webrx-react

Monadic Development for the Web

Using RxJS and React

Follow Along @ https://git.io/vQ10Y

Who Am I?

Pat Sissons

Senior Software Developer

at Marine Learning Systems

/patsissons

/marinels

webrx-react?

`webrx-react` is a single page application web framework written in TypeScript that aims to reduce boilerplate code by taking advantage of monadic state mutations to drive efficient page component rendering.

What is Monadic Programming?

State Encapsulation
Functional Mutations
Chainable Operations

RxJS

Monads as Observables
Asynchronous Event Management
Large Library of Operations
Ported to Many Languages

RxJS Demo

(Click the title for a live demo)

```
const container = document.getElementById('container');
const baseUri = '//baconipsum.com/api/?type=all-meat&format=html';
Rx.Observable
  .timer(0, 5000)
  .take(10)
  // pick a random number of paragraphs between 1 and 5
  .map(x => Math.floor(Math.random() * 5) + 1)
  .flatMap(x => {
    return Rx.Observable
      .ajax({
        url: `${ baseUri }&paras=${ x }`,
        crossDomain: true,
        responseType: 'text',
      });
  })
  .subscribe(x => {
    container.innerHTML = x.response;
  });
```

Ideas from WPF and RxUI

MVVM Pattern
Data Binding
View Templating
Reactive Properties
Reactive Commands
Observable Composition with `whenAny`

A Lightweight Port of webrx

Reactive Object Framework

Smaller Footprint, More Modularity

Support for TypeScript `2.3.x`

Support for RxJS `5.x.x`

Closer Approximation to RxUI

Properties and Commands

Observable Sourced Properties
Two-Way Bound Properties
Observable Sourced Command Execution
DOM Event Command Execution

Observable Web API

Using Observable.ajax

`GET` Data

`POST` Modifications

Asynchronously Composable Results

ObservableApi Demo

```
const api = new ObservableApi('//baconipsum.com/api/?type=');
Observable
  .timer(0, 5000)
  .take(10)
  // pick a random number of paragraphs between 1 and 5
  .map(x => Math.floor(Math.random() * 5) + 1)
  .flatMap(paras => {
    return api
      .getObservable<Array<string>>(
        'all-meat',
        { format: 'json', paras },
      );
})
.subscribe(
  x => { console.log(x); },
  e => { console.error(e); },
);
```

Composing Observables with `whenAny`

Wrapper for `combineLatest`

Automatic `startWith` for Properties

```
wx.whenAny(
  Observable.of('x1'),
  Observable.timer(1000, 1000).take(2).select(x => `x2-${ x }`),
  Observable.from([ 'x3-0', 'x3-1', 'x3-2' ]),
  (x1, x2, x3) => ({ x1, x2, x3 }),
)
// { x1, x2-0, x3-0 }
.subscribe(x => { console.log(JSON.stringify(x)); });
```

React Rendering Engine

Readonly Component Attributes
Readonly Snapshots of Mutable State
Declarative Templating
Observable Results Invoke Rendering

React Demo

(Click the title for a live demo)

```
class HelloThereComponent extends Component<{}, { counter: number }> {
  constructor() { super(); this.state = { counter: 0 }; }
  componentWillMount() {
    Rx.Observable
      .timer(0, 2800) // gif has a duration of ~2800ms
      .subscribe(x => this.setState(() => ({ counter: x + 1 })));
  }
  render() {
    return (
      <div style={{ textAlign: 'center' }}>
        <img src='http://gph.to/2tC4JiE' />
        <h3>Hellos There'd: { this.state.counter }</h3>
      </div>
    );
  }
}
```

View Models

Containers for Properties & Commands
Lifecycle Injection Functions
Consumers of Routing State
Search & Menu Item Injection Functions

Views

React `Component<P, S>` Wrapper
React Lifecycle Injection Functions
View Model Component Bindings
Updates Driven by View Model

Component Demo

```
class ToggleViewModel extends BaseViewModel {
  public readonly toggle = this.command<boolean>();
  public readonly enabled = this.toggle.results
    .scan(x => !x, false).toProperty(false);
}
interface TogglProps extends BaseViewProps {}
class ToggleView extends BaseView<TogglProps, ToggleViewModel> {
  updateOn() { return [ this.state.enabled.changed ]; }
  render() {
    const enabled = this.state.enabled.value;
    return <CommandButton
      className={ classNames('Toggle', { enabled }) }
      command={ this.state.toggle }>
        { this.props.children }
    </CommandButton>;
  }
}
```

webrx-react Components

Based on Bootstrap 3 (`react-bootstrap`)
Easy to Use Component Library
`BindableInput` & `CommandButton`
`DataGrid` & `ItemListPanel`
`ModalDialog` & `ContextMenu`
And Many More...

