React + Flux

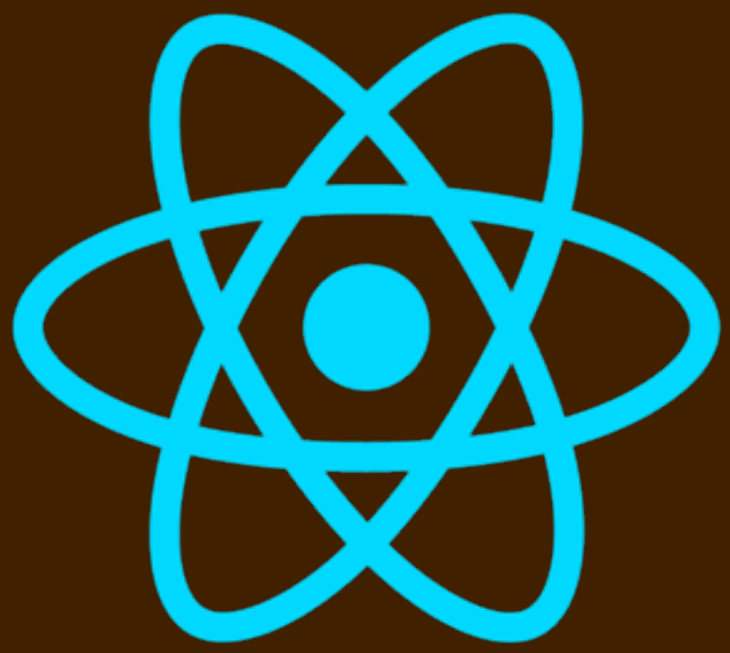
Two Great Tastes that Taste Great Together

Bill Fisher @fisherwebdev #ReactJS

https://speakerdeck.com/fisherwebdev/react-flux-fluent-2015

bit.ly/1Hrqfpc

https://speakerdeck.com/fisherwebdev/react-flux-fluent-2015



React + Flux

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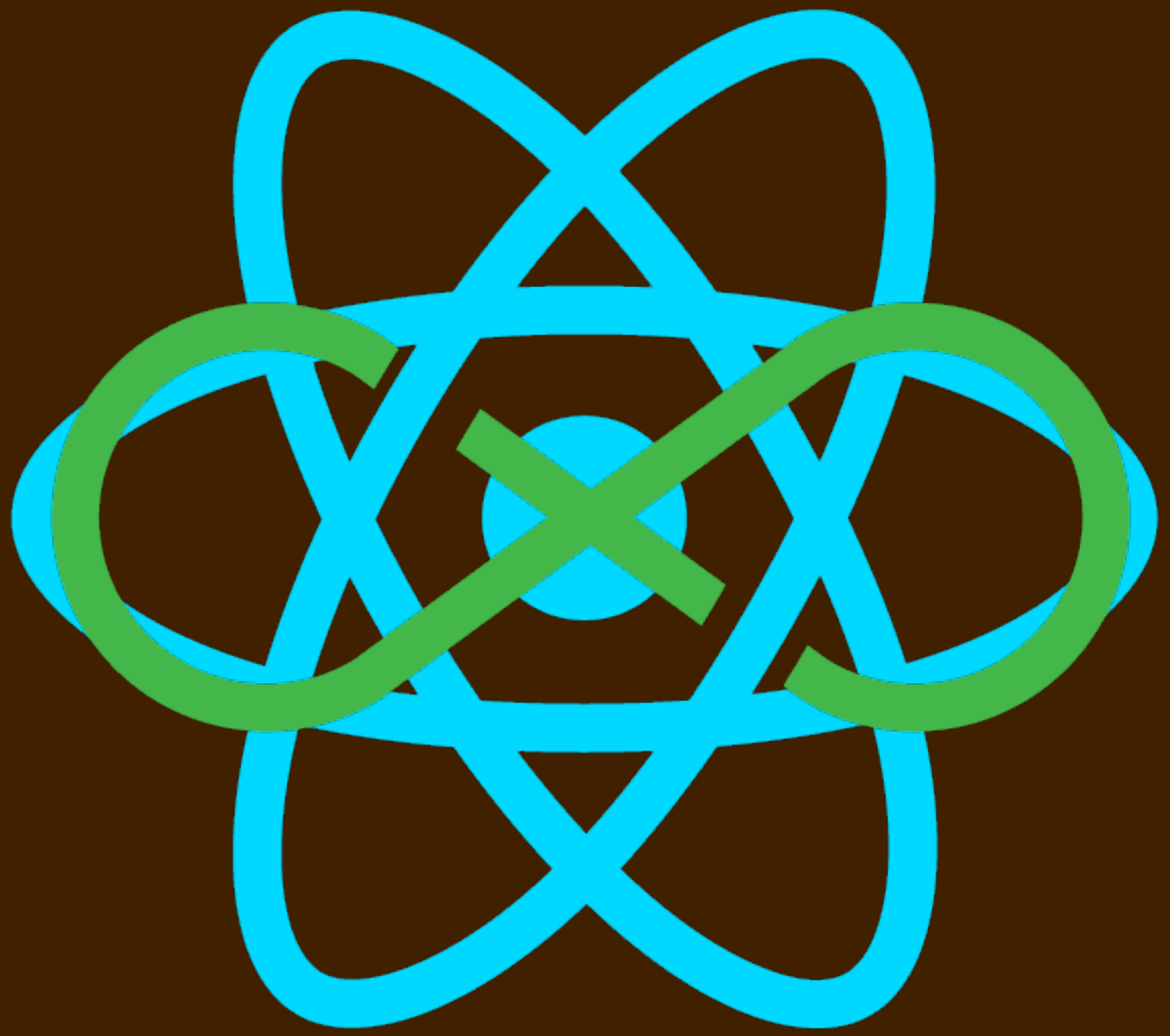

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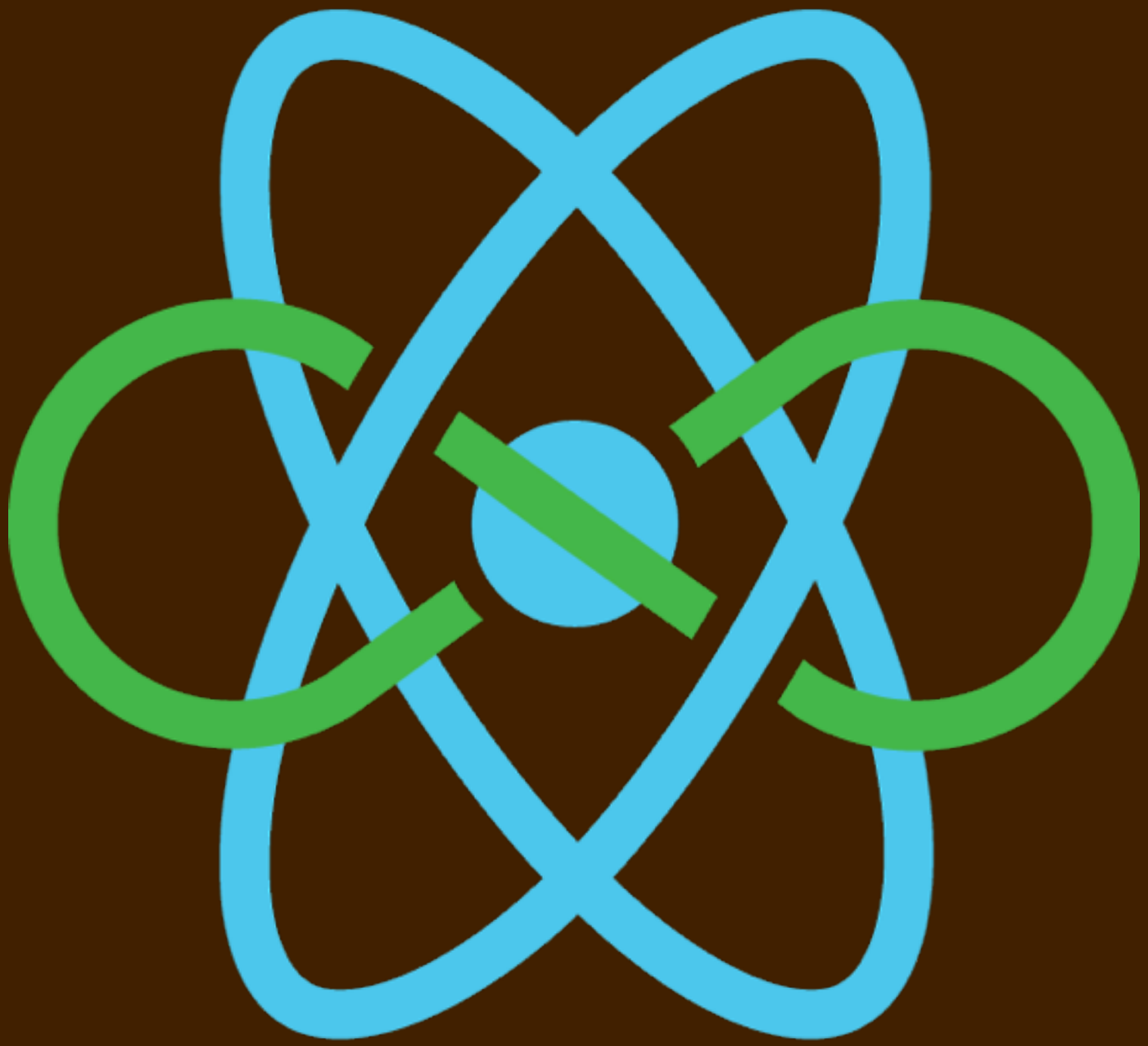

