Startel

Angular Advanced
State management and `@ngrx/store`

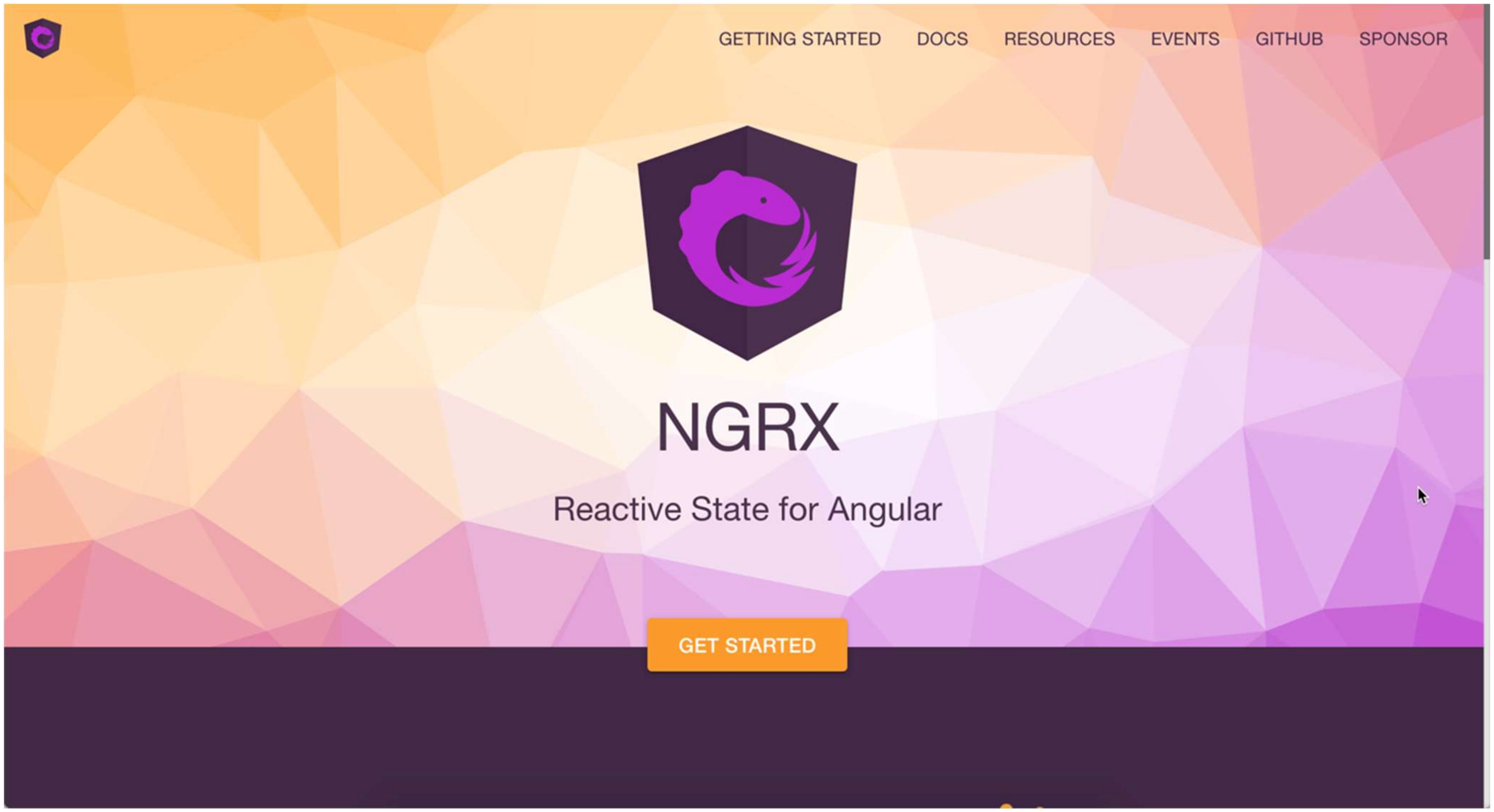
Peter Kassenaar
info@kassenaar.com

What is State Management?