BindableInput & CommandButton

```
const input = wx.property<string>();
const cmd = wx.command(x => console.log(`Executed: '${ x }'`));
function render() {
  return (
    <div>
      <BindableInput property={ this.state.input }>
        <FormControl type='text' placeholder='Type Some Text In...' />
      </BindableInput>
      <CommandButton
        command={ this.state.cmd }
        commandParameter={ () => this.state.input.value }
      >
        <span>Execute!</span>
      </CommandButton>
    </div>
  );
}
```

DataGridView & ItemListPanelView

```
const grid = new DataGridViewModel(Observable.of([
  { id: 1, userName: 'hmar', name: 'Hank', lastName: 'Mardukas' },
]));
function render() {
  return (
    <div>
      <DataGridView viewModel={ this.state.grid }>
        <DataGridColumn fieldName='id' header='User ID' />
        <DataGridColumn header='Name'
          renderCell={ x => `${ x.firstName } ${ x.lastName }` }
        />
      </DataGridView>
      <ItemListPanelView viewModel={ this.state.grid }>
        <DataGridColumn header='Name'
          renderCell={ x => `${ x.firstName } ${ x.lastName }` }
        />
        <DataGridColumn
          renderCell={ x => (<CommandButton command={ this.state.viewUser } />) }
          tooltip={ x => x == null ?
            (<Tooltip>Click the Button to view the user</Tooltip>) :
            (<Tooltip>{ `View User ${ x.userName }` }</Tooltip>)
          }
        />
      </ItemListPanelView>
    </div>
  );
}
```

ModalDialogView & ContextMenu

```
const modal = new ModalDialogViewModel();
function render() {
  return (
    <div>
      <ContextMenu id='menu' header='Open Modal'>
        <div>Summon A Context Menu</div>
        <MenuItem onClick={ this.bindEventToCommand(this.state, x => x.showModal) }>
          Show Modal
        </MenuItem>
      </ContextMenu>
      <ModalDialogView viewModel={ this.state.modal }  header='A Wild Modal Appears'>
        <CommandButton command={ this.state.modal.hideOnExecute(this.state.cancel) }>
          Cancel
        </CommandButton>
        <CommandButton command={ this.state.modal.hideOnExecute(this.state.accept) }>
          Accept
        </CommandButton>
      </ModalDialogView>
    </div>
  );
}
```

RouteHandlerView

```
const routingMap = {
  '/Demo': { path: '/Demo/' }, // redirect
  '^/Demo/(.*)$': { path: '/Demo/', creator: () => new DemoComponentViewModel() },
};
const viewMap = {
  Demo: (viewModel: DemoComponentViewModel) => (
    <DemoComponentView viewModel={ viewModel }>
      <div>Routed Content: { this.state.param.value }</div>
    </DemoComponentView>
  ),
};
const router = new RouteHandlerViewModel(routingMap);
function render() {
  return (
    <div>
      <div>Header (see PageHeaderView)</div>
      <RouteHandlerView viewModel={ this.state.router } viewMap={ viewMap } />
      <div>Footer (see PageFooterView)</div>
    </div>
  );
}
```

