Redux Boilerplate

A brownbag deep-dive at

MX®

by Seth House

State management?

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Mgmt	🌐 👱	📦 🌿	🔃	👀	📐
Component	👱	📦	✅	✅	⛔ *
Redux	🌐	🌿	⛔	⛔	✅
Context	👱 *	🌿	⛔	⛔ *	⛔

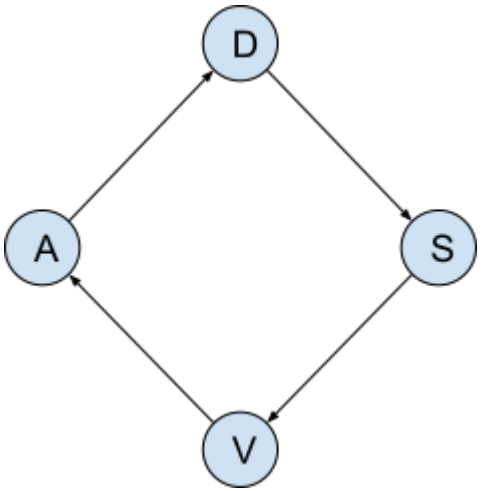
The Flux pattern

User interface architectures

- MVC
- MVP
- MVT
- MVVM
- MVI
- Flux
- BEST
- MVU

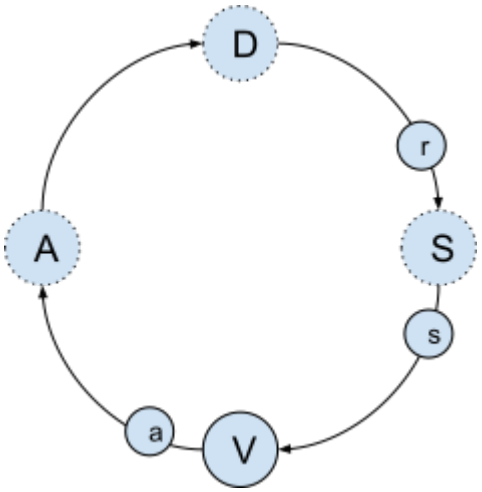
...etc.

Flux



D - Dispatcher
S - Store
V - View
A - Actions

Redux



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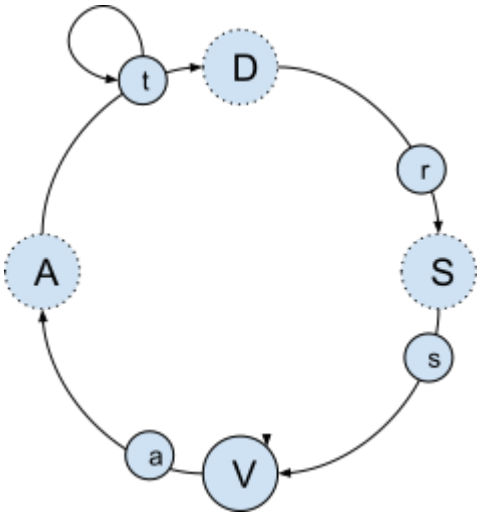
redux-thunk



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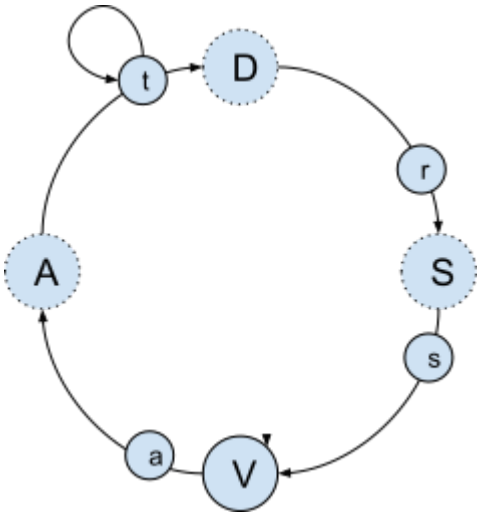