- Various design patterns, used for managing *state* (data in its broadest sense!) in your application.
- Multiple solutions possible – depends on application & framework

Redux

https://ngrx.io/



What is ngrx?

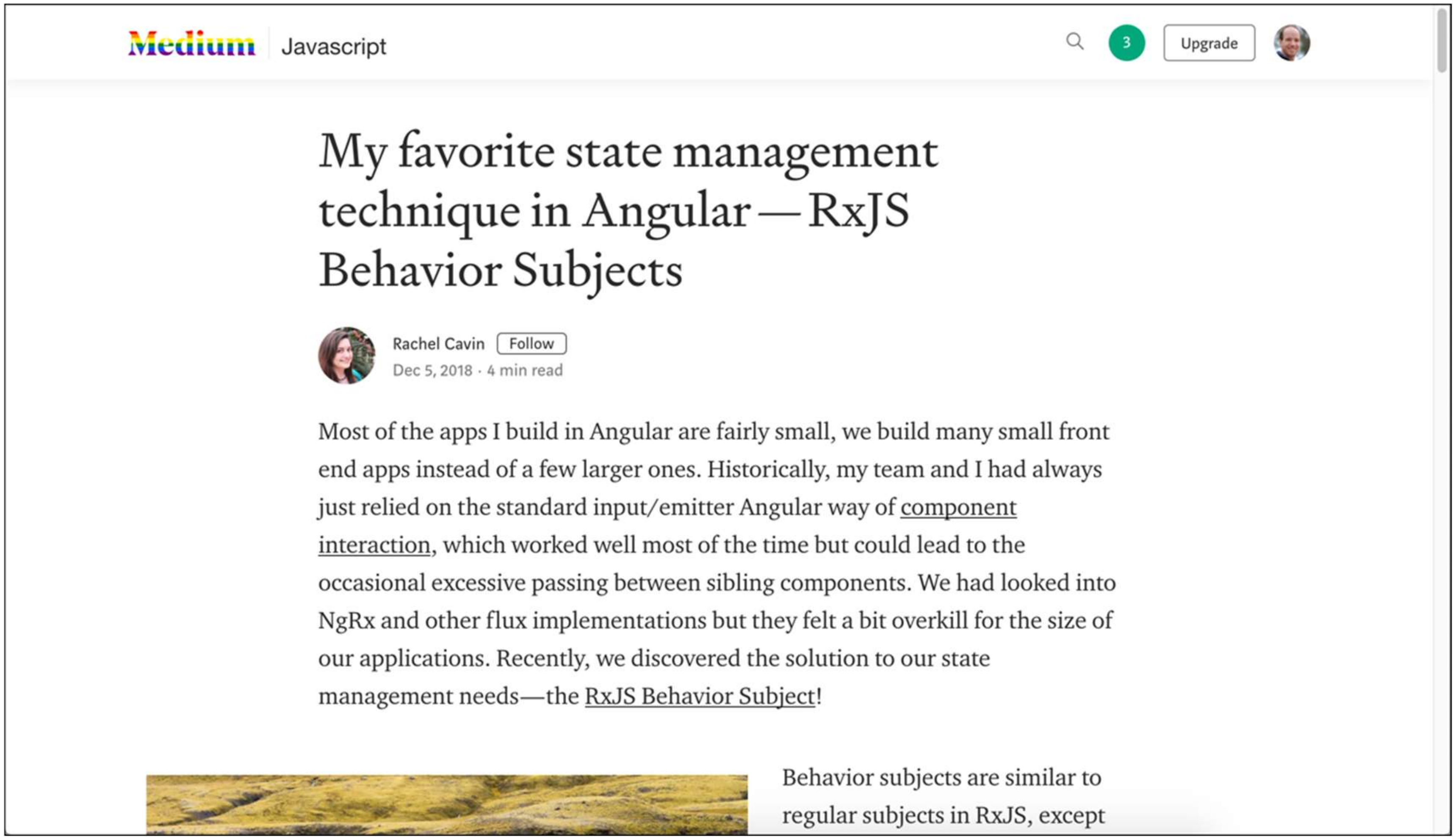
"Ngrx provides reactive state management for Angular apps inspired by Redux"