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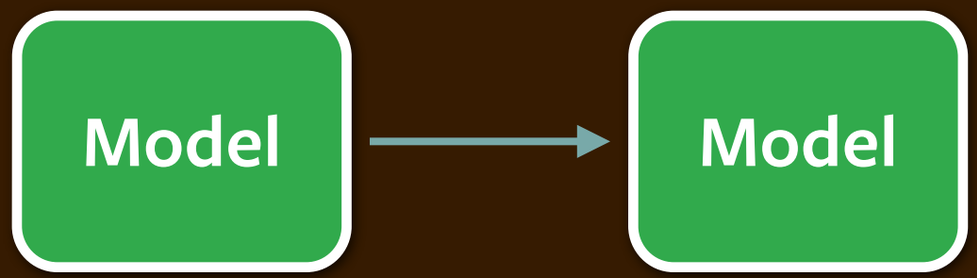
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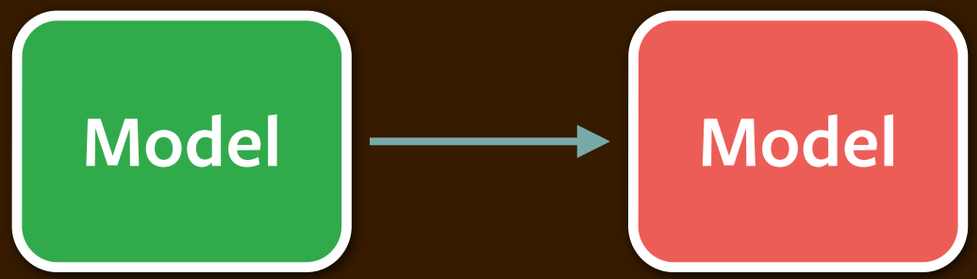
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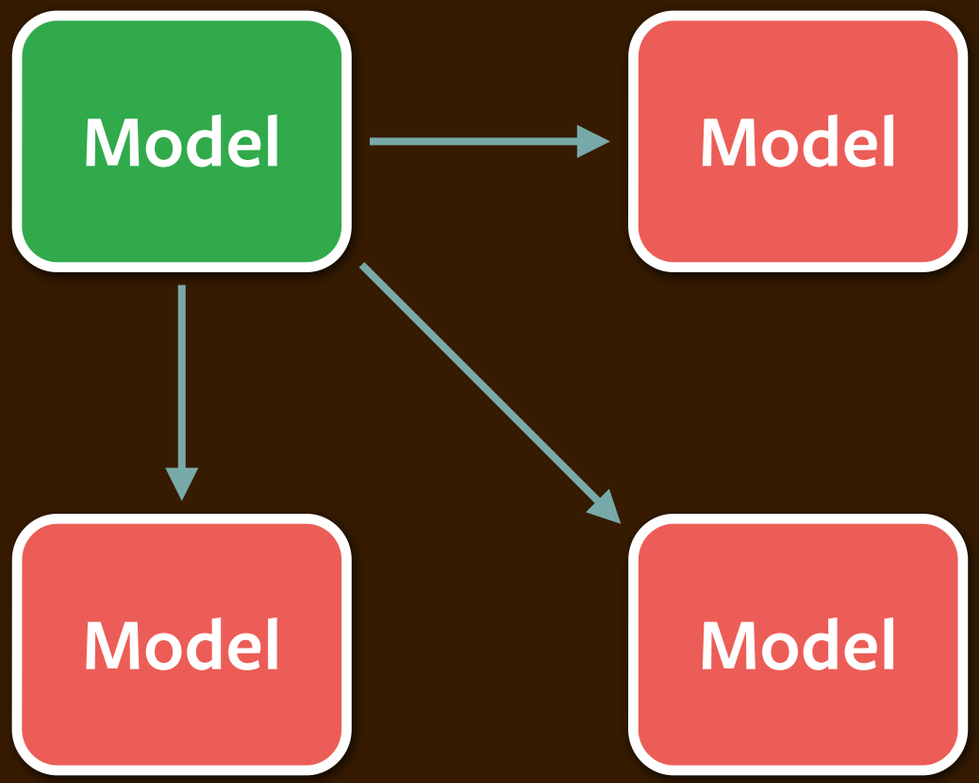