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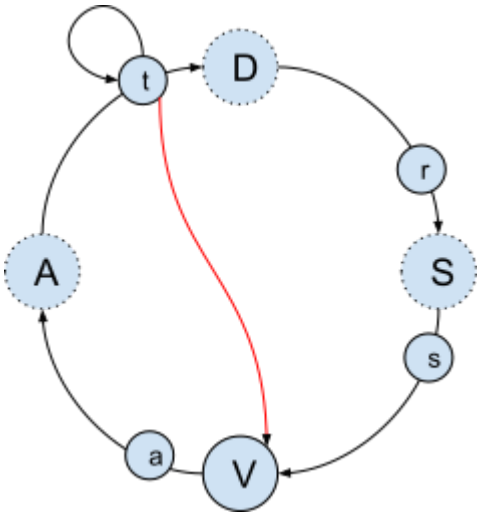
```
const myAction = (payload) => (dispatch) =>
    MyAPI.someCall(payload).then(rep =>
        dispatch({
            type: ActionTypes.SOME_ACTION,
            payload: rep.body,
        }))
```

redux-thunk (warning)



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// Don't return a Promise from an action creator.
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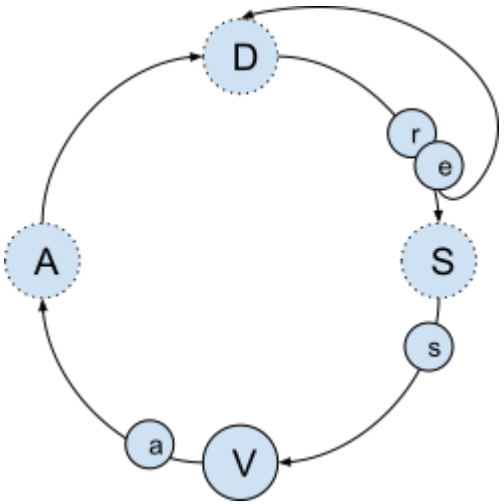
redux-observable



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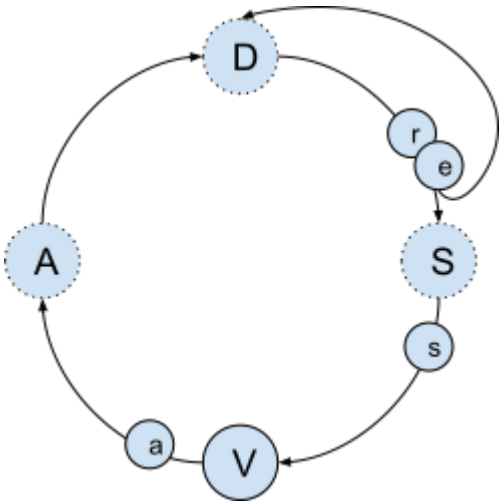

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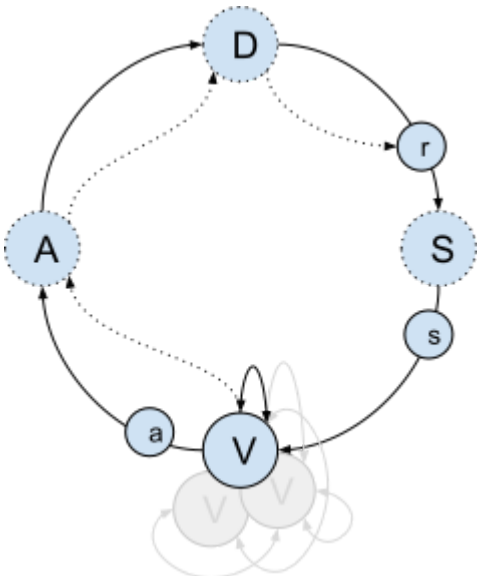
- Reducers and Epics are peers.
- Both are appropriate for business logic. (Be consistent.)

