

Using React, Redux and Saga with Lottoland APIs

[View Lotteries](#)

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Agenda

1. ReactJS
2. Redux
3. Redux Saga - managing side effects
4. RESTful APIs - Lottoland API
5. DEMO

ReactJS

Reactive programming:

- is programming with asynchronous data streams.
- is to specify the dynamic behaviour of a value completely at the time of declaration
- separates the *how* from the *when* question

ReactJS

Props and State

- Props - *props* (short for *properties*) are a Component's **configuration**, its *options* if you may. They are received from above and are **immutable** as far as the Component receiving them is concerned.

Implementation:

```
import React, { Component } from 'react'

export default class Jackpots extends
  Component {
  render() {
    const jackpots = []

    this.props.data.forEach((jackpot) =>
    {
      jackpots.push(jackpot + '\n')
    })

    return (
      <div>
        {jackpots}
      </div>
    )
  }
}
```

Usage:

```
<li>Jackpots: <Jackpots data={this.props.jackpots} /></li>
```

ReactJS

State

- State - the *state* starts with a default value when a Component mounts and then **suffers from mutations in time (mostly generated from user events)**. It's a serializable* representation of one point in time—a snapshot.

```
constructor (props) {  
  super(props)  
  
  this.state = {  
    valid: true  
  }  
  this.validate = this.validate.bind(this)  
  
  validate () {  
    if (!this.props.validate) return  
    this.setState({  
      valid:   
this.props.validate(this.getValue())  
    })  
  }  
  
  isValid () {  
    return this.state.valid  
  }  
  
  render () {  
    const common = {  
      id: this.props.id,  
      ref: 'input',  
      onChange: this.validate  
    }  
  
    const classes = []  
  
    if (this.state.valid === true) {  
      classes.push('valid')  
    } else if (this.state.valid === false) {  
      classes.push('invalid')  
    }  
  }  
}
```

ReactJS

Components and Containers

- Stateless Component (dumb) - Only *props*, no *state*. There's not much going on besides the `render()` function and all their logic revolves around the *props* they receive. This makes them very easy to follow (and test for that matter).

```
import React, { Component } from 'react'
import { Route, Link } from 'react-router-dom'

import PrivateRoute from '../containers/
  PrivateRoute'
import LoginDialog from '../containers/
  LoginDialog'
import HomePage from '../pages/HomePage'
import LotteryPage from '../pages/LotteryPage'

class Header extends Component {

  render() {
    return (
      <div>
        <nav >
          <Link to="/">Home</Link>
          {" | "}
          <Link to="/lotteries">Lotteries</Link>
        </nav>

        <Route exact path="/" component={HomePage}/>
        <Route path="/login" component={LoginDialog}/>
      </div>
    )
  }
}

export default Header
```

ReactJS

Components and Containers

- Stateful Component (container) - Both *props* and *state*. We also call these *state managers*. They are in charge of client-server communication (XHR, web sockets, etc.), processing data and responding to user events.

```
class LotteryPage extends Component {  
  
  constructor() {  
    super()  
    this.logout = this.logout.bind(this)  
  }  
  
  componentDidMount() {  
    this.props.dispatch(getData())  
  }  
  
  logout() {  
    this.props.dispatch(logOut())  
  }  
  
  render() {  
    const { lotteries } = this.props  
    return (  
      <Wrapper>  
        <Lotteries lotteriesData={lotteries} />  
        <div>  
          <Button primary onClick={this.logout}>  
            Logout</Button>  
        </div>  
      </Wrapper>  
    )  
  }  
}  
  
LotteryPage.propTypes = {  
  dispatch: propTypes.func.isRequired  
}  
  
const mapStateToProps = (state) => ({  
  lotteries: getLotteriesData(state)  
})  
  
export default connect(mapStateToProps)(LotteryPage)
```