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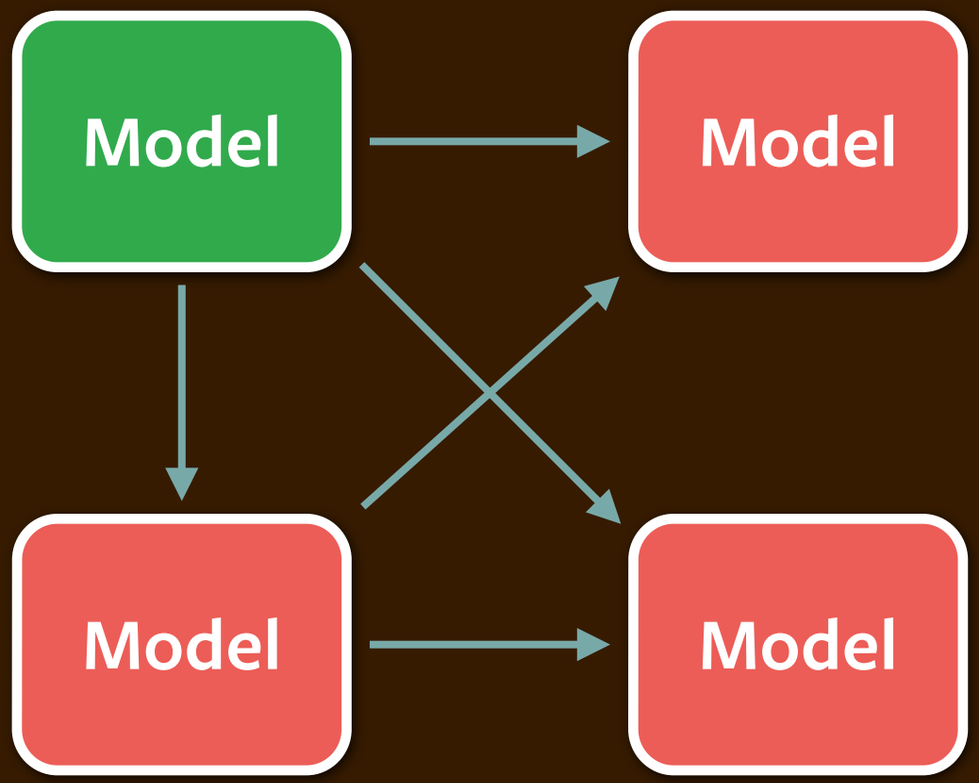
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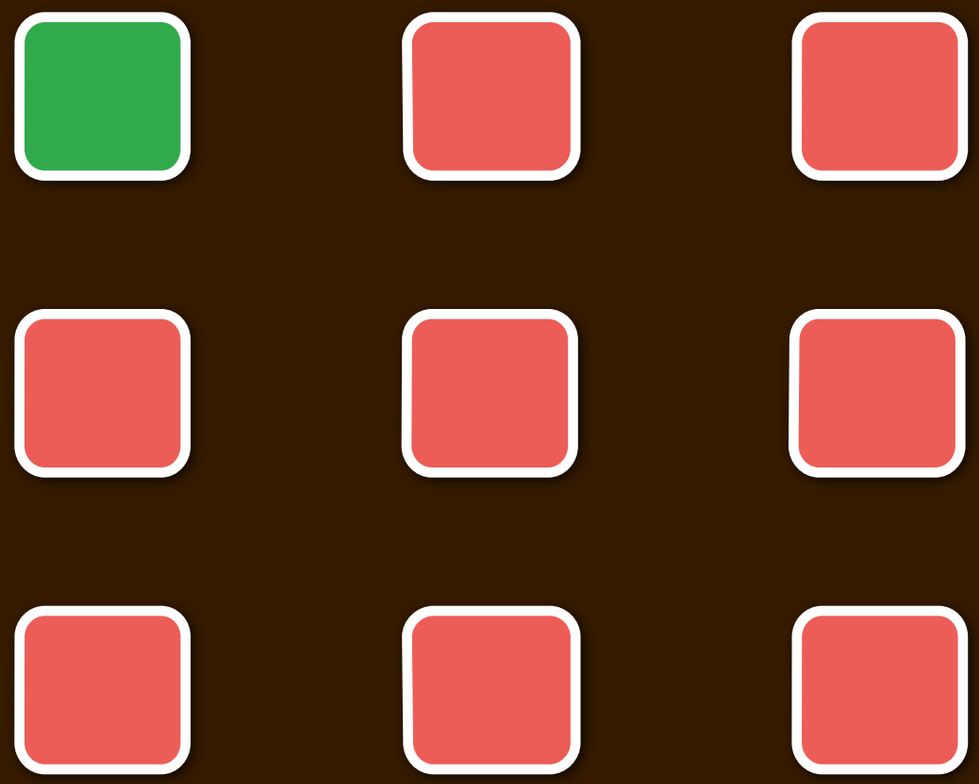
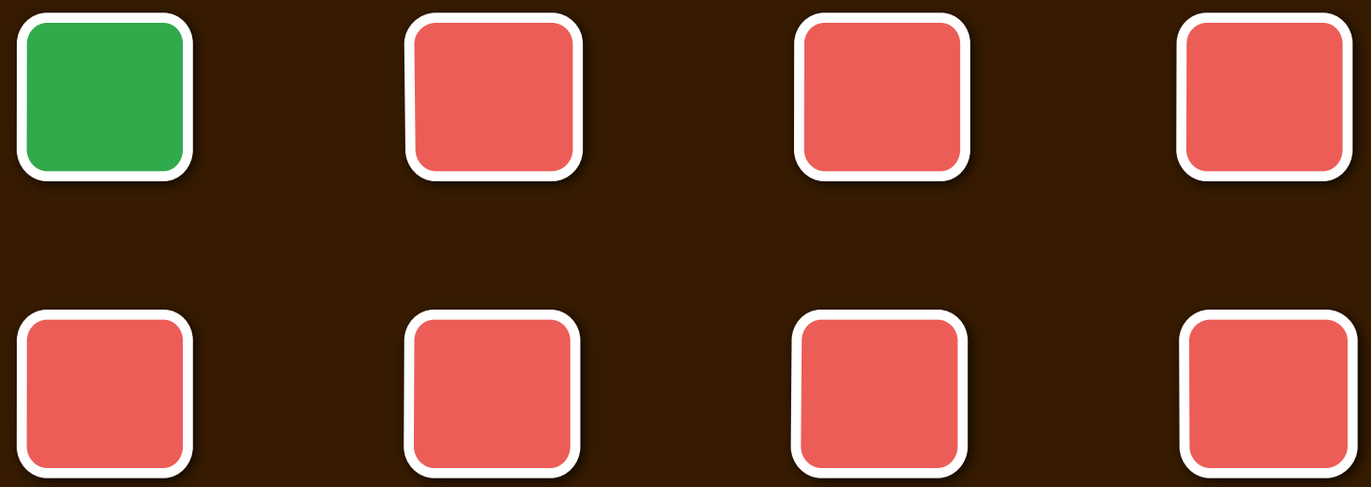
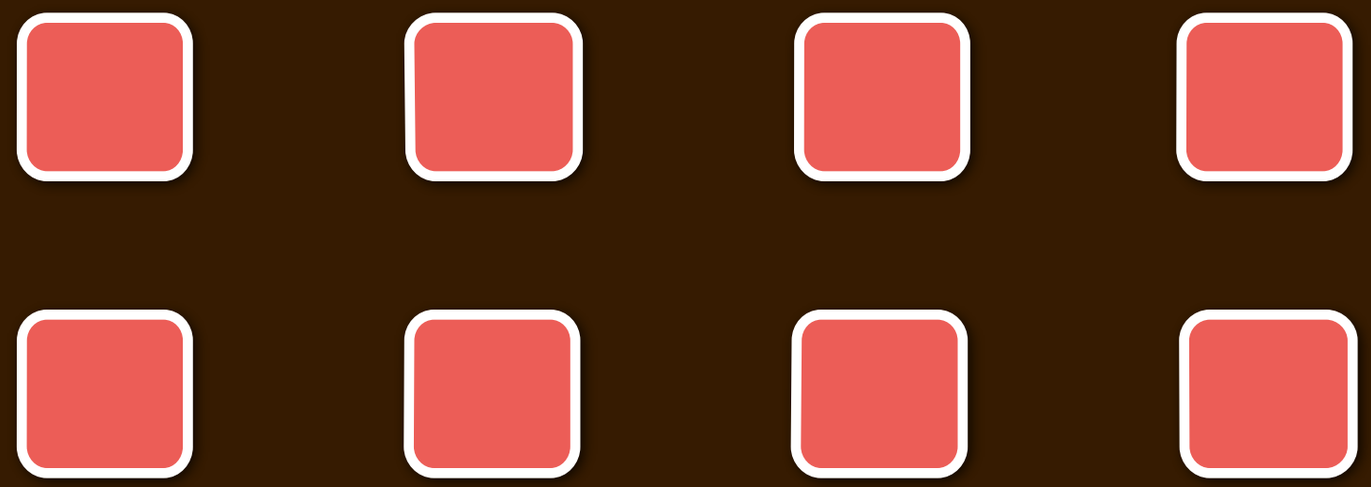
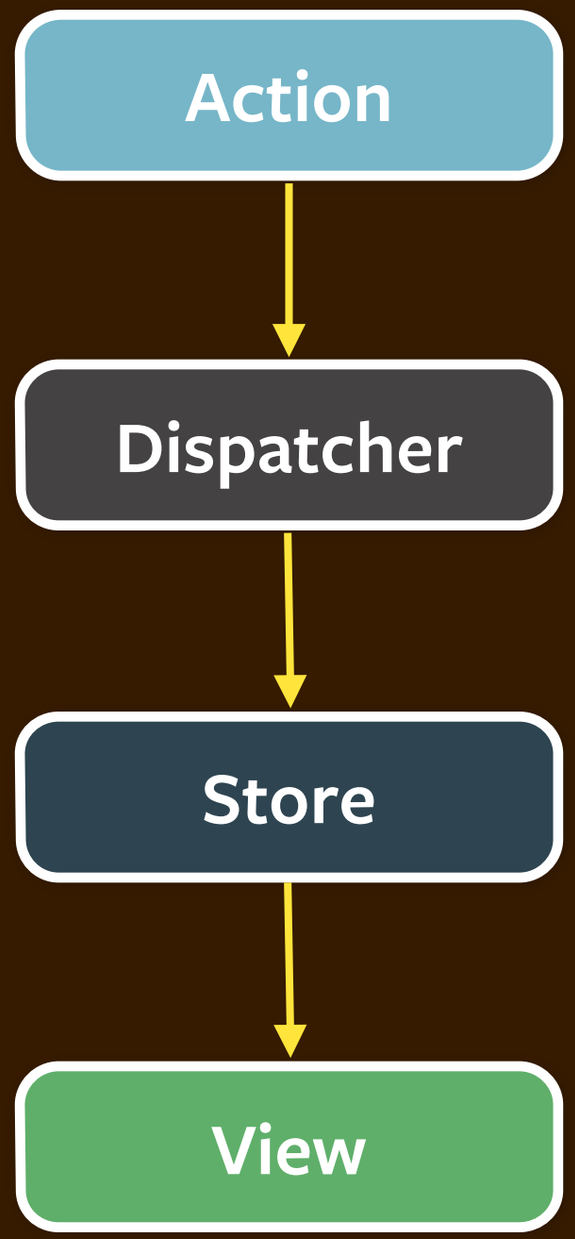
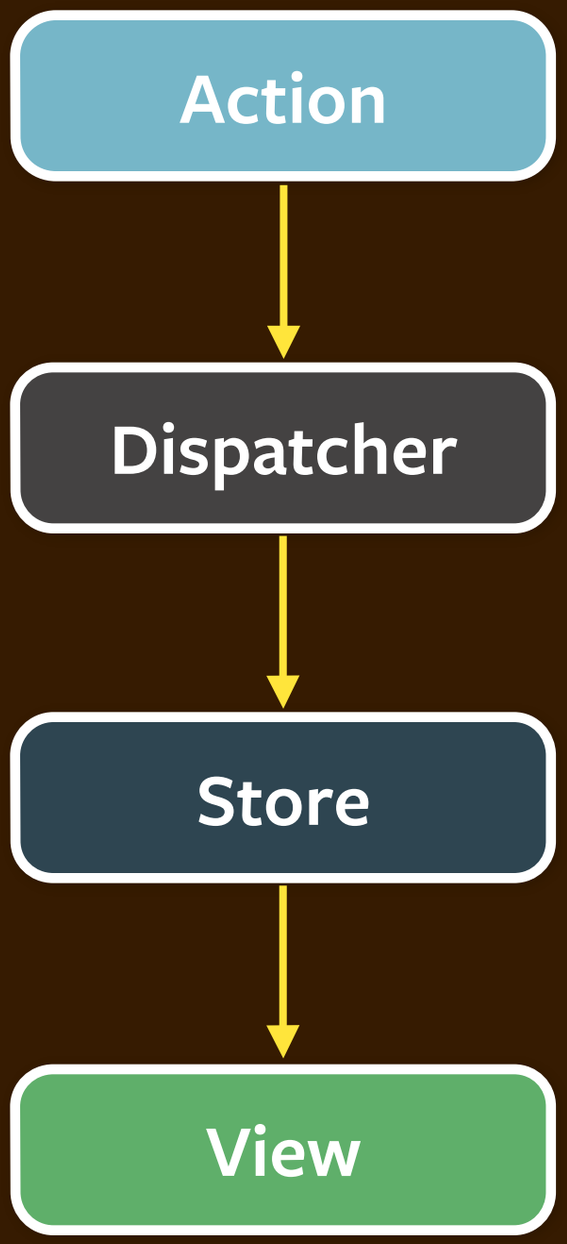