Component state



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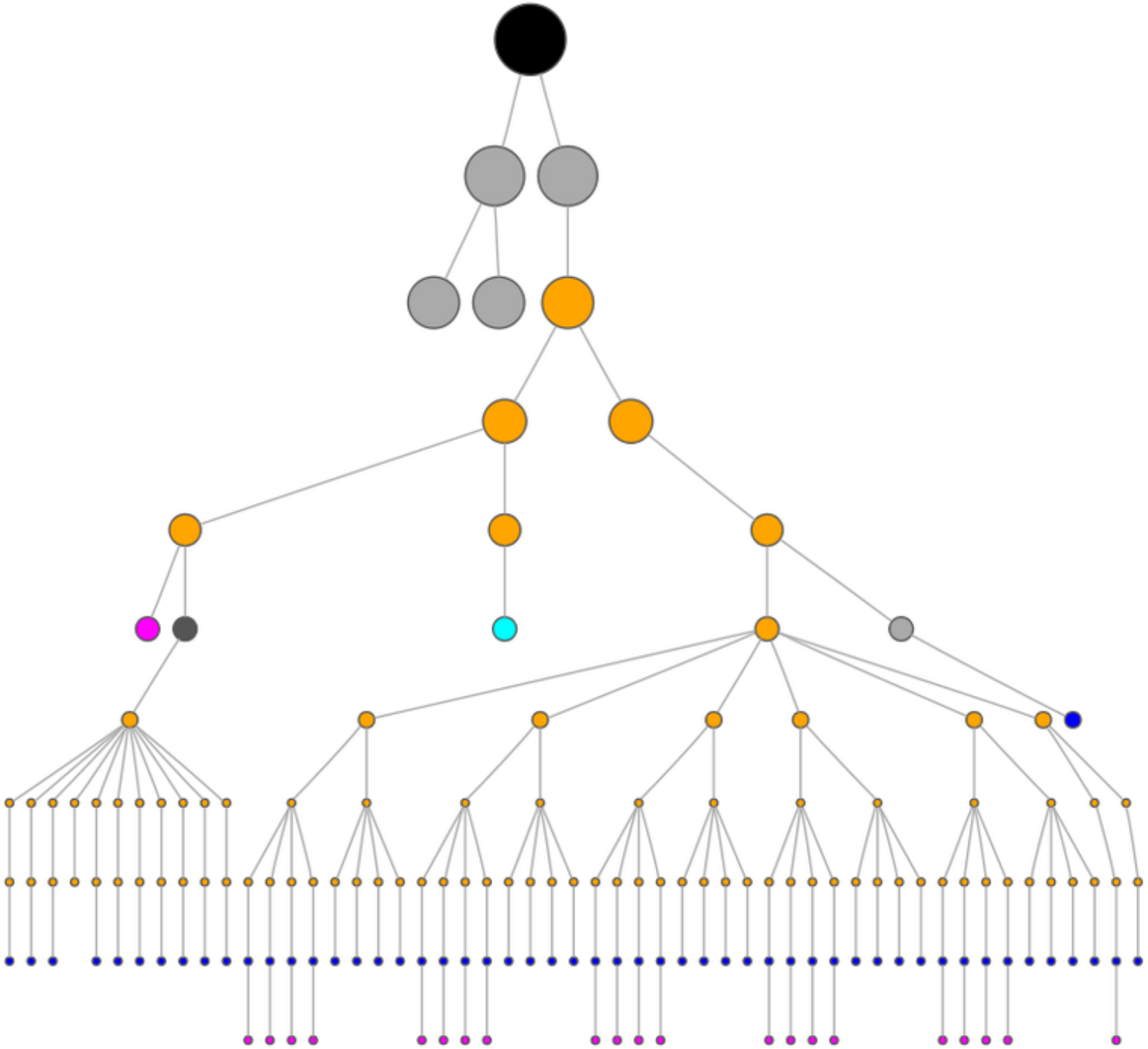

Redux

Redux features

Redux

A Predictable State Container for JS Apps

Get Started

Predictable

Redux helps you write applications that **behave consistently**, run in different environments (client, server, and native), and are **easy to test**.

Centralized

Centralizing your application's state and logic enables powerful capabilities like **undo/redo**, **state persistence**, and much more.

