React and Redux 101

July 2018

Danielo **JEAN-LOUIS**
Front-end developer

An (another) javascript framework

An (another) javascript ~~framework~~ library!

Sources
http://www.nicoespeon.com/en/2015/01/pure-functions-javascript/
https://web.archive.org/web/20070504053354/
http://www.ddj.com/blog/architectblog/archives/2006/07/frameworks_vs_l.html

What's React ?

- Javascript library developed, open sourced and maintained by facebook
- Designed for (large) applications **with data that change over the time**
- Released in 2013
- Dogfed by facebook with facebook and instagram

Sources
https://en.wikipedia.org/wiki/Eating_your_own_dog_food
https://reactjs.org/docs/getting-started.html

What's React ?

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- Relies on Virtual DOM

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What's React ?

- Javascript library developed, open sourced and maintained by facebook
- Designed for (large) applications **with data that change over the time**
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- Relies on Virtual DOM ⟶ Extremely fast

Sources
https://en.wikipedia.org/wiki/Eating_your_own_dog_food
https://reactjs.org/docs/getting-started.html

What's React ?

- No MVC
- No MVVM
- No MVW
- No DM-VM-CM-VC-V*
- ...

*https://github.com/xlasne/MVVM-C

React is only view

React is only view
React is components

React components are

Reusable
Testable
Maintainable

React components are not Web components

Web components are **for strong encapsulation**
React components are **made to be sync with data**

Sources
https://reactjs.org/docs/web-components.html

Let’s write our first component

Let’s write our first component

```
import React from 'react';

export default class MyFirstComponent extends React.Component {
  render() {
    return (
      <p>It's my first component with React !</p>
    );
}
```

Let’s write our first component

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import React from 'react';

export default class MyFirstComponent extends React.Component {
  render() {
    return (
      <p>It’s my first component with React !</p>
    );
  }
}
```

render() method displays the template of the component

Let’s write our first component

```
import { render } from 'react-dom'
import MyFirstComponent from ‘./MyFirstComponent’

render(
      <MyFirstComponent />,
      document.getElementById(‘content’)
);
```

We start the React app
(A div can contain only one react app)

Component’s life cycle

Mount
Update
Unmount

Sources
https://reactjs.org/docs/react-component.html#the-component-lifecycle

Component's life cycle

Mount
Update
Unmount

Error handling

Sources
https://reactjs.org/docs/react-component.html#the-component-lifecycle

Props and state

Props and state allow to change/set component's content/data

Props are **immutable**
Props are **read-only**
Props are **passed only by component's closest parent**

Sources
https://reactjs.org/docs/react-component.html#the-component-lifecycle

Props and state

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State is **mutable**
State is **handled by the component itself**

Sources
https://reactjs.org/docs/react-component.html#the-component-lifecycle

Props and state

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Props are **immutable**
Props are **read-only**
Props are **passed only by the closest parent**

State is **mutable**
State is **handled by the component itself**
Updates component's state will call component's render method

Sources
https://reactjs.org/docs/react-component.html#the-component-lifecycle

Do not update the state inside render!

Props and state

```
import React from 'react';
import MyChildComponent from './my-child-component';

export default class MyFirstComponent extends React.Component {
  constructor(props) {
      // [...]
      this.state = {
            hello: "el mundo"
      }

      setTimeout(this.myMethod, 5000);
  }
  myMethod() {
      this.setState({
            hello: "world"
      })
  }
  render() {
    return (
      <MyChildComponent text={this.state.hello} />
    );
}
```

Example – props & state

Sources
https://github.com/DanYellow/presentations/tree/master/react-redux-101/examples/props-and-state

Data flow (up)

Callback function to communicate **with the closest parent**

Data flow (up) - Parent

Callback function to communicate **with the closest parent**

```
export default class MyFirstComponent extends React.Component {
  // [...]
  myCallback () {
    console.log(“my child talks to me!”);
  }
  render() {
    return (
      <MyChildComponent
            text={this.state.hello}
            onClickCB={this.myCallback}
      />
    );
}
```

Data flow (up) - Parent

Callback function to communicate **with the closest parent**

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    );
}
```

