(
  shopItemsSelector,
  items => items.reduce((acc, item) => acc + item.value, 0)
)

const taxSelector = createSelector(
  subtotalSelector,
  taxPercentSelector,
  (subtotal, taxPercent) => subtotal * (taxPercent / 100)
)

export const totalSelector = createSelector(
  subtotalSelector,
  taxSelector,
  (subtotal, tax) => ({ total: subtotal + tax })
)

let exampleState = {
  shop: {
    taxPercent: 8,
    items: [
      { name: 'apple', value: 1.20 },
      { name: 'orange', value: 0.95 },
    ]
  }
}

console.log(subtotalSelector(exampleState)) // 2.15
console.log(taxSelector(exampleState))      // 0.172
console.log(totalSelector(exampleState))    // { total: 2.322 }
```

DEMO

下一代 React：异步渲染

异步渲染的两个部分

时间分片（Time Slicing）

DOM 操作的优先级低于浏览器原生行为，例如键盘和鼠标输入，从而保证操作的流畅。

渲染挂起（Suspense）

虚拟 DOM 节点可以等待某个异步操作的完成，并指定 timeout，之后才完成真正的渲染。

时间分片

1. 虚拟 DOM 的 diff 操作可以分片进行
2. React 新 API： unstable_deferredUpdates
3. Chrome 新 API：requestIdleCallback

渲染挂起

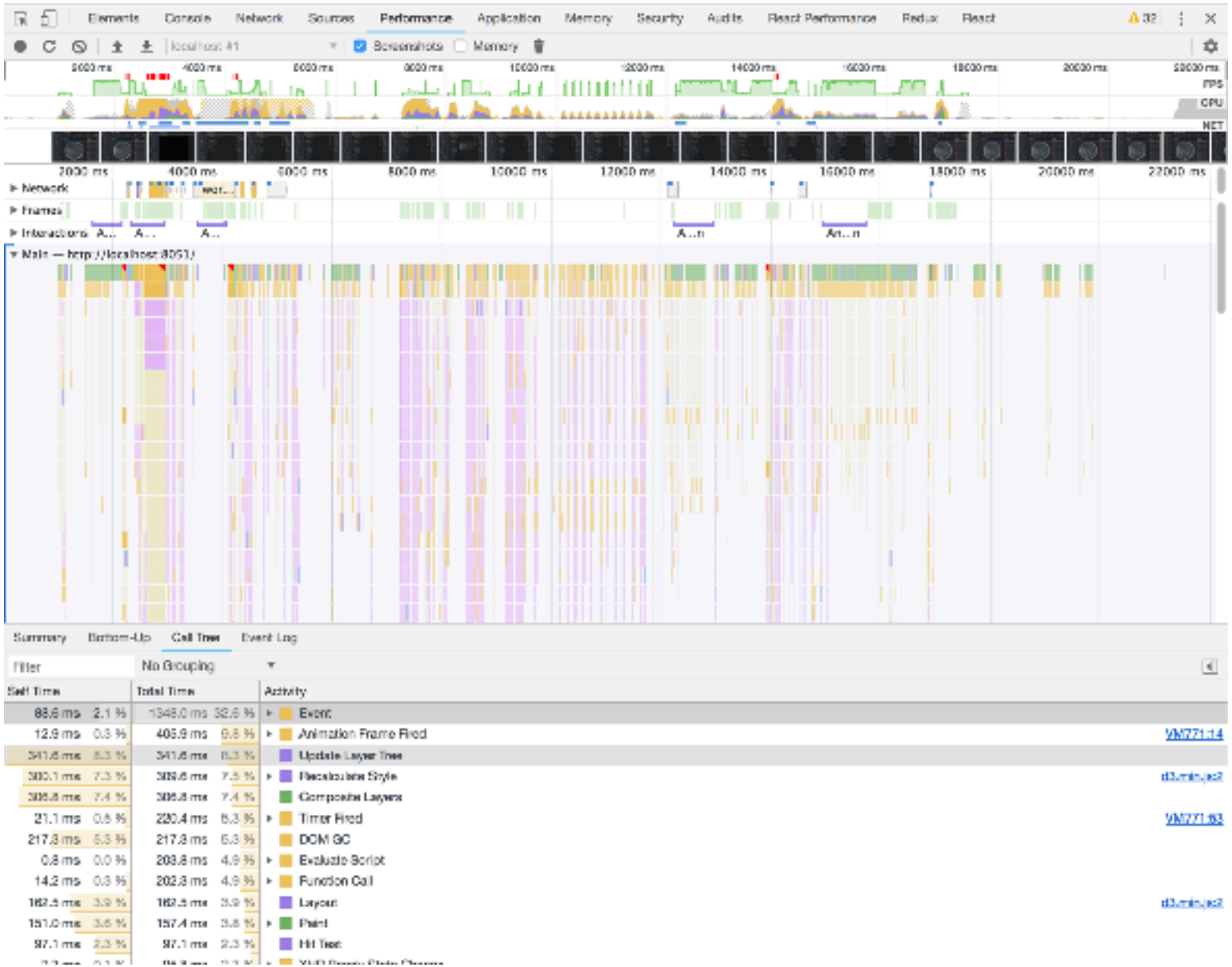
1. 新内置组件：Timeout
2. unstable_deferUpdate

DEMO

使用 Chrome DevTool 进行性能调优

借助工具发现性能问题

1. 使用 React DevTool 找到多余渲染
2. 使用 Chrome DevTool 定位性能瓶颈


Elements
Console
Network
Sources
Performance
Application
Memory
Security
Audits
React Performance
Redux
React
Screenshots
Memory
FPS
CPU
NET
2000 ms
4000 ms
6000 ms
8000 ms
10000 ms
12000 ms
14000 ms
16000 ms
18000 ms
20000 ms
22000 ms
Network
Frames
Interactions
Main — http://localhost:8051/
Summary
Bottom-Up
Call Tree
Event Log
Filter
No Grouping
Self Time
Total Time
Activity
88.6 ms 2.1 %
1348.0 ms 32.6 %
Event
12.9 ms 0.3 %
405.9 ms 9.8 %
Animation Frame Fired
VM771:14
341.6 ms 8.3 %
341.6 ms 8.3 %
Update Layer Tree
308.1 ms 7.5 %
308.6 ms 7.5 %
Recalculate Style
d3.min.js:2
308.6 ms 7.4 %
308.6 ms 7.4 %
Composite Layers
21.1 ms 0.5 %
220.4 ms 5.3 %
Timer Fired
VM771:53
217.3 ms 5.3 %
217.3 ms 5.3 %
DOM GC
0.8 ms 0.0 %
203.8 ms 4.9 %
Evaluate Script
14.2 ms 0.3 %
202.8 ms 4.9 %
Function Call
182.5 ms 3.9 %
182.5 ms 3.9 %
Layout
d3.min.js:2
151.0 ms 3.6 %
157.4 ms 3.8 %
Paint
97.1 ms 2.3 %
97.1 ms 2.3 %
Hit Test

DEMO