Debuggable

The Redux DevTools make it easy to trace **when, where, why, and how your application's state changed**. Redux's architecture lets you log changes, use **"time-travel debugging"**, and even send complete error reports to a server.

Flexible

Redux **works with any UI layer**, and has **a large ecosystem of addons** to fit your needs.

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- ...often overlooked: Async support (via middleware).

"You might not need Redux"

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vs

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  No: Redux has scaling considerations too...as does all of software.

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  Possible:

  - *Purposefully* model component state with the reducer pattern.
  - Rely on external data via actions.
  - *Never* use external data (like from other Hooks).
    - This means no API calls (the `useEffect` execution semantics are too different).

  Otherwise a refactoring nightmare.

Redux isn't needed anymore

- "Just use context."
- "Just use Hooks."
- "useState is so much simpler."
- "useReducer is the same thing."
- "Context + useReducer is Redux."

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return (
  <LocalStyle theme={lightTheme}>
    <ErrorBoundary fallback="Something went very wrong, try refreshing?">
      <LiveAnnouncer>
        <Store initialStore={initialStore}>
          <OptimizelyWrapper>
            <NotificationsProvider>
              <QueryClientProvider client={queryClient}>
                <APIContextProvider>
                  <APICacheProvider initial={apiCache}>
                    <SubscriptionProvider>
                      <FlaggedThemeProvider>
                        <HelmetProvider context={helmetContext}>
                          <OfflineNotice />
                          {children}
                        </HelmetProvider>
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Hooks

- Nice, succinct API.
- Entirely dependent on very specific React internal behavior.
- Still new and unproven for long-term maintenance. Beware the hype.

`useState`

- No principled data management.
- Usually said by developers who started with React after hooks were introduced and who don't have experience with class component patterns for wrangling component state.

`useReducer`

- The reducer pattern applied to component state.
- Good for organizing data in a single component.
- Possible to reuse across multiple components (with work).
- No side-loading data.
- Async possible via action creator wrappers around `dispatch` (thunks-like usage).

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- Worth investigating?

Why do *we* use Redux?

- Popular Flux implementation.
- Well documented.
- Lots of support options.

Why is popularity waning?

- Boilerplate.
- Hooks hype (component state revival).
- Missing features & downsides.

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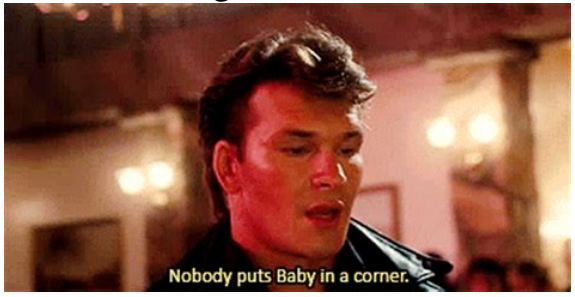

Deconstructing Redux

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- Reducing/removing "magic" helps you make informed decisions.
- If you don't understand the 'why' then you end up following the patterns regardless if they're helpful or not in a given situation.

`map`, `filter`, `reduce`

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const oldArray = [0, 1, 2, 3, 4]
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const evensArray = oldArray.filter(x => x % 2 === 0)
// [ 0, 2, 4 ]
```

`map`, `filter`, `reduce`

```
const oldArray = [0, 1, 2, 3, 4]
```

```
const newArray = oldArray.map(x => x + 1)
// [ 1, 2, 3, 4, 5 ]
```

```
const evensArray = oldArray.filter(x => x % 2 === 0)
// [ 0, 2, 4 ]
```

```
const totalCount = oldArray.reduce((acc, cur) => {
    acc += cur
    return acc
}, 0)
// 10
```

The 'reducer' pattern

```
const oldState = {count: 0}

const actions = [
    {type: 'INC', payload: 1},
    {type: 'DEC', payload: -1},
    {type: 'INC', payload: 1},
    {type: 'INC', payload: 1},
]

const newState = actions.reduce((acc, cur) => {
    return {...acc, count: acc.count + cur.payload }
}, oldState);