ReactJS

React Router v4

- Used to navigate through different pages of an app
- A pure React rewrite of the popular package. The required route configuration from previous versions has been removed and everything is now “just components”.
- Installation - yarn add --dev react-router-dom.
- Rendering a <Router>

```
<Route exact path="/" component={HomePage}/>  
<Route path="/login" component={LoginDialog}/>  
<PrivateRoute path="/lotteries" component={LotteryPage}/>
```

```
import React from 'react'  
import ReactDOM from 'react-dom'  
import { BrowserRouter } from 'react-router-dom'
```

```
import App from './containers/App'  
import { Provider } from 'react-redux'  
import configureStore from './store/configureStore'
```

```
const store = configureStore()
```

```
ReactDOM.render((  
  <Provider store={store}>  
    <BrowserRouter>  
      <App />  
    </BrowserRouter>  
  </Provider>  
>), document.getElementById('root'))
```


ReactJS

styled-components

- CSS styles embedded into JS
- No need of preprocessors
- High decoupling and able to re-use them in 'components like' style
- Check if interesting: <https://styled-components.com/> / https://www.youtube.com/watch?v=jjN2yURa_uM

ReactJS

styled-components example

Usage: `<Button primary>View Lotteries</Button>`

Implementation:

```
import styled from 'styled-components'

const Button = styled.button`
  /* Adapt the colors based on primary prop */
  background: ${props => props.primary ? 'palevioletred' : 'white'};
  color: ${props => props.primary ? 'white' : 'palevioletred'};

  font-size: 1em;
  margin: 1em;
  padding: 0.25em 1em;
  border: 2px solid palevioletred;
  border-radius: 3px;

  &:hover {
    color: ${props => props.primary ? 'palevioletred' : 'white'};
    background: ${props => props.primary ? 'white' : 'palevioletred'};
  }
`

export default Button
```

ReactJS

yarn vs npm

Potential Problems with NPM

- *nested dependencies (fixed in npm 3)*
- *serial installation of packages*
- *single package registry (npmjs.com ever go down for you?)*
- *requires network to install packages (though we can create a makeshift cache)*
- *allows packages to run code upon installation (not good for security)*
- *indeterminate package state (you can't be sure all copies of the project will be using the same package versions)*

ReactJS

yarn vs npm

Yarn Solutions

- *multiple registries* - Yarn reads and installs packages from both `npmjs.com` as well as *Bower*. In the event one goes down, your project can continue to be built in CI without issue
- *flat dependency structure* - simpler dependency resolution means Yarn finishes faster and can be told to use a single version of certain packages, which uses less disk space
- *automatic retries* - a single network request failing won't cause an install to fail. Requests are retried upon failure, reducing red builds due to temporary network issues
- *parallel downloads* - Yarn can download packages in parallel, reducing the time builds take to run
- *fully compatible with npm* - switching from npm to Yarn is a no friction process
- *Yarn.Lock*- keeps dependencies locked to specific versions similar to *Gemfile.lock* in the Ruby world

ReactJS

React Dev Tools

- Chrome plugin useful for developing and debugging of React Apps
- Installation -
<https://chrome.google.com/webstore/detail/react-developer-tools/fmkadmapgofadopljbjfkapdkoienihi?hl=en>