"Tangled wires, Freegeek, Portland, Oregon, USA" by Cory Doctorow, used under CC BY 2.0\


Action
Dispatcher
Store
View

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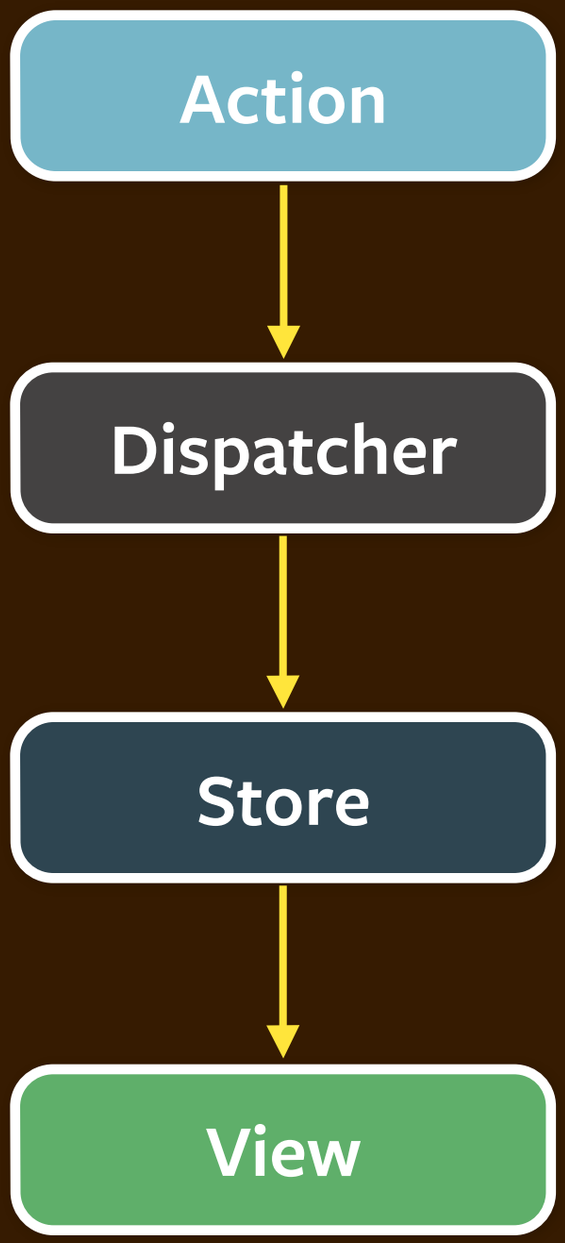


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```

Actions & Action Creators


```
actions
└── MessageActionCreators.js
```

Actions & Action Creators

Actions:

- an object with a type property and new data, like events

Action creators:

- semantic methods that create actions
- collected together in a module to become an API

EXTRA EXTRA EXTRA EXTRA

The Weather
Bay Area: Fair today except night and morning fog. High, to 70s; low, 50s. Wind, 10-12 m.p.h.
See Page 51