The RouteManager

Hash-based Routing State

Use Browser `history` API

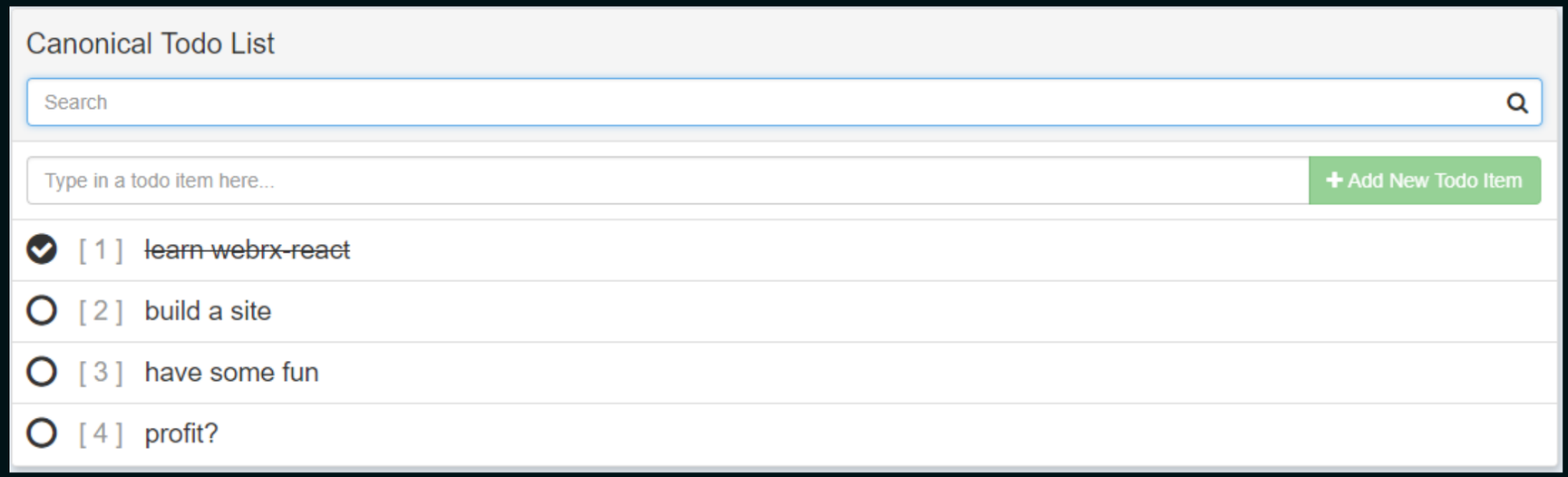
Fallback on `hashChanged` events

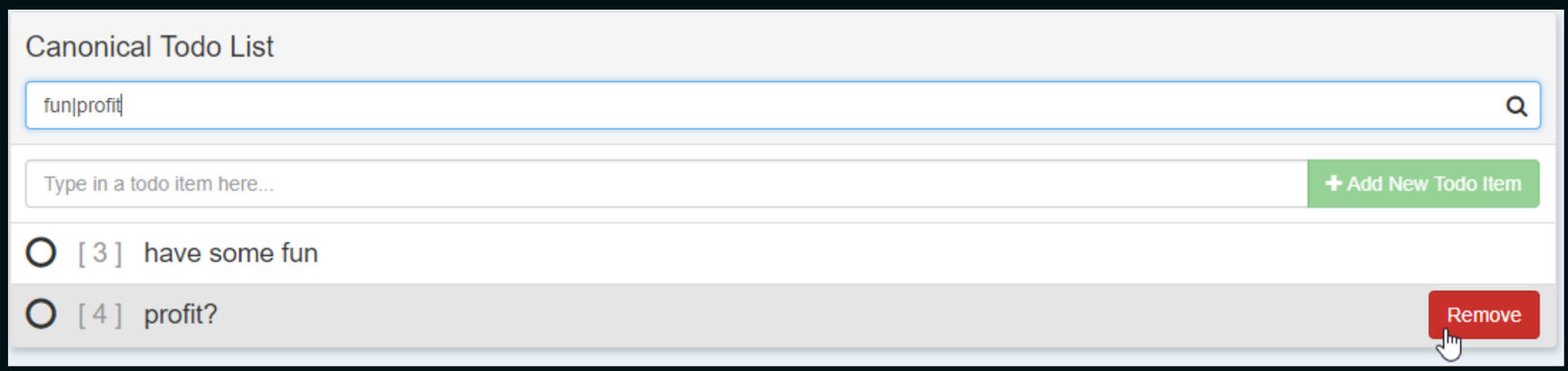
Routing State Decoded Automatically

`saveRoutingState` & `loadRoutingState`

Canonical Todo List

(Click the title for a live demo)





Consuming `webrx-react`

Published to npm
Available via unpkg (npmcdn)
Uglified Bundle for ES5+ (IE9 support)
Modular Imports for ES6+ & TypeScript

Why?

Modular Sharable Components
Snappy Responsive Complex Views
IE9+ Compatibility

Roadmap

First Official Non-Beta Release
Component View Abstractions
e.g., Material, Foundation, Fabric, Polymer

Questions?