We define a method

Data flow (up) - Parent

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    return (
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      />
    );
}
```

We pass as props the callback function

Data flow (up) - Child

Callback function to communicate **with the closest parent**

```
export default class MyChildComponent extends Component {
  constructor(props) {
    super(props);

    this.handleClick = this.handleClick.bind(this);
  }

  handleClick() {
    this.props.onClickCB()
  }

  render() {
    return (
      <p onClick={this.handleClick}>{ this.props.text }</p>
    );
  }
}
```

Data flow (up) - Child

Callback function to communicate **with the closest parent**

```
export default class MyChildComponent extends Component {
  constructor(props) {
    super(props);

    this.handleClick = this.handleClick.bind(this);
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  handleClick() {
    this.props.onClickCB()
  }

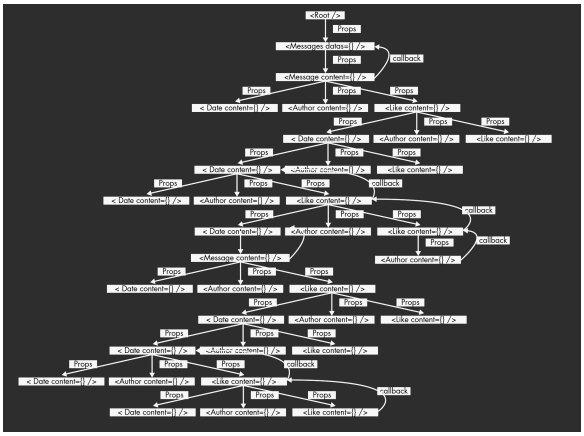
  render() {
    return (
      <p onClick={this.handleClick}>{ this.props.text }</p>
    );
  }
}
```

We invoke the props

Example – callback

Sources
https://github.com/DanYellow/presentations/tree/master/react-redux-1017examples/callback

Data flow (up)



Advanced topics

Stateless component

When a component doesn't need to update its state or rely on its lifecycle, it should be written as a function also called **stateless component**

Stateless component

When a component doesn't need to update its state, it should be written as a function also called **stateless component**

```
Import React from 'react';