@ngrx/store – 3 generations

- Generation #1 – Angular 2
  - Creator: Rob Wormald
  - Simple implementation, (almost) all hand coded
- Generation #2 – Angular 4-7
  - Action Creators, custom payload
  - `@Effects`
- Generation #3 – Angular 8+
  - `createAction()`, `createReducer()` and more
  - (they try to make it) less complex…
  - …if you know the principles and where to look

Maybe you don't need a store...

- https://medium.com/@rmcavin/my-favorite-state-management-technique-in-angular-rxjs-behavior-subjects-49f18daa31a7



My favorite state management technique in Angular — RxJS Behavior Subjects

Rachel Cavin Follow
Dec 5, 2018 · 4 min read

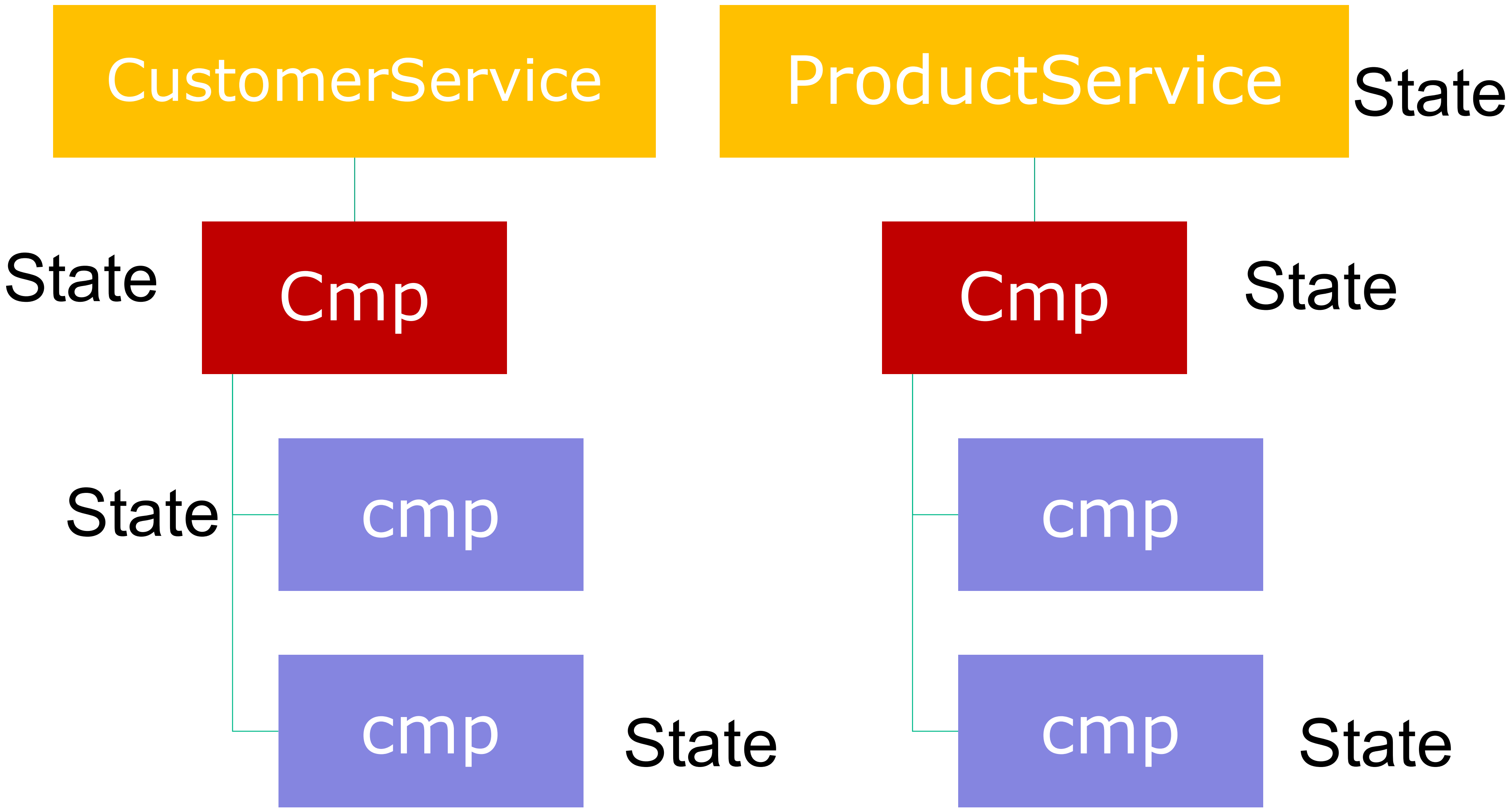
Most of the apps I build in Angular are fairly small, we build many small front end apps instead of a few larger ones. Historically, my team and I had always just relied on the standard input/emitter Angular way of component interaction, which worked well most of the time but could lead to the occasional excessive passing between sibling components. We had looked into NgRx and other flux implementations but they felt a bit overkill for the size of our applications. Recently, we discovered the solution to our state management needs—the RxJS Behavior Subject!