// { count: 2 }
```

```
await import('https://unpkg.com/redux@4.1.2/dist/redux.js')

// Actions
const A = { INC: 'INC', DEC: 'DEC' }

// Store
const defaultState = {count: 0}
const myReducer = (state = defaultState, action) => {
  switch (action.type) {
    case A.INC: return { ...state, count: state.count + 1 }
    case A.DEC: return { ...state, count: state.count - 1 }
    default: return state
  }
}
const Store = Redux.createStore(myReducer)

// View
const myView = (props) => `<div>My Counter: ${props.count}.<br>
  <button onclick="((ev) =>
    Store.dispatch({ type: A.INC }))(event)">+</button>
  <button onclick="((ev) =>
    Store.dispatch({ type: A.DEC }))(event)">-</button>
</div>`

// App
document.body.innerHTML = myView(Store.getState())
Store.subscribe(() =>
  document.body.innerHTML = myView(Store.getState()))
```

react-redux (classes)

```
const connect = (config) => (MyComponent) => {
    class MyWrapper extends React.Component {
        componentDidMount() {
            this.sub = Store.subscribe(() => {
                this.latestState = Store.getState()
                this.forceUpdate()
            })
        }

        componentWillUnmount() {
            this.sub.unsubscribe()
        }

        render() {
            return React.createElement(MyComponent,
                this.latestState)
        }
    }
}
```

react-redux (hooks)

```
const useSelector = fn => {
  var latestState = useRef(fn(Store.getState()))
  var [_, forceRender] = useState(0)

  useEffect(() => {
    const sub = Store.subscribe(() => {
      latestState.current = fn(Store.getState())
      forceRender((c) => (c + 1) % 10)
    }

    return () => sub.unsubscribe()
  }, [])

  return latestState.current
}
```

```
const createStore = (reducer, initialState) => {
  let _state = initialState
  let _subscribers = []

  const ret = {
    getState: () => _state,
    dispatch: (action) => {
      const newState = [action].reduce(reducer, _state)
      console.log(action.type, {action, oldState: _state, newState})
      if (newState !== _state) {
        _state = newState
        _subscribers.forEach((cb) => cb())
      }
    },
    subscribe: (cb) => {
      _subscribers.push(cb)
      return {unsubscribe: () => {
        const idx = _subscribers.indexOf(cb)
        if (idx !== -1) { _subscribers.splice(idx, 1) }
      }}
    },
  }

  // Dispatch nothing to seed initial state from reducer.
  ret.dispatch({})
  return ret
}
```

`combineReducers`

```
const foo = (state, action) => { /* ... */ }
const bar = (state, action) => { /* ... */ }

const rootReducer = combineReducers({foo, bar})
// {foo: {...fooStateHere}, bar: {...barStateHere}}
```

Our patterns

(Collected from our four biggest & oldest codebases.)

Summary of problem patterns

Summary of problem patterns

```
commit d26c0a4f1928c4be10ce426a952e786d7ab41bc7

    Add Redux boilerplate for addition Foo
---
 src/redux/actions/Foo.js                  | 14 +++++++++
 src/redux/epics/Foo.js                    | 38 ++++++++++++++
 src/redux/epics/__tests__/Foo-test.js     | 48 +++++++++++++++++++
 src/redux/epics/index.js                  |  4 +++
 src/redux/reducers/Foo.js                 |  2 ++
 5 files changed, 104 insertions(+)
```

Redux isn't fun to use.

Who should we blame?

Redux isn't fun to use.

Who should we blame?

- Organic growth.
- Shifting patterns and libraries.
- Big codebases.
- Care not to disrupt tens of millions of users.
- Deadlines.
- Customer demands.

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- Organic growth.
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- Nobody. These are Redux-community standard patterns.

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- Customer demands.
- Nobody. These are Redux-community standard patterns.
- Sam.

Proposals

Proposals

You want to transition *how much* code?

Project	JavaScript SLOC
Biggest	143,625
Important	75,736
Big	51,774
Newcomer	33,603

Pattern: action creators