San Francisco Chronicle

★★★ FINAL

105th Year No. 201 ★★★ MONDAY, JULY 21, 1969 10 CENTS GArfield 1-1111

MEN ON MOON

Man Makes a Lunar Landing --Astronauts Walk on Surface

A Sort of Holiday Today

Today is Moon Day—or, more officially, a National

How They Made the Descent

By David Perlman

Historic Moment

Spacemen Scout The Landscape

```
// MessageActionCreators.js

var AppDispatcher = require('../AppDispatcher');
var AppConstants = require('../AppConstants');

var ActionTypes = Constants.ActionTypes;

module.exports = {

  messageCreated: text => {
    AppDispatcher.dispatch({
      type: ActionTypes.MESSAGE_CREATED,
      text
    });
  },

};
```

```
  messageCreated: text => {
    AppDispatcher.dispatch({
      type: ActionTypes.MESSAGE_CREATED,
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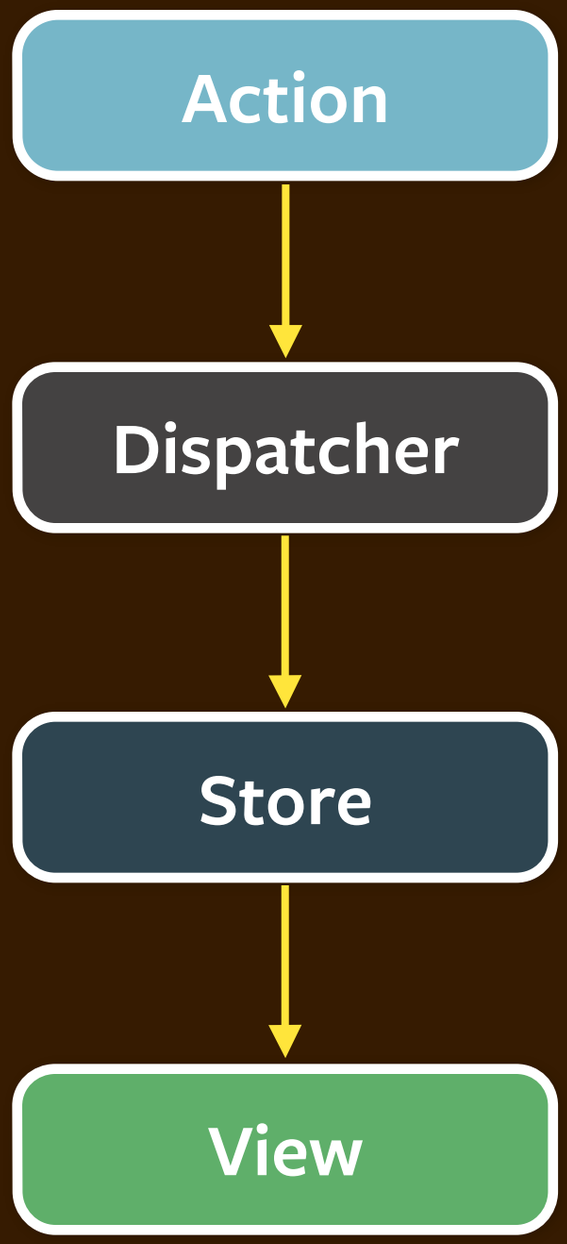


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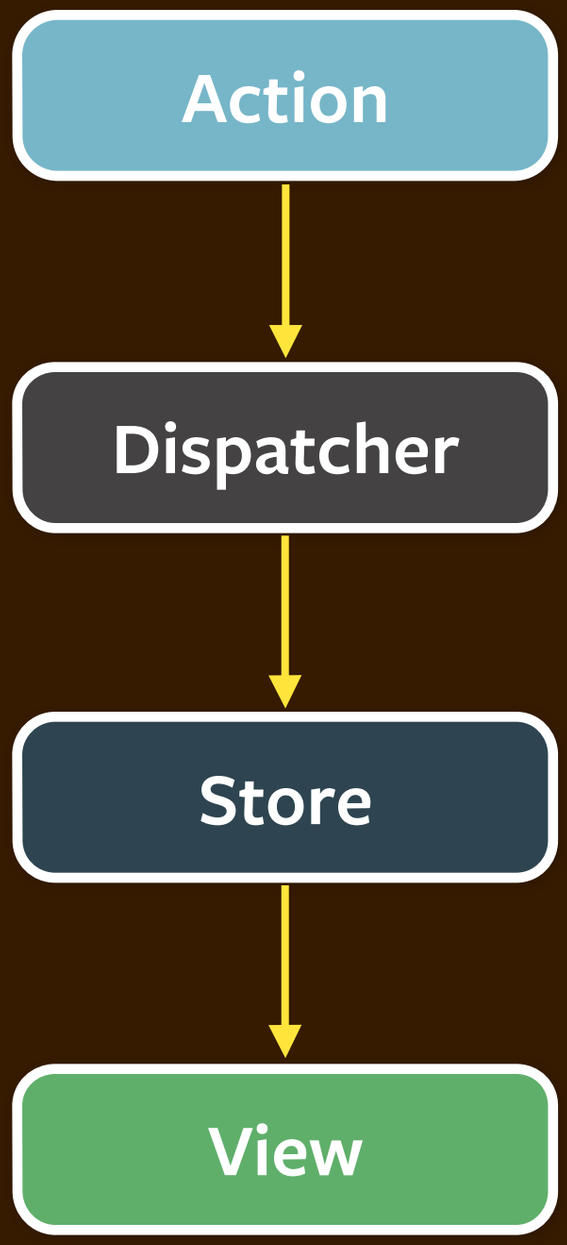


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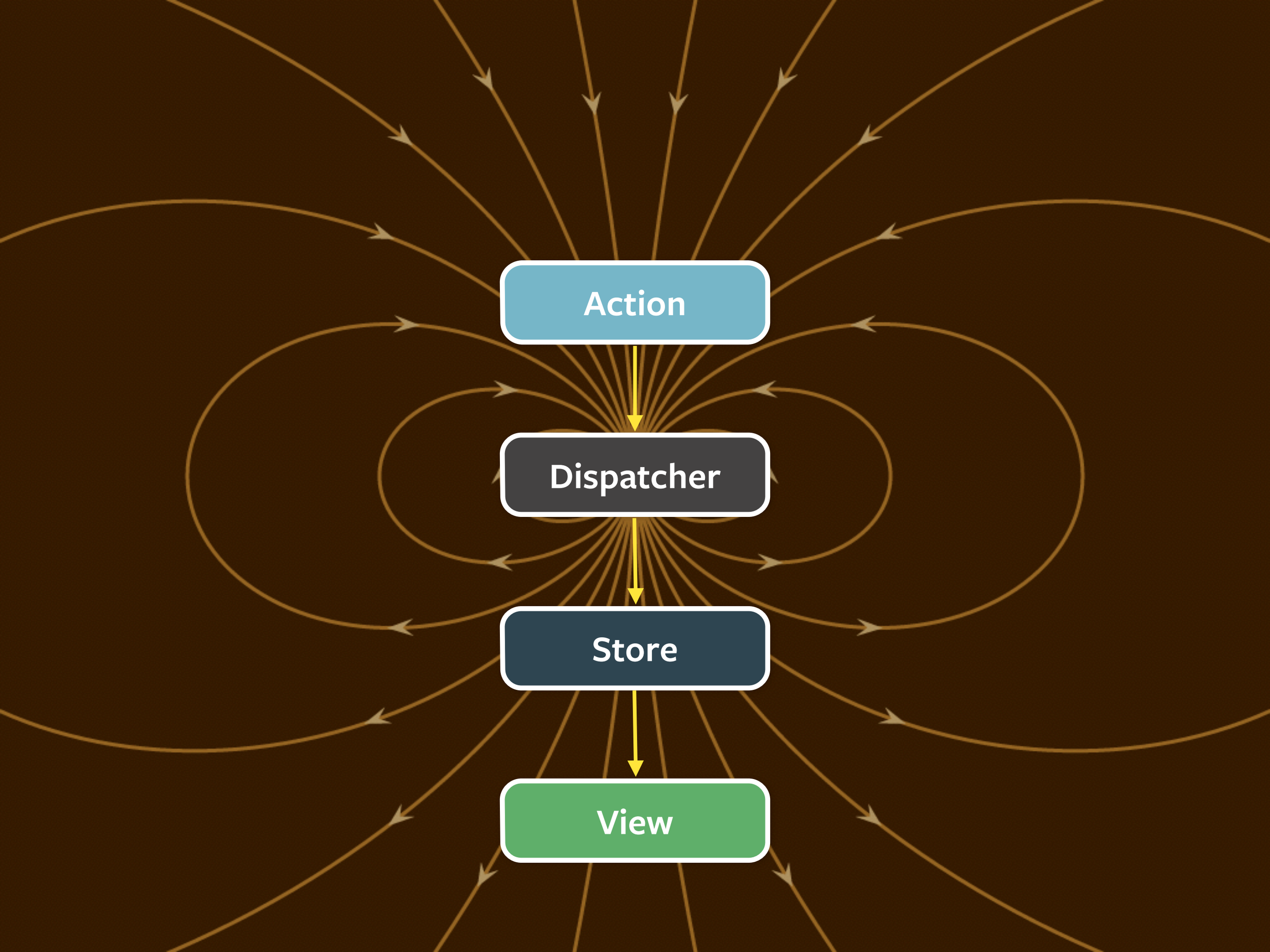
The Dispatcher

AppDispatcher.js

The Dispatcher

"Sunset at Sutro" by ohad, used under CC BY 2.0*


Action
Dispatcher
Store
View

The Dispatcher

Available through npm or Bower as **flux**

A singleton registry of callbacks, similar to EventEmitter

`dispatch(action)`: invokes all callbacks, provides action

Primary API: `dispatch()`, `register()`, **`waitFor()`**

The Dispatcher

`waitFor()` is a distinctive feature, vital for derived state

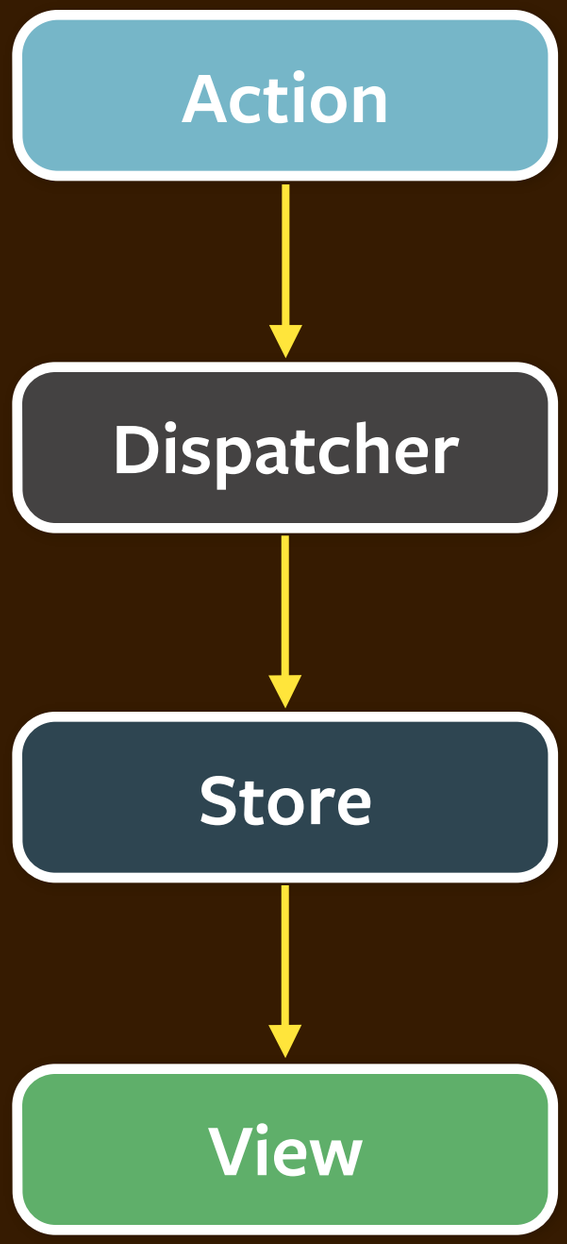
Cannot dispatch within a dispatch

Each dispatch is a discrete moment of change