Behavior subjects are similar to regular subjects in RxJS, except

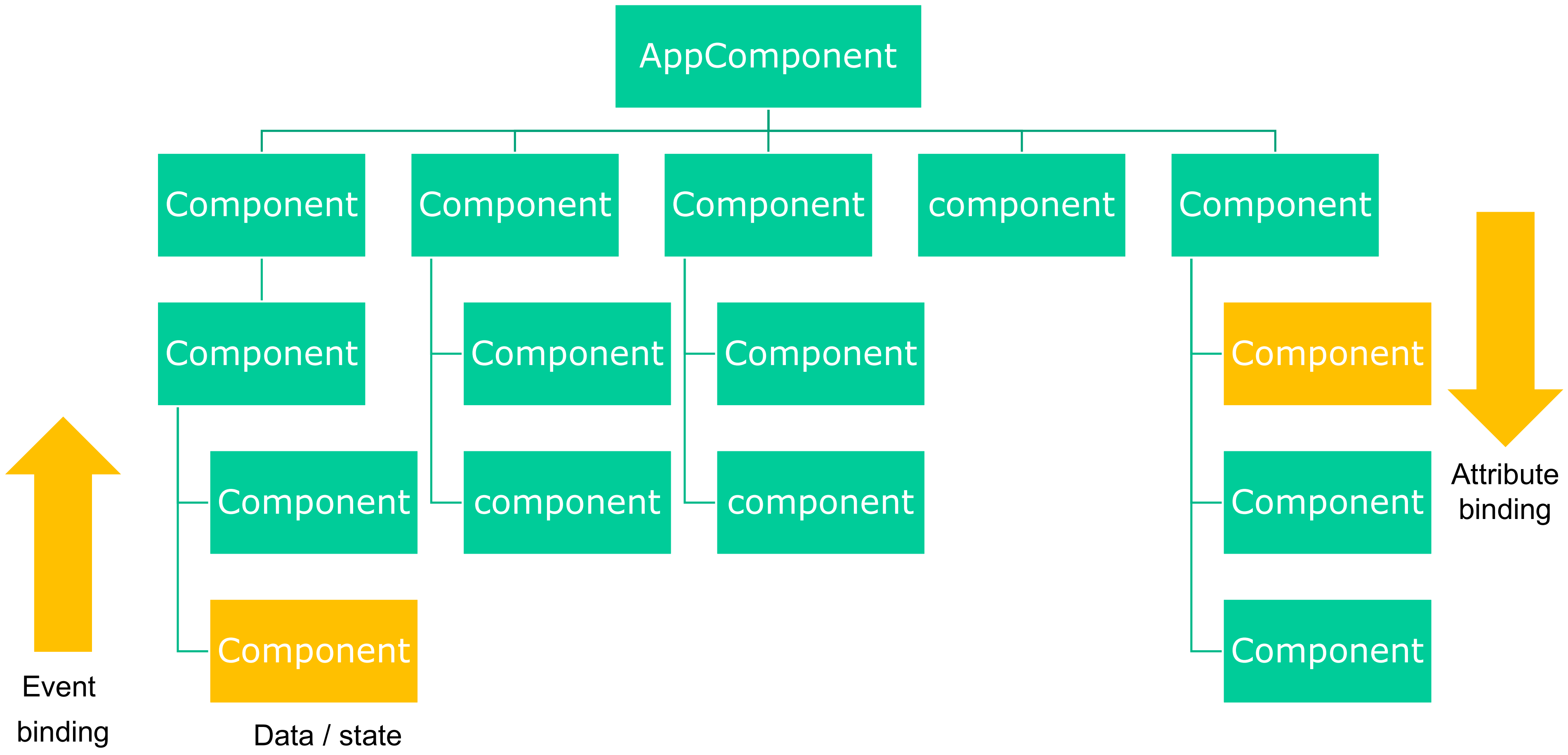
Why state management?