```
export const ActionTypes = {
  FOO_DO_THING: 'foo/do/thing',
  FOO_LOAD_THINGS: 'foo/load/thing',
  FOO_LOAD_THINGS_SUCCESS: 'foo/load/success',
  FOO_LOAD_THINGS_ERROR: 'foo/load/error',
  // ...etc
}

export const doThing = payload => ({
  type: ActionTypes.FOO_DO_THING,
  payload,
})
export const loadThings = () => ({
  type: ActionTypes.FOO_LOAD_THINGS,
})
// ...etc

export default dispatch => ({
  doThing = payload => dispatch(doThing),
  loadThings = payload => dispatch(loadThings),
  // ...etc
})
```

Proposal: no action creators

```
export const ActionTypes = {
  FOO_DO_THING: 'FOO_DO_THING',
  FOO_LOAD_THINGS: 'FOO_LOAD_THINGS',
  FOO_LOAD_THINGS_SUCCESS: 'FOO_LOAD_THINGS_SUCCESS',
  FOO_LOAD_THINGS_ERROR: 'FOO_LOAD_THINGS_ERROR',
  // ...etc
}
```

Proposal: no action creators

```
export const ActionTypes = {
  FOO_DO_THING: 'FOO_DO_THING',
  FOO_LOAD_THINGS: 'FOO_LOAD_THINGS',
  FOO_LOAD_THINGS_SUCCESS: 'FOO_LOAD_THINGS_SUCCESS',
  FOO_LOAD_THINGS_ERROR: 'FOO_LOAD_THINGS_ERROR',
  // ...etc
}
```

...or

```
export const ActionTypes = objMirror([
  'FOO_DO_THING',
  'FOO_LOAD_THINGS',
  'FOO_LOAD_THINGS_SUCCESS',
  'FOO_LOAD_THINGS_ERROR',
])
```

Proposal: no action creators (usage #1)

```
// src/components/MyView.js

import { useDispatch } from 'react-redux'
import { ActionTypes } from 'src/redux/actions/foo.js'

export const MyView = props => {
  const dispatch = useDispatch()

  return (
    <button
      onClick={ev =>
        dispatch({
          type: ActionTypes.DO_THING,
          payload: ev.target.value,
        })
      }
    >
      Do thing!
    </button>
  )
}
```

Proposal: no action creators (usage #2)

```
// src/components/MyView.js

import { send } from 'src/redux/store'
import { ActionTypes } from 'src/redux/actions/foo.js'

export const MyView = props => {
  return (
    <button
      onClick={ev => send(ActionTypes.DO_THING, ev.target.value)}
    >
      Do thing!
    </button>
  )
}
```

Proposal: no action creators (usage #3)

```
// src/components/MyView.js

import { send } from 'utils/Redux'
import { ActionTypes } from 'src/redux/actions/foo.js'

export const MyView = props => {
  return (
    <button onClick={send(ActionTypes.DO_THING)}>
      Do thing!
    </button>
  )
}
```

Pattern: reducers via `createReducer`

```
// src/redux/reducers/foo.js

import { ActionTypes } from 'src/redux/actions/foo.js'

const doThing = (state, action) => { /* ... */ }

const thingsLoading = (state, action) => { /* ... */ }

const thingsLoaded = (state, action) => { /* ... */ }

export const myReducer = createReducer(defaultState, {
  [ActionTypes.DO_THING]: doThing,
  [ActionTypes.THINGS_LOADING]: thingsLoading,
  [ActionTypes.THINGS_LOADED]: thingsLoaded,
})
```

Pattern: unnecessary destructuring

```
import { ActionTypes } from 'src/redux/actions/foo.js'

const {
  DO_THING,
  THINGS_LOADING,
  THINGS_LOADED,
} = ActionTypes
```

Pattern: unnecessary destructuring

```
import { ActionTypes } from 'src/redux/actions/foo.js'

const {
  DO_THING,
  THINGS_LOADING,
  THINGS_LOADED,
} = ActionTypes
```

I digress:

```
const {
  foo,
  bar,
  baz,
  qux,
  quux,
  quuz,
  corge,
  grault,
  // ...etc
} = props // or state, or Redux, or whatever
```

Proposal: only destructure with purpose

- Rename variables:

```
const { foo as MyFoo } = someObj
```

- Omit values:

```
const { foo, ...everythingButFoo } = someObj
```

- Tee up local variables for object creation using shorthand properties:

```
const { foo, bar } = someObj
const newObj = { foo, bar, otherVar }
```

Proposal: only destructure with purpose

- Rename variables:

```
const { foo as MyFoo } = someObj
```

- Omit values:

```
const { foo, ...everythingButFoo } = someObj
```

- Tee up local variables for object creation using shorthand properties:

```
const { foo, bar } = someObj
const newObj = { foo, bar, otherVar }
```

- Use aliases to reduce typing (be consistent!):

```
import { ActionTypes as A } from 'src/redux/actions/foo.js'
```

Pattern: reducers via `switch`

```
import { ActionTypes } from 'src/redux/actions/foo.js'

const thingsLoadedReducer = (state, action) => { /* ... */ }

export const myReducer = (state = defaultState, action) => {
  switch (action.type) {
    case ActionTypes.DO_THING:
      return /* ... */
    case ActionTypes.THINGS_LOADING:
      return {...state, loading: true}
    case ActionTypes.THINGS_LOADED:
      return thingsLoadedReducer(state, action)
    default:
      return state
  }
}
```

Proposal: colocate action with reducer

```
const reducers = {
    [A.INC]: (state, payload) => {
        return {...state, count: state.count + 1};
    },
    [A.DEC]: (state, payload) => {
        return {...state, count: state.count - 1};
    },
};

// or
reducers = {}
reducers[A.INC] = (state, payload) => {
    return {...state, count: state.count + 1};
}
reducers[A.DEC] = (state, payload) => {
    return {...state, count: state.count - 1};
}
```

Proposal: colocate action with reducer

```
const reducers = {
    [A.INC]: (state, payload) => {
        return {...state, count: state.count + 1};
    },
    [A.DEC]: (state, payload) => {
        return {...state, count: state.count - 1};
    },
};

// or
reducers = {}
reducers[A.INC] = (state, payload) => {
    return {...state, count: state.count + 1};
}
reducers[A.DEC] = (state, payload) => {
    return {...state, count: state.count - 1};
}
```

```
const initialState = {/* ... */}
export myReducer = makeReducer(reducers, initialState)
```

Pattern: for the sake of "the pattern"

```
import { ActionTypes } from 'src/redux/actions/foo.js'

const doThing = (state, action) => {
    ...state,
    foo: action.payload,
}

const doOtherThing = (state, action) => {
    ...state,
    bar: action.payload,
}

const doYetAnotherThing = (state, action) => {
    ...state,
    bar: action.payload,
}
```

Proposal: refactor, combine, compose

```
// {type: 'FOO', payload: {foo: {foo: 'Foo!'}}}
// {type: 'BAR', payload: {bar: {bar: 'Bar!'}}}
// {type: 'BAZ', payload: {baz: {baz: 'Baz!'}}}
const passthrough = (state, action) => {
    ...state,
    ...action.payload,
}
```

Proposal: refactor, combine, compose

```
// {type: 'FOO', payload: {foo: {foo: 'Foo!'}}}
// {type: 'BAR', payload: {bar: {bar: 'Bar!'}}}
// {type: 'BAZ', payload: {baz: {baz: 'Baz!'}}}
const passthrough = (state, action) => {
    ...state,
    ...action.payload,
}
```

```
const toggleLoading = (key) => (state, action) =>
  ({ ...state, [key]: !state[key] })

const setStateFromPayload = (state, action) =>
  ({...state, ...action.payload })

const reducers = {
    [A.LOADING]: toggleLoading('loading'),
    [A.LOADED]: composeReducers(
      toggleLoading('loading'),
      setStateFromPayload,
    ),
}
```

Pattern: same-y epics