```
// AppDispatcher.js

var Dispatcher = require('Flux.Dispatcher');

// export singleton
module.exports = new Dispatcher();
```

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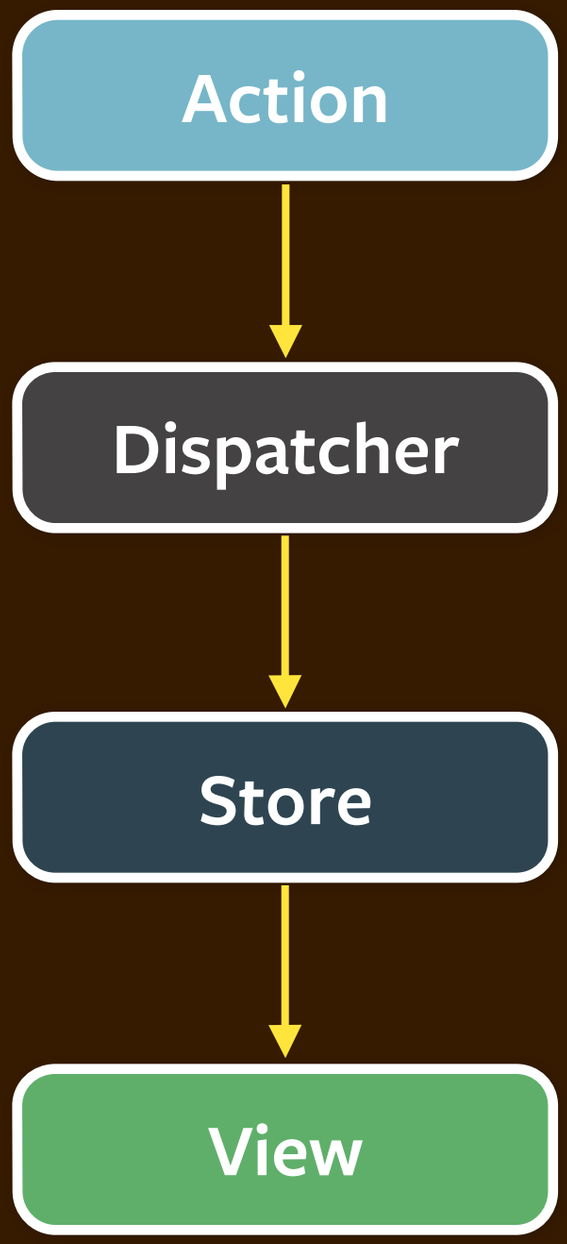


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```

Stores

Store

```
stores
├── MessageStore.js
└── __tests__
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```