const MyStatelessComponent = (props) => {
    return (
        <p>
            I turn myself into a stateless component. I'm a stateless component!
        </p>
    );
}
```

Stateless component - Advantages

- Easier to test
- Better performance (since React ≥ 16)
- No need to bind this inside methods
- Decreases bundle size within the app

Debugging

Browser extension for React (Firefox and Chrome)

Create React App

- Wonderful tool to set up a React project in less than 1 min
- Create dev and prod env
- Provide linters and unit tests setup

Sources
https://github.com/facebook/create-react-app

First part summary

React is **only view in the MVC pattern**
React **relies on VDOM, it's fast thank to it**
JSX is strongly encouraged for templating
React allows a full control of the component with its lifecycle
Props **allows parent to set/update children's data**
Props are immutables

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State is updated by the component itself
State is mutable

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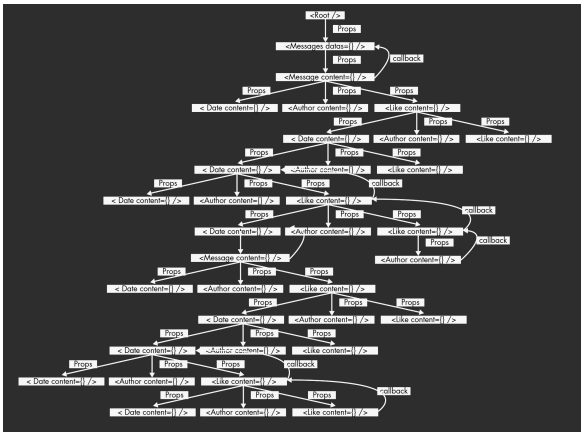
The data flow (up) in React is a mess... except if we use...

What's Redux ?

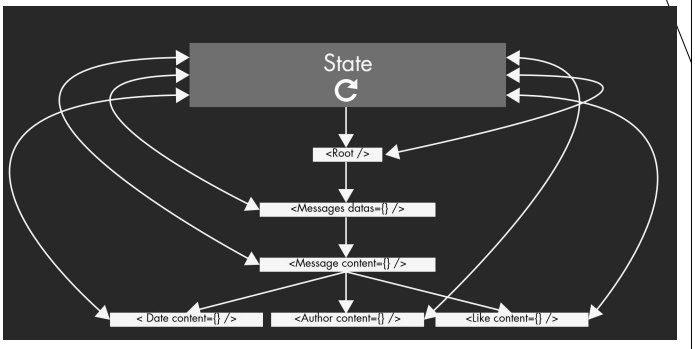
- Predicable state container for **any javascript application**
- With Redux, a React app **has only one state for the whole app**
- Redux **is agnostic,** it works with React, VueJS, Angular and of course vanilla js

Sources
https://github.com/angular-redux/ng-redux
https://github.com/reduxjs/react-redux
https://github.com/titouancreach/vuejs-redux

Dataflow (up and down) without Redux



Dataflow (up and down) with Redux



Redux's principles

- Single source of truth for **the entire app**
- State **is immutable**
- Changes are made with pure and synchronous functions

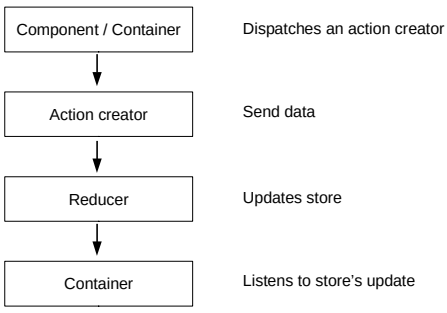
Sources
https://github.com/reactjs/redux/blob/master/docs/introduction/ThreePrinciples.md
https://en.wikipedia.org/wiki/Pure_function

Redux's advantages

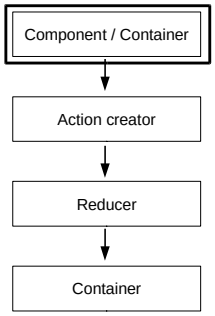
- Easier to debug ReactJS apps ; All data transit in the same place
- Brings (M)VC pattern to React (React is only View)
- Limits corrupted datas ; Redux rewrites state at each change

Sources
https://github.com/reactjs/redux/blob/master/docs/introduction/ThreePrinciples.md
https://en.wikipedia.org/wiki/Pure_function

Redux's flow



Redux's flow



Dispatches an action creator

Send data (an action)

Updates store

Listens to store's update

Component / Container
It's the View in MVC pattern
Calls an action creator

Redux's flow – Component / container

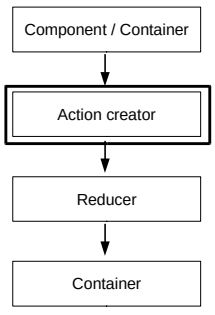
It's the View in MVC pattern. Calls an action creator

```
import React from 'react';

export default class MessageForm extends React.Component {
  // [...]
  submitMessage (e) {
    e.preventDefault();
    this.props.dispatch(addMessage(“Hello world”));
  }

  render() {
    const { messages } = this.props;
    return (
      <h1>{ messages[messages.length - 1] }</h1>
      <form>
        <textarea value={this.props.content} />
        <button>Add message</button>
      </form>
    );
  }
}
```

Redux's flow



Dispatches an action creator

Send data (an action)

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Action creator
Notifies the app that something happened
Note : An action must return an object, to use a function use redux-thunk

Redux's flow – Action creator

Notifies the app that something happened

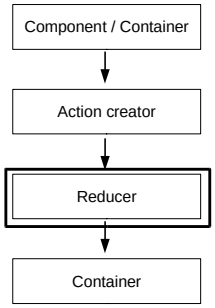
```
export const addMessage = function (text) {
  return {
    type: 'ADD_MESSAGE',
    payload: { text: text }
  }
}
```

Action

Action creator

Sources
http://redux.js.org/docs/basics/Actions.html

Redux's flow



Dispatches an action creator

Send data (an action)

Updates store

Listens to store's update

Reducer
Compute the action triggered with the current store

Redux's flow – Reducer

Associates action and current state to get next state.
Indicates how the store should respond to any action
(previousState, action) => newState

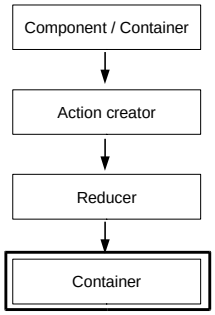
```
const DEFAULT_STATE = { text: '' }