Why on earth would you need/want a Store ?

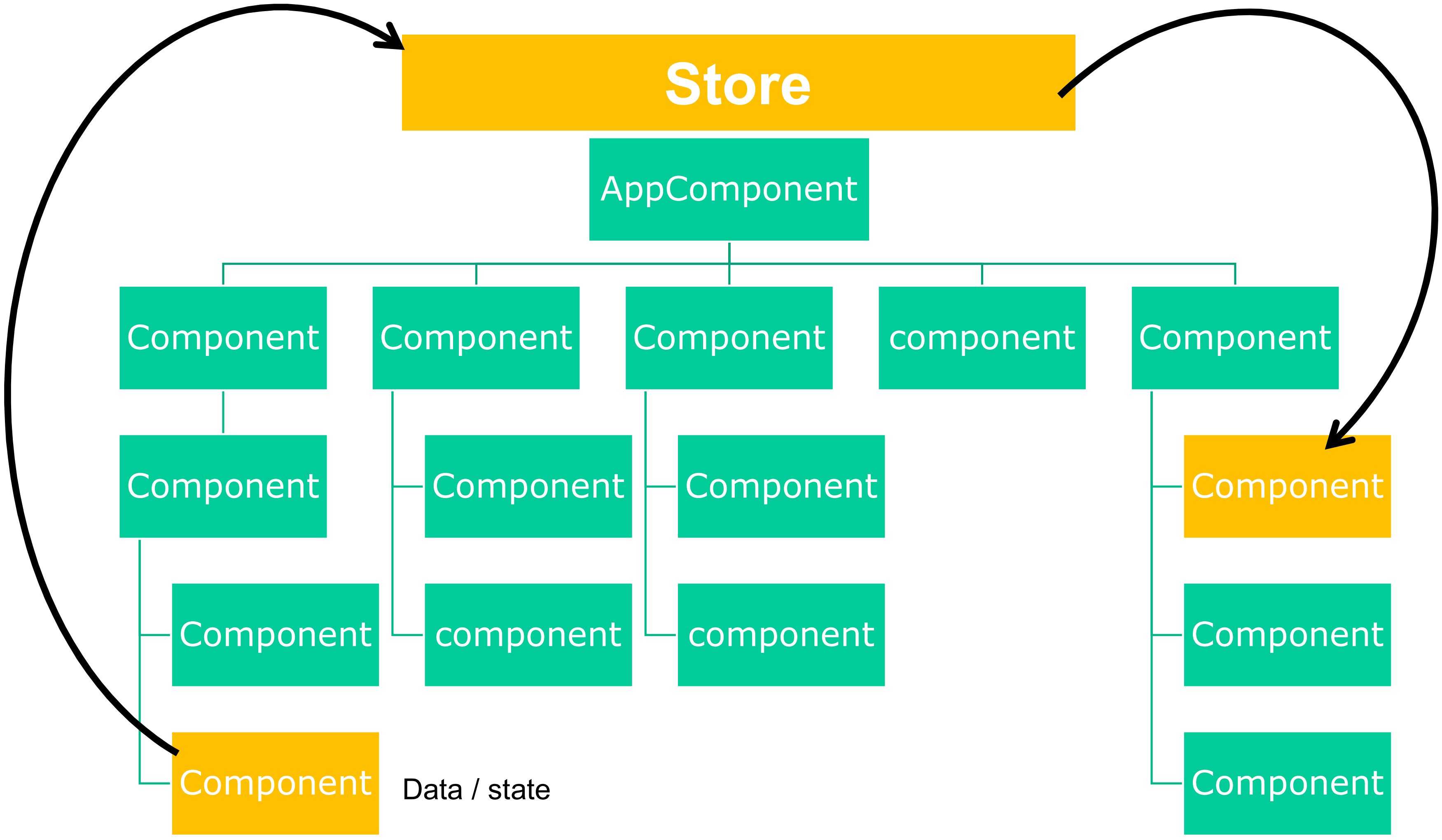
State management without a store



Data flow in complex applications



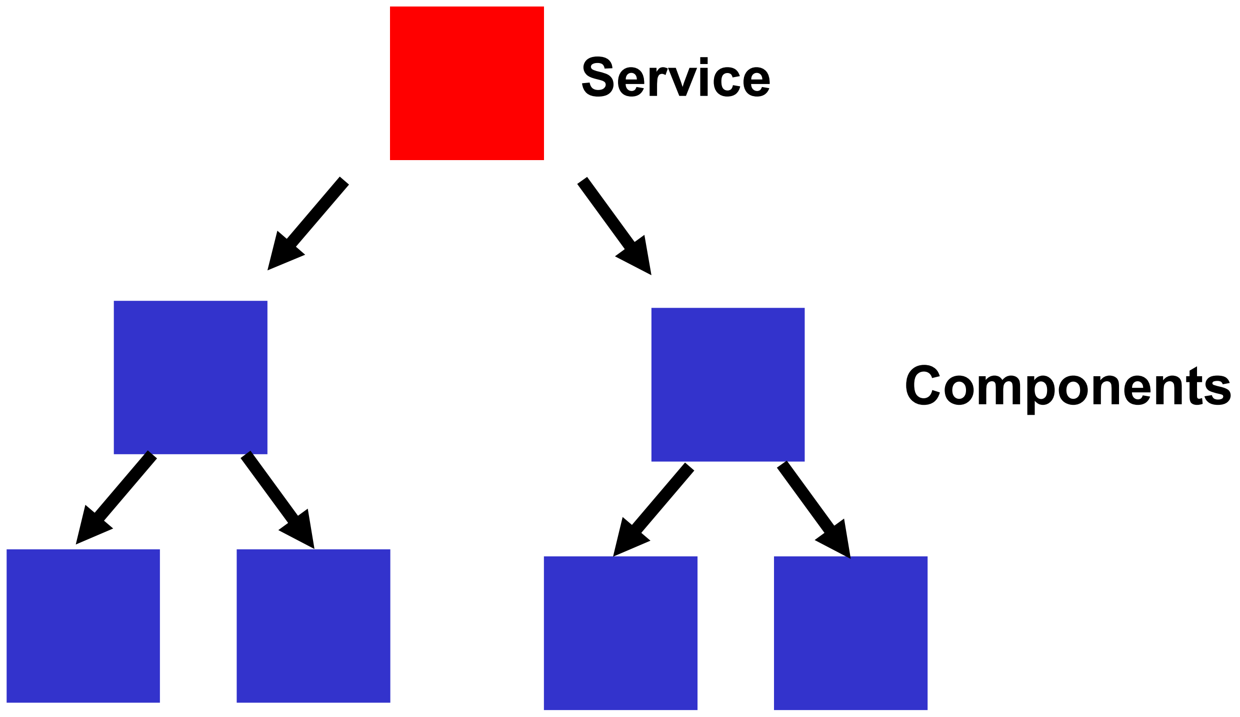
State management *with* a store