Redux

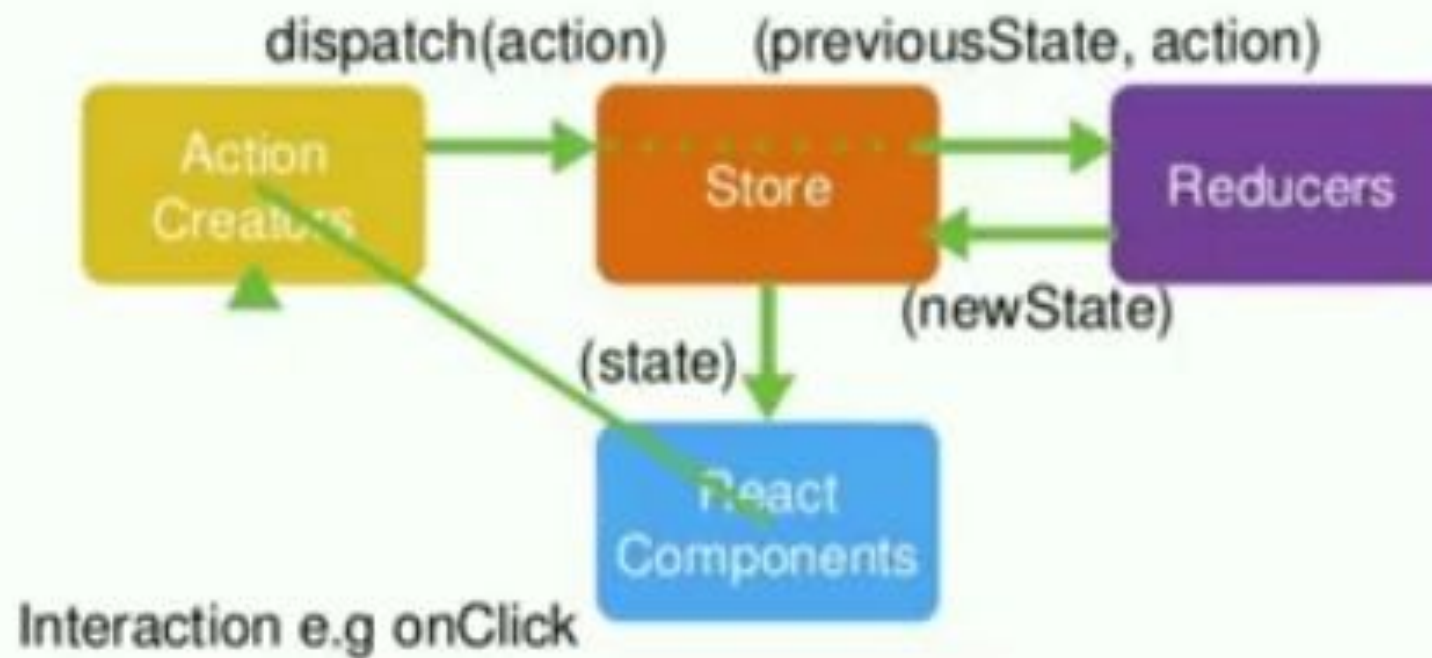
What is Redux?

- Provides predictable state management using actions and reducers.
- Can use *middleware* to manage **async**/side effects, such as Redux-Thunk or Redux-Saga
- *Single source of truth* - the *state* of your whole application is stored in an object tree within a single *store*
- react-redux is the package that allows you to use Redux in a React app

Redux

Redux Flow

Redux Flow



Redux

Actions

- Describe something has (or should) happen, but they don't specify how it should be done
- Payloads of information that send data from your application to your store
- The only source of information for the store
- Plain JavaScript objects that must have *type* property that indicates the type of the action being performed

Example:

```
export const AUTH_REQUEST = 'AUTH_REQUEST'
```

```
{  
  type: types.AUTH_REQUEST,  
  payload: { username, password }  
}
```


Redux

Action Creators

- Functions that create actions
- Redux action creators simply return an action
- In Redux usually are used with `dispatch()`, like this:

```
logout() {  
  this.props.dispatch(logOut())  
}
```

Example:

```
export function login (username, password) {  
  return {  
    type: types.AUTH_REQUEST,  
    payload: { username, password }  
  }  
}
```