```
export const someLoadEpic = (actions$, _, { theLoadAPIFn }) =>
  actions$.pipe(
    ofType(ActionTypes.LOAD_THING),
    switchMap(() =>
      theLoadAPIFn().pipe(
        map(rep => {
          return {
            type: ActionTypes.LOAD_THING_SUCCESS,
            payload: rep.some_value,
          }
        }),
        catchError(err => {
          return of({
            type: ActionTypes.LOAD_THING_ERROR,
            payload: err,
          })
        }),
      ),
    ),
  )
```

Proposal: `toType` operator

```
export const someLoadEpic = (actions$, _, { theLoadAPIFn }) =>
  actions$.pipe(
    ofType(ActionTypes.LOAD_THING),
    switchMap(() =>
      theLoadAPIFn().pipe(
        toType(
          ActionTypes.LOAD_THING_SUCCESS,
          ActionTypes.LOAD_THING_ERROR,
          // Optional:
          (rep) => ({ someValue: rep.some_value }),
        )
      ),
    ),
  )
```

Proposal: `toType` operator (alt)

```
epics = {}

epics[A.LOAD_THING] = (actions$, _, { theLoadAPIFn }) =>
  actions$.pipe(
    switchMap(() =>
      theLoadAPIFn().pipe(
        toType(
          ActionTypes.LOAD_THING_SUCCESS,
          ActionTypes.LOAD_THING_ERROR,
          // Optional:
          (rep) => ({ someValue: rep.some_value }),
        )
      ),
    ),
  )

export myEpic = makeEpic(epics)
```

Pattern: manual import/export list

```
import { foo, bar, baz } from 'src/redux/epics/Foo'
import { qux, quux, quz } from 'src/redux/epics/Qux'

export const rootEpic = combineEpics(
  foo,
  bar,
  baz,
  qux,
  quux,
  quz,
  // ...etc
)
```

Proposal: wildcard epic imports

```
import * as FooEpics from 'src/redux/epics/Foo'
import * as QuxEpics from 'src/redux/epics/Qux'

export const rootEpic = combineEpics(
  ...Object.values(FooEpics),
  ...Object.values(QuxEpics),
)
```

Pattern: same-y epic tests

```
it('load thing successfully', () => {
  const ctx = { loadThing: () => of('SUCCESS') }

  expectRx.toMatchObject.run(({ hot, expectObservable }) => {
    const input$ = hot('a', { a: actions.loadThing() })

    expectObservable(epics.loadThing(input$, null, ctx)).toBe('a', {
      a: { type: ActionTypes.LOAD_THING_SUCCESS },
    })
  })
})
it('load thing unsuccessfully', () => {
  const ctx = { loadThing: () => throwError('FAIL') }

  expectRx.toMatchObject.run(({ hot, expectObservable }) => {
    const input$ = hot('a', { a: actions.loadThing() })

    expectObservable(epics.loadThing(input$, null, ctx)).toBe('a', {
      a: { type: ActionTypes.LOAD_THING_ERROR },
    })
  })
})
```

Proposal: test generator for simple epics

```
describe('some module tests', () => {
  genTestToType('load the thing',
    A.LOAD_THING,
    A.LOAD_THING_SUCCESS,
    A.LOAD_THING_ERROR,
    epics.loadThing,
    [ajaxCallFoo, ajaxCallBar],
  )
})
```

Summary of proposals

- Remove action creators (entirely).
- Use `dispatch()` in views -- or `send()` helper.
- Associate a reducer function directly with action constant.
- Treat reducer functions like functions, not pattern.
- Avoid unnecessary destructuring.
- Export reducer/epic to automatically combine it.

Summary of proposals

- Remove action creators (entirely).
- Use `dispatch()` in views -- or `send()` helper.
- Associate a reducer function directly with action constant.
- Treat reducer functions like functions, not pattern.
- Avoid unnecessary destructuring.
- Export reducer/epic to automatically combine it.
- What did I miss?