Benefits of using a store

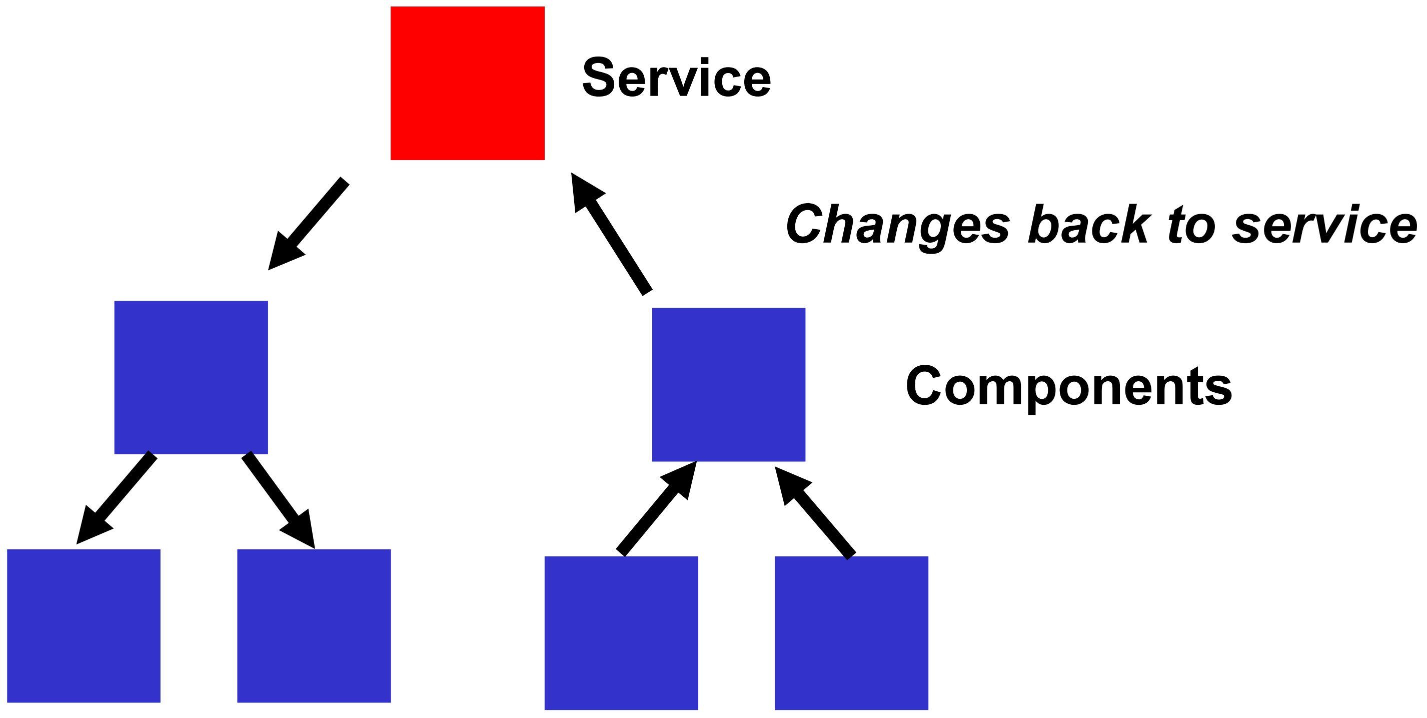
- State is only changed in a controlled way
- Component state is also driven from the store
- Based on immutable objects – b/c they are predictable
- In Angular – immutability is fast
  - Because no changes can appear, no change detection is needed!
- Developer tools available to debug and see how the store changes over time
  - “Time travelling Developer tools”