Redux

Reducers

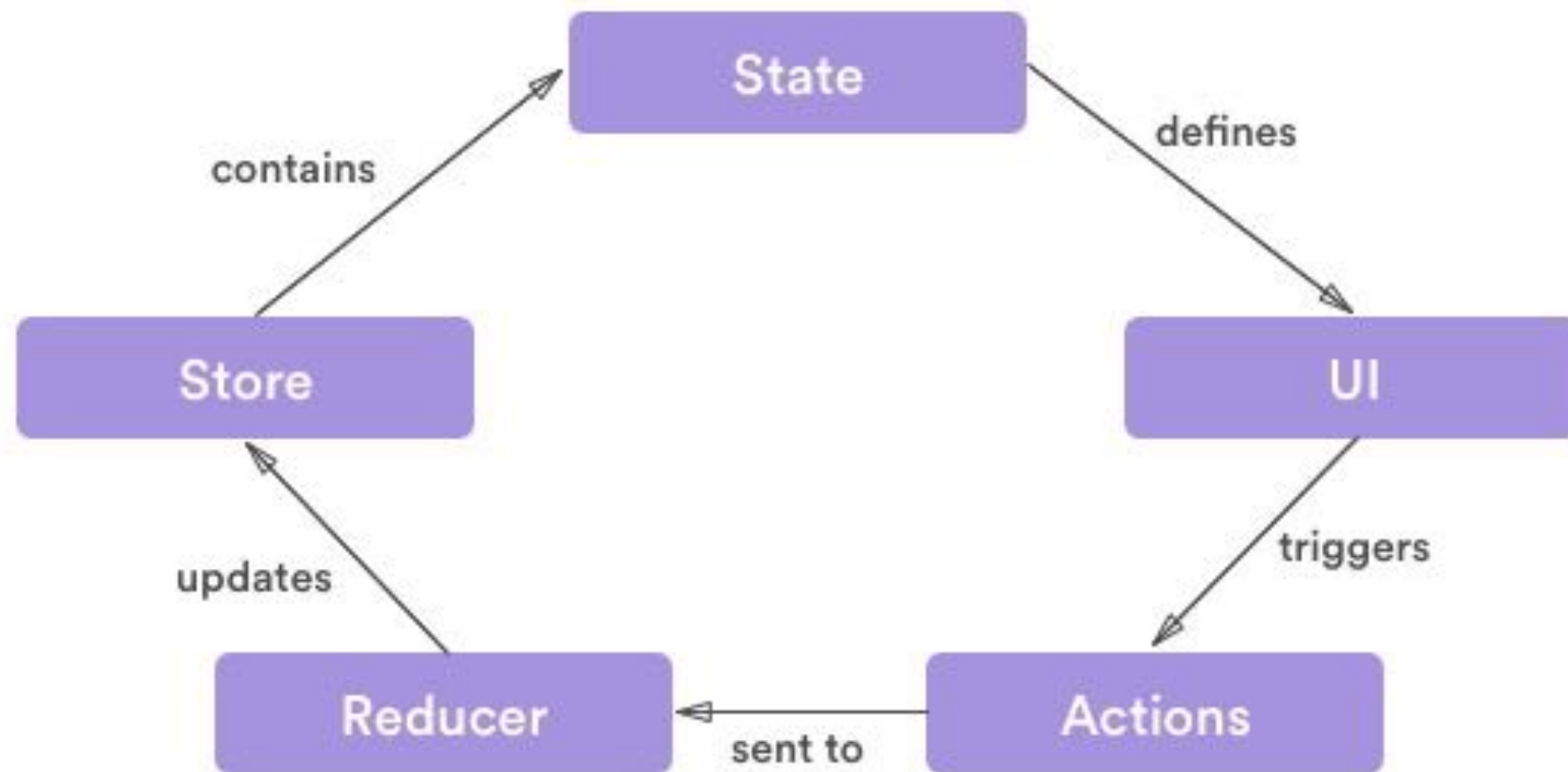
- Pure functions that take the previous state and an action, and return the next state
- **Actions** describe the fact that *something happened*, but don't specify how the application's state changes in response, this is the job of reducers
- Reducers handle state transitions, but they must be done synchronously

Things you should **never** do inside a reducer:

- Mutate its arguments;
- Perform side effects like API calls and routing transitions;
- Call non-pure functions, e.g. `Date.now()` or `Math.random()`

Redux

Reducers



Redux

Reducers Examples

authReducer

```
import * as types from '../constants/actionTypes'
import { Map, fromJS } from 'immutable'

export default function (state = Map(), action) {
  if (action.type === types.AUTH_RESPONSE) {
    return Map(state).mergeDeep(fromJS(action))
  }
  if (action.type === types.AUTH_LOGOUT) {
    return Map()
  }
  if (action.type === types.AUTH_ERROR) {
    return Map(state).set('error', action.payload)
  }
  return state
}
```

lotteriesDataReducer

```
import * as types from '../constants/actionTypes'
import { Map, fromJS } from 'immutable'

export default function (state = Map(), action) {
  if (action.type === types.DATA_RESPONSE) {
    return Map(state).mergeDeep(fromJS(action))
  }
  if (action.type === types.DATA_ERROR) {
    return Map(state).set('error', action.payload)
  }
  return state
}
```

* Using *immutable.js* to prevent mutating the state by accident.