const messageReducer = function (state = DEFAULT_STATE, action) {
  switch (action.type) {
    case 'ADD_MESSAGE':
      return action.payload.text;
    default:
      return state;
  }
}

export default messageReducer
```

Sources
http://redux.js.org/docs/basics/Reducers.html

Redux's flow - Container



Dispatches
an action creator

Send data (an action)

Updates store

Listens to store's update

Container
Links store (global state) to its component
It's the Controller in MVC pattern

Redux's flow – Container

Add some logic to component. It's the Controller in MVC pattern

```
// [...]
import { connect } from 'react-redux';
import Messages from '../components/Messages'

// Mainly Message Container definition

function mapStateToProps(state) {
  return {
    messages: state.messages
  }
}

export default connect(mapStateToProps)(Messages)
```

Sources
http://redux.js.org/docs/basics/Reducers.html

Redux's vocabulary

The best way to communicate with a developer, it's to have the same language

Container
React component aware of redux. It calls the connect() method.
A container is also called a "smart component"

Component
"Dumb component" (also called "presentational component")
it just consumes props from its parents

Action creator
Function which **triggers** a store update. It doesn't update the store just indicates what's happened.

Reducer
Indicates how the store should respond to any action

Sources
https://medium.com/@dan_abramov/smart-and-dumb-components-7ca2f9a7c7d0

Example – messages

Sources
https://github.com/DanYellow/presentations/tree/master/react-redux-101/examples/messages

« You might get the wrong impression from over-engineered tutorials and all the stuff that community has built around it. But Redux itself is very simple. »

Dan Abramov, Redux's co-creator

Sources
https://www.reddit.com/r/reactjs/comments/4npzq5/confused_redux_or_mobx/d46k2bl
http://www.slideshare.net/tedpennings/how-to-redux
http://redux.js.org/index.html

Good practices

Good practices

- Name your action type like… an action
- redux-ducks architecture
- **Never ever** use a function like push or reassign the state inside a reducer. Use Object.assign or the spread operator

Sources
https://github.com/erikras/ducks-modular-redux

Advanced topics

Context API – React ≥ 16.3

- Built-in “equivalent” of redux inside react
- Allows to bypass container-component hierarchy
- Relies between two members:
  - Provider: Redux’s smart component
  - Consumer: Redux’s dumb component

Sources
https://reactjs.org/docs/context.html

Context API – React ≥ 16.3

- Built-in “equivalent” of redux inside react
- Allows to bypass container-component hierarchy
- Relies on two parts:
  - Provider: Redux’s smart component
  - Consumer: Redux’s dumb component

Note: React has a deprecated context API. You should never use it

Sources
https://reactjs.org/docs/context.html

MapDispatchToProps

Second parameter of redux high-order function (HOF) connect
Allows to bind actions creator to any container

3 (main) ways to bind actions as props to a container
- connect(…, object): short-hand syntax
- connect(…, function): useful to split the logic between store’s and actions creator
- connect(…, undefined): adds a props function called dispatch inside the container to call directly inside the **component** an action creator.
E.g.: this.props.dispatch(actionCreator(param))

MapDispatchToProps

Second parameter of redux high-order function (HOF) connect
Allows to bind actions creator to any container

Debugging

Browser extension for redux (redux dev-tools)

Use it only on dev!

Sources
https://github.com/zalmoxisus/redux-devtools-extension

Questions ?

More ressources

- Presentation + examples :
https://github.com/DanYellow/presentations/tree/master/react-redux-101

Stateless component

When a component doesn't need to update its state, it should be written as a function also called **stateless component**