Stores

Courtesey of The Bancroft Library, UC Berkeley BANC PIC 1905.17500 v.10:141--ALB

Stores

Each store is a singleton

The locus of control within the application

Manages application state for a logical domain

Private variables hold the application data

Numerous collections or values can be held in a store

Stores

Register a callback with the dispatcher

Callback is the only way data gets into the store

No setters, only getters: a universe unto itself

Emits an event when state has changed

```
// MessageStore.js

var _dispatchToken;
var _messages = {};

class MessageStore extends EventEmitter {

  constructor() {
    super();
    _dispatchToken = AppDispatcher.register(action => {

      switch(action.type) {

        case ActionTypes.MESSAGE_CREATED:
          var message = {
            id: Date.now(),
            text: action.text
          }
          _messages[message.id] = message;
          this.emit('change');
          break;

        case ActionTypes.MESSAGE_DELETED:
          delete _messages[action.messageID];
          this.emit('change');
          break;

        default:
          // no op
      }

    });
  }

  getDispatchToken() {
    return _dispatchToken;
  }

  getMessages() {
    return _messages;
  }

}

module.exports = new MessageStore();
```

```
_dispatchToken = AppDispatcher.register(action => {

  switch(action.type) {

    case ActionTypes.MESSAGE_CREATED:
      var message = {
        id: Date.now(),
        text: action.text
      }
      _messages[message.id] = message;
      this.emit('change');
      break;

    case ActionTypes.MESSAGE_DELETED:
      delete _messages[action.messageID];
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    default:
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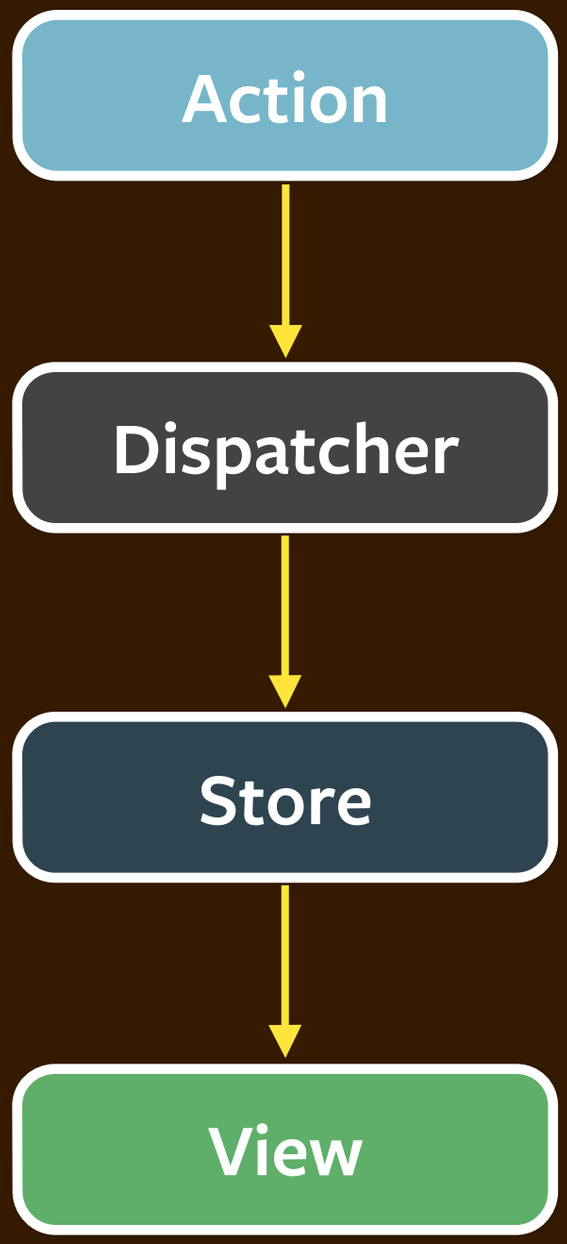


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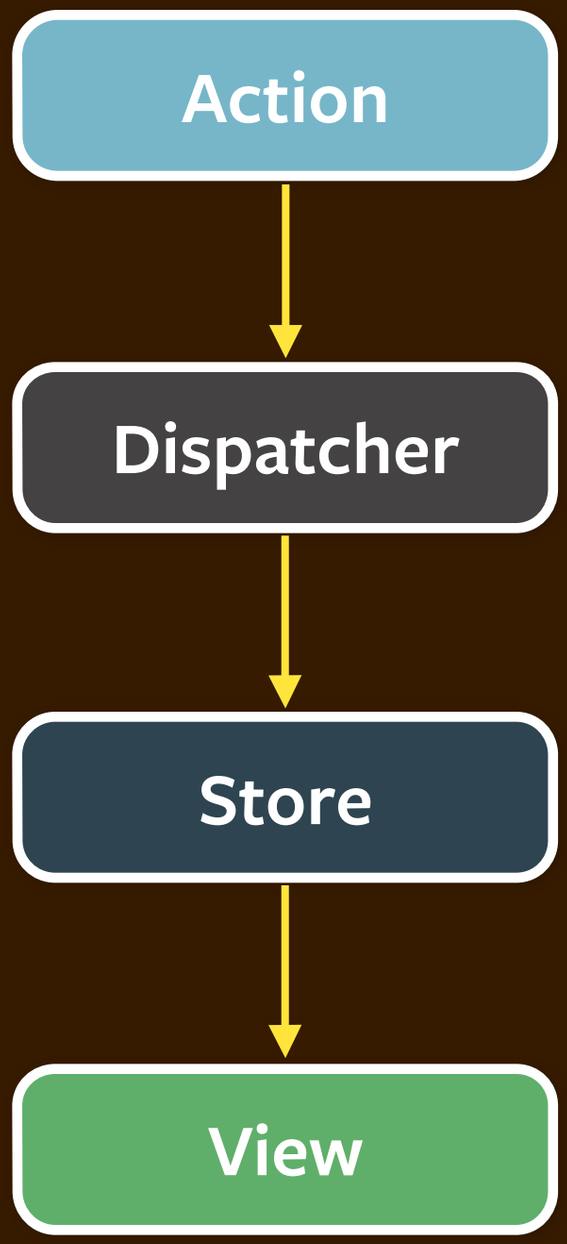


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Views & “Controller” Views

View

```
views
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└── MessageListItem.react.js
```

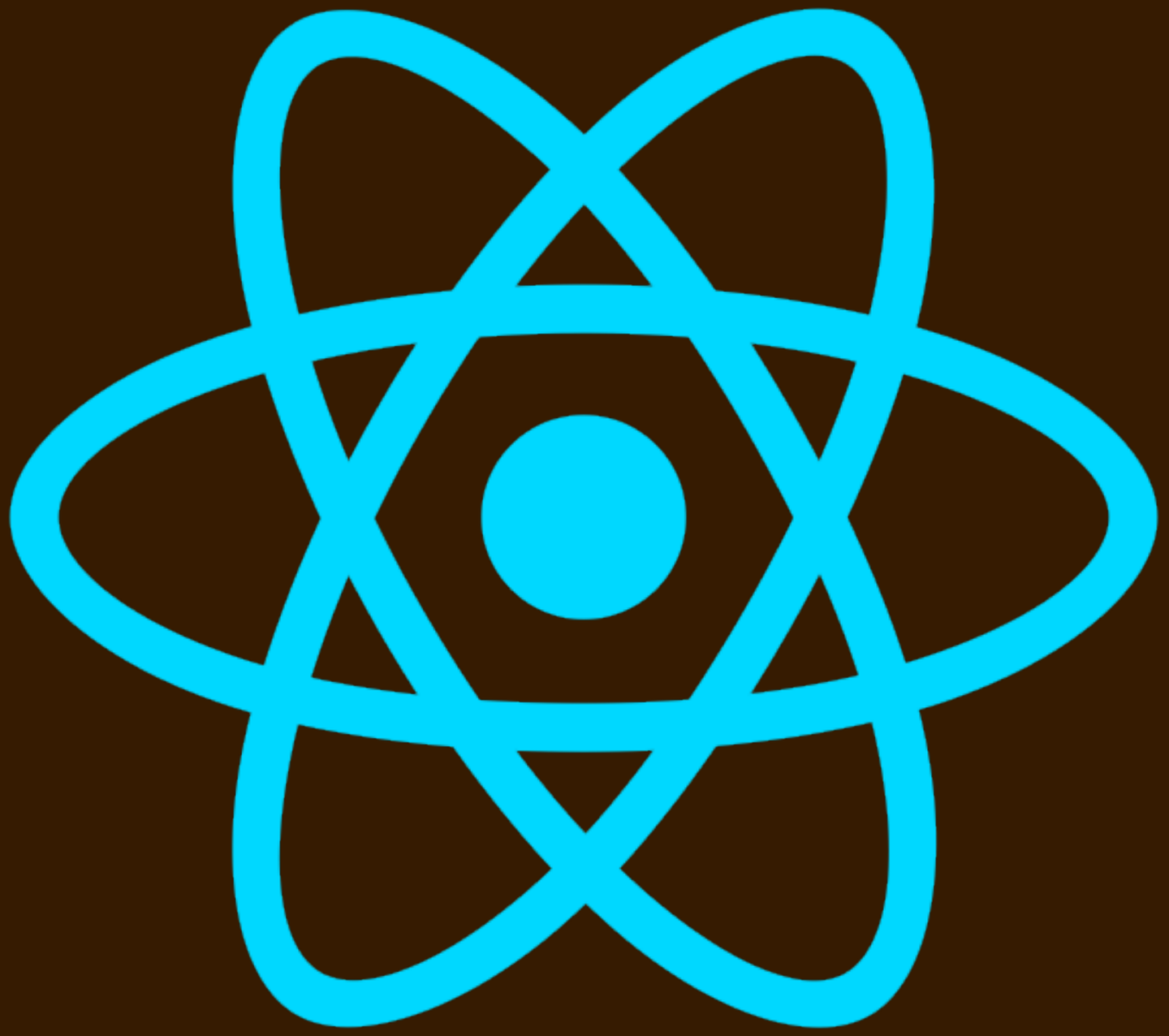
Views & “Controller” Views

Tree of React components

Controller views are near the root, listen for change events

On change, controller views query stores for new data

With new data, they re-render themselves & children



React & the DOM

Component-based framework for managing DOM updates

Uses a “Virtual DOM”: data structure and diff algorithm

Updates the DOM as efficiently as possible

Huge performance boost

Bonus: we can stop thinking about managing the DOM

React's Paradigm

Based on Functional-Reactive principles

Unidirectional data flow

Composability

Predictable, Reliable, Testable

Declarative: what the UI should look like, given props

Using React

Data is provided through props

Rendering is a function of `this.props` and `this.state`

Keep components as stateless as possible

“Re-render” (or not) on every state change or new props

Component lifecycle and update cycle methods