Redux

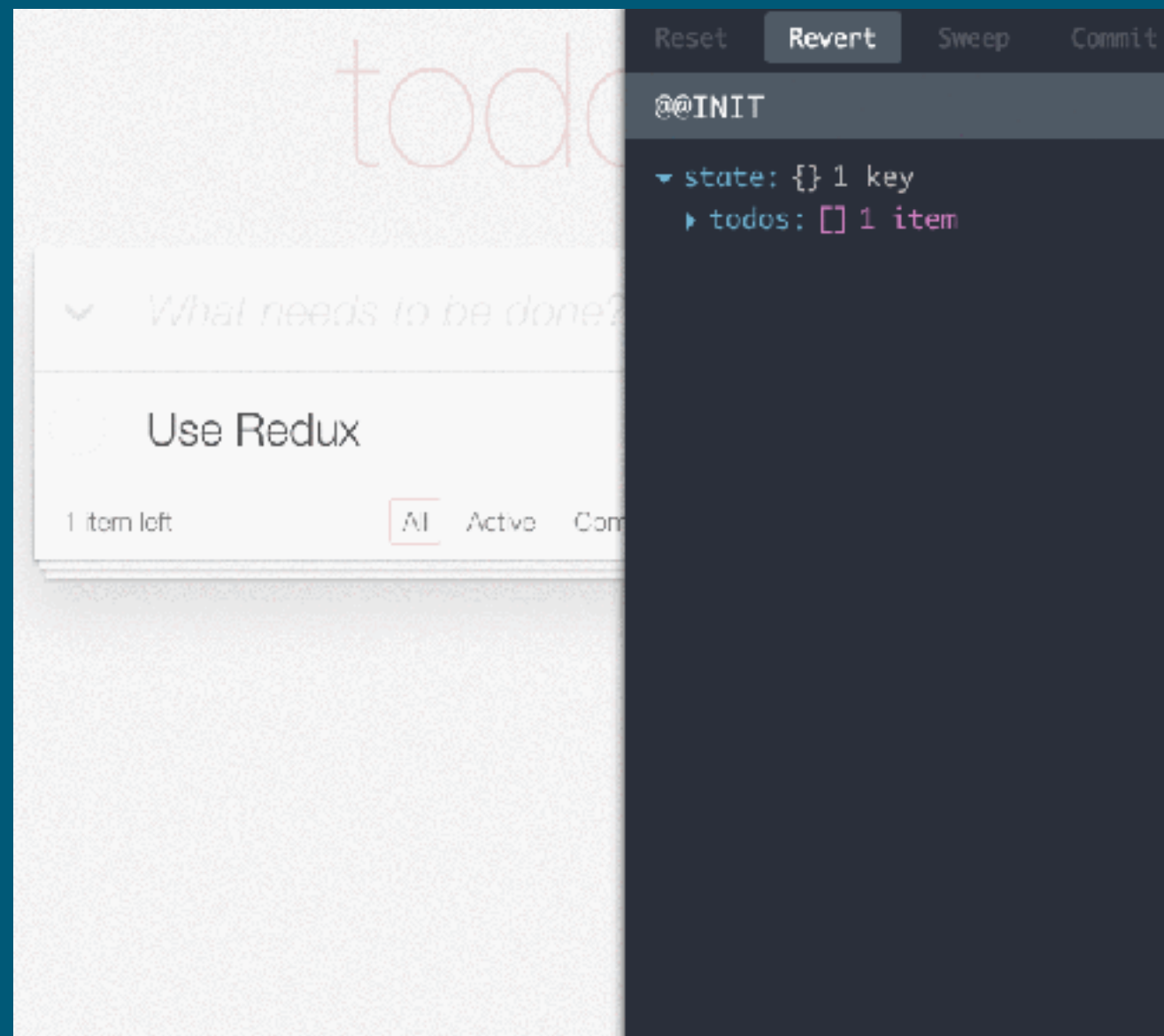
Store, Connected components

- Store is an object that brings actions and reducers together
- Store holds application state
- Store allows access to state via *getState()*
- Store allows state to be updated via *dispatch(action)*
- Store registers listeners via *subscribe(listener)*
- Store handles unregistering of listeners via the function returned by *subscribe(listener)*
- Use *connect()* to connect the *React part* of your app with the store, such components are also known as *connected components*
- It's important to note that you'll only have a single store in a Redux application

Redux

Redux Dev Tools

<https://github.com/gaearon/redux-devtools>

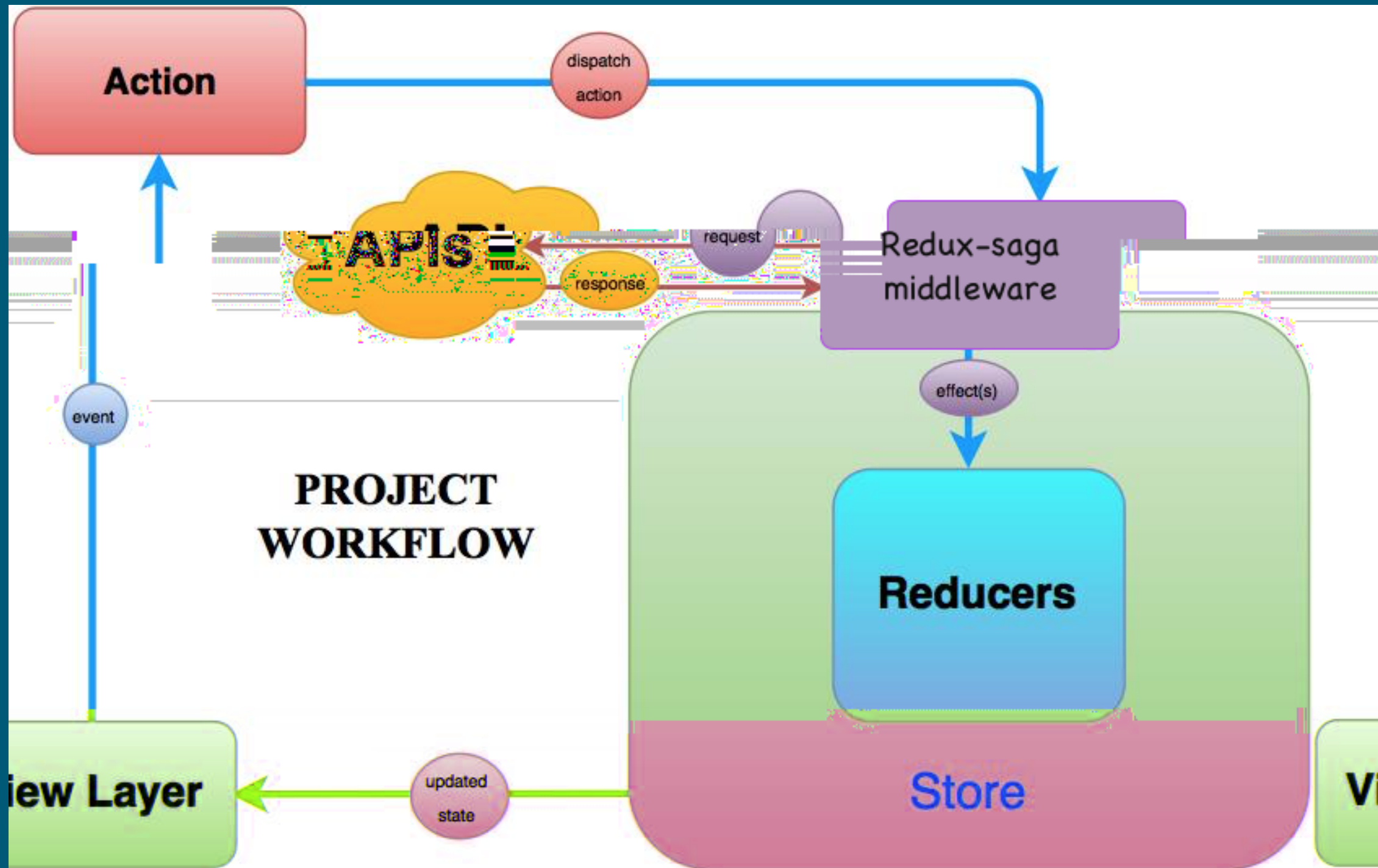


Redux-Saga

What is Redux-Saga?