```
// MessagesControllerView.react.js

var MessagesControllerView = React.createClass({

  getInitialState: function() {
    return { messages: MessageStore.getMessages() };
  },

  componentDidMount: function() {
    MessageStore.on('change', this._onChange);
  },

  componentWillUnmount: function() {
    MessageStore.removeListener('change', this._onChange);
  },

  render: function() {
    // TODO
  },

  _onChange: function() {
    this.setState({ messages: MessageStore.getMessages() });
  }

});
```

```
// MessagesControllerView.react.js

var MessagesControllerView = React.createClass({

  getInitialState: function() {
    return { messages: MessageStore.getMessages() };
  },

  componentDidMount: function() {
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  render: function() {
    // TODO
  },

  _onChange: function() {
    this.setState({ messages: MessageStore.getMessages() });
  }

});
```
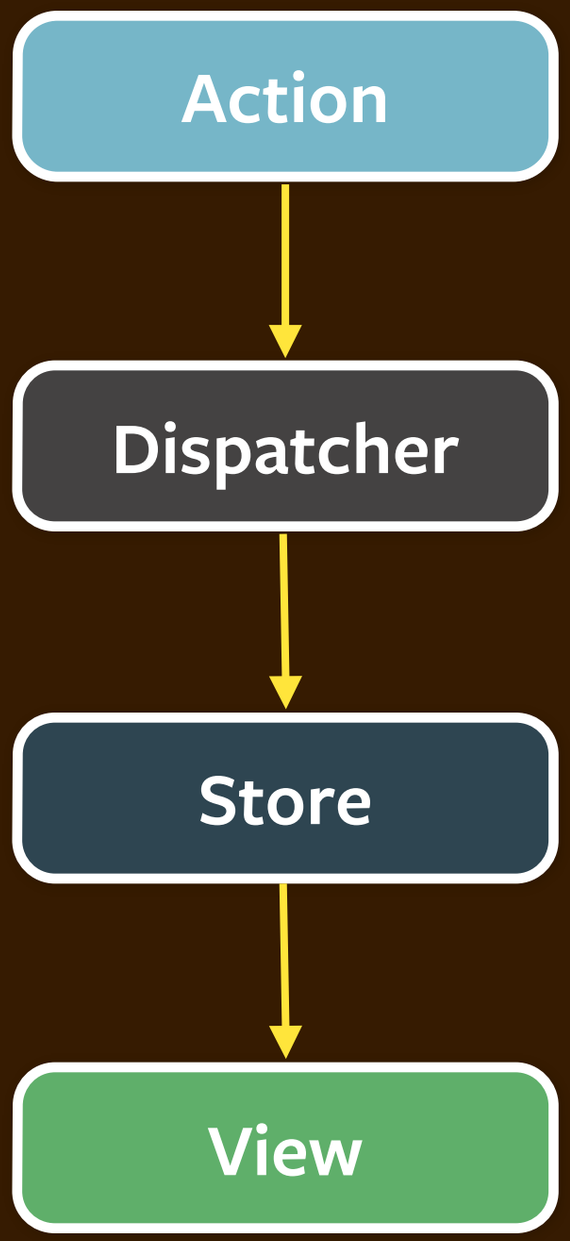

```
render: function() {
  var messageListItems = this.state.messages.map(message => {
    return (
      <MessageListItem
        key={message.id}
        messageID={message.id}
        text={message.text}
      />
    );
  });
  return (
    <ul>
      {messageListItems}
    </ul>
  );
},
```

```
// MessageListItem.react.js

var MessageActionCreators = require('MessageActionCreators');
var React = require('react');

var MessageListItem = React.createClass({

  propTypes = {
    messageID: React.PropTypes.number.isRequired,
    text: React.PropTypes.string.isRequired
  },

  render: function() {
    return (
      <li onClick={this._onClick}>
        {this.props.text}
      </li>
    );
  },

  _onClick: function() {
    MessageActionCreators.messageDeleted(this.props.messageID);
  }

});

module.exports = MessageListItem;
```




```
messageDeleted: messageID => {
  AppDispatcher.dispatch({
    type: ActionTypes.MESSAGE_DELETED,
    messageID
  });
}
```

```
case ActionTypes.MESSAGE_DELETED:
  delete _messages[action.messageID];
  this.emit('change');
  break;
```

```
_onChange: function() {
  this.setState({
    messages: MessageStore.getMessages()
  });
}
```

Initialization of the App

Usually done in a bootstrap module

Initializes stores with an action

Renders the topmost React component

```
// AppBootstrap.js

var AppConstants = require('AppConstants');
var AppDispatcher = require('AppDispatcher');
var AppRoot = require('AppRoot.react');
var React = require('React');

require('FriendStore');
require('LoggingStore');
require('MessageStore');

module.exports = (initialData, elem) => {
  AppDispatcher.dispatch({
    type: AppConstants.ActionTypes.INITIALIZE,
    initialData
  });
  React.render(<AppRoot />, elem);
};
```

Calling a Web API

Use a WebAPIUtils module to encapsulate XHR work.

Start requests directly in the Action Creators, or in the stores.

Important: create a new action on success/error.

Data must *enter* the system through an action.

Immutable Data

Boost performance in React's `shouldComponentUpdate()`

React.addons.PureRenderMixin

immutable-js: http://facebook.github.io/immutable-js/

More Flux Patterns

LoggingStore

Error handling with client ID / dirty bit

Error handling with actions queue

Resolving dependencies in the Controller-view

Anti-patterns

Application state/logic in React components

Getters in `render()`

Public setters in stores & the setter mindset trap

Props in `getInitialState()`

Dataflow Programming

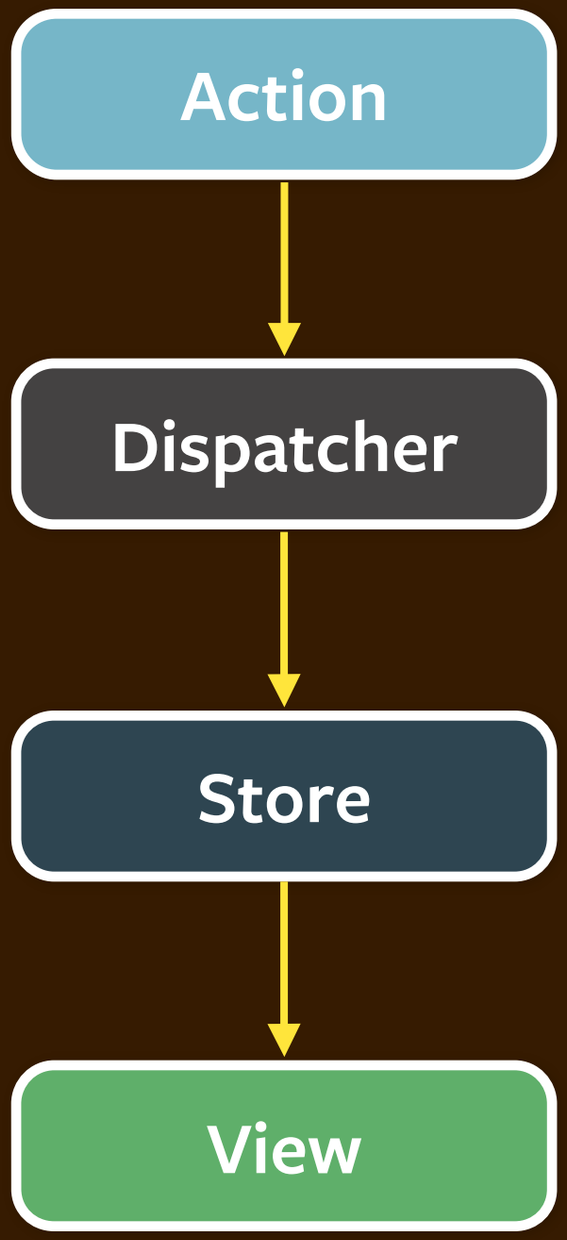
CQRS

Reactive

Flux

MVC

Functional and FRP



FLUX TOTALLY WORKS

https://speakerdeck.com/fisherwebdev/react-flux-fluent

Thank You!

https://speakerdeck.com/fisherwebdev/react-flux-fluent-2015

http://facebook.github.io/react/

http://facebook.github.io/flux/

http://facebook.github.io/jest/

http://facebook.github.io/immutable-js/

Thank You!