- A library that aims to make side effects (i.e. asynchronous things like data fetching and impure things like accessing the browser cache) in React/Redux applications easier and better
- Uses ES6 Generators for making asynchronous flows easy to read, write and test
- Advantage against another famous *middleware* called 'redux-thunk' is that you don't end up in callback hell

React - Redux - Saga Cycle



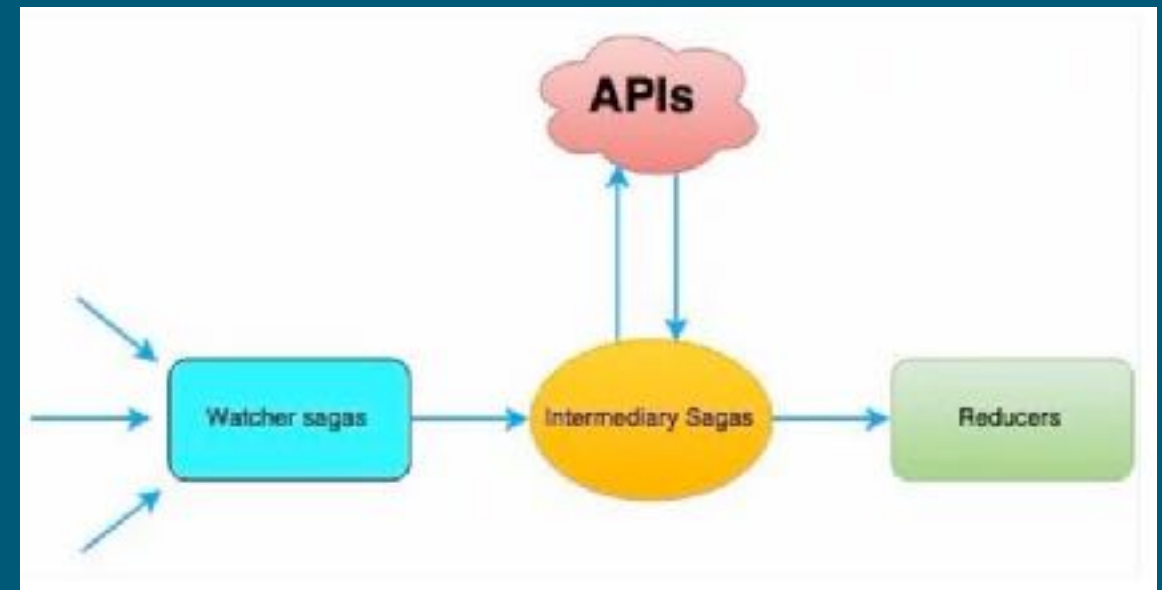
Redux-Saga

Examples

Sagas starter:

```
import { fork } from 'redux-saga/effects';
import watchAuthentication, { watchLotteriesData } from './watcher';

export default function* startForman() {
  yield fork(watchAuthentication);
  yield fork(watchLotteriesData);
}
```



authSaga

```
import { put, call } from 'redux-saga/effects'
import { login } from '../API/api'
import * as types from '../constants/actionTypes'

export default function* authSaga({ payload }) {
  try {
    const authInfo = yield call(login, payload)
    yield put({ type: types.AUTH_RESPONSE, authInfo })
  } catch (error) {
    yield put({ type: types.AUTH_ERROR, error })
  }
}
```

lotteriesSaga

```
import { put, call } from 'redux-saga/effects'
import { getData } from '../API/api'
import * as types from '../constants/actionTypes'

export default function* lotteriesSaga() {
  try {
    const data = yield call(getData)
    yield put({ type: types.DATA_RESPONSE, data })
  } catch (error) {
    yield put({ type: types.DATA_ERROR, error })
  }
}
```

RESTful APIs - Lottoland API

- *RESTful API - **Representational state transfer (REST)** or **RESTful Web services** are one way of providing interoperability between computer systems on the *Internet*. REST-compliant Web services allow requesting systems to access and manipulate textual representations of Web resources using a uniform and predefined set of *stateless* operations*
- The most common use of them is with JSON - they accept http requests (GET, POST, PUT, etc) to a certain URL and provide responses like JSON objects.
- Lottoland APIs used in the demo app:
 - `{{Server}}/api/client/v1/players/login` - for logging in the user
 - `{{Server}}/api/client/v1/drawings` - for getting the info about the lotteries

RESTful APIs - Lottoland API

JSON Responses

Login

```
{
  "access_token":
"eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJqdGkiOiI2YWYwMjE5NS0wNGE2LTQ5ZTktOWVjYS1hNGExYjY5MWEyNDIiLCJleHAiOjE0OTYzMDkyNjIsImhhdCI6MTQ5NTA5OTY2MiwiYXVkIjoiaXh0ZXJuIiwicGFrIjoia0TN6eU5MeEZSaHc9Iiwia2MiOiIiLCJ1b3R5IjoiaWwibG5hIjoia0R2FiZXJvdiIsImN1ciI6IkVVUiiIsInN1YiI6IjU5MDBhZTFhYWY3MzcxMTE0YWY3YmI4ZCJ9.U82W1rRTuwvd4BNWy-taPYUbbIUd-C4JfNxsqKJws24",
  "token_type": "bearer",
  "expires_in": "2592000",
  "refresh_token":
"eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJqdGkiOiJmNDcyMTM0Ny0wYzA4LTQ5YmUtOWMxZi1iMzg1MjliYWYwMjE5NS0wNGE2LTQ5ZTktOWVjYS1hNGExYjY5MWEyNDIiLCJleHAiOjE0OTYzMDkyNjIsImhhdCI6MTQ5NTA5OTY2MiwiYXVkIjoiaXh0ZXJuIiwicGFrIjoia0TN6eU5MeEZSaHc9Iiwia2MiOiIiLCJ1b3R5IjoiaWwibG5hIjoia0R2FiZXJvdiIsImN1ciI6IkVVUiiIsInN1YiI6IjU5MDBhZTFhYWY3MzcxMTE0YWY3YmI4ZCJ9.qKE7Et5wJkGxRAeLRM9EHP6RZ8fLYnPZhK6CYlBtAwg"
}
```

Drawings

```
[
  {
    "id": "austriaLotto_2629",
    "lotteryId": "austriaLotto",
    "drawingDate": "2017-05-21T16:30:00.000+0000",
    "closingDate": "2017-05-21T16:00:00.000+0000",
    "state": "IN_PLAY",
    "doubleJackpotAllowed": true,
    "jackpots": [
      {
        "lotteryId": "austriaLotto",
        "jackpot": 0,
        "marketingJackpot": 0
      }
    ],
    "drawingType": "SU"
  },
  {
    "id": "cash4Life_307",
    // ...more
  }
]
```

DEMO

<https://github.com/mihailgaberov/lottoland-react-demo>

References

- <https://hackernoon.com/rapid-tips-for-your-react-redux-application-68f513a7cebf>
- <https://github.com/uberVU/react-guide/blob/master/props-vs-state.md>
- <https://scotch.io/tutorials/build-a-media-library-with-react-redux-and-redux-saga-part-2>
- <https://gist.github.com/staltz/868e7e9bc2a7b8c1f754>
- <http://stackoverflow.com/questions/42123261/programmatically-navigate-using-react-router-v4>
- <https://medium.com/@pshrmn/a-simple-react-router-v4-tutorial-7f23ff27adf>
- <https://github.com/reactjs/redux/blob/master/docs/introduction/ThreePrinciples.md>
- <https://redux-saga.js.org/>
- [React: Up and Running: Building Web Applications, book by Stoyan Stefanov](#)