Store architecture - #2 - traditional

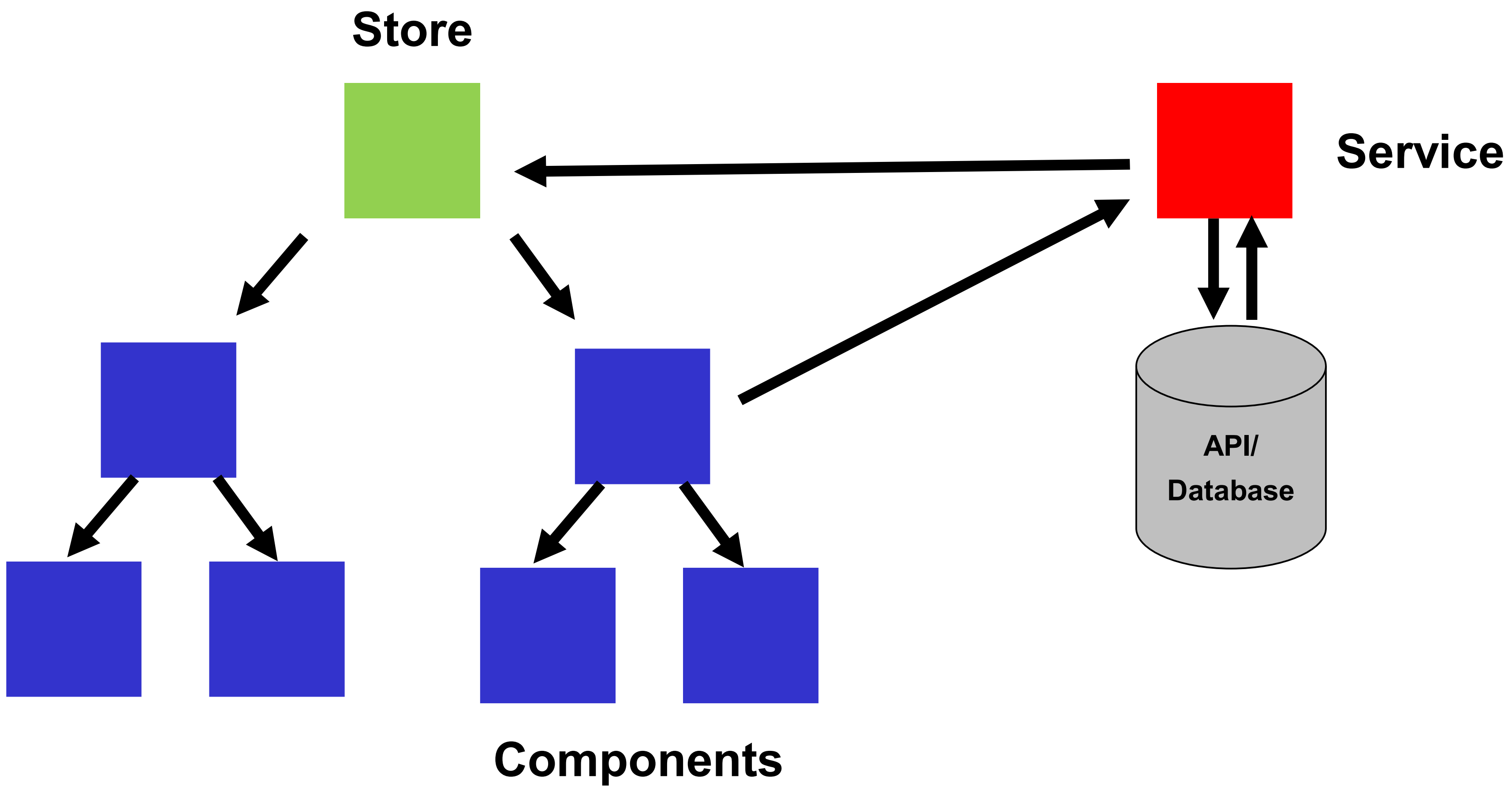


https://ultimateangular.com/angular-pro

Store architecture - #2



Store architecture - #2 with a store



Angular State Management

- Simple applications - In the component
  - `counter : number = 0;`
  - `this.counter += 1;`
- Intermediate applications - In a service
  - `counter : number = 0;`
  - `this.counter = this.counterService.increment(1);`
  - Cache `counter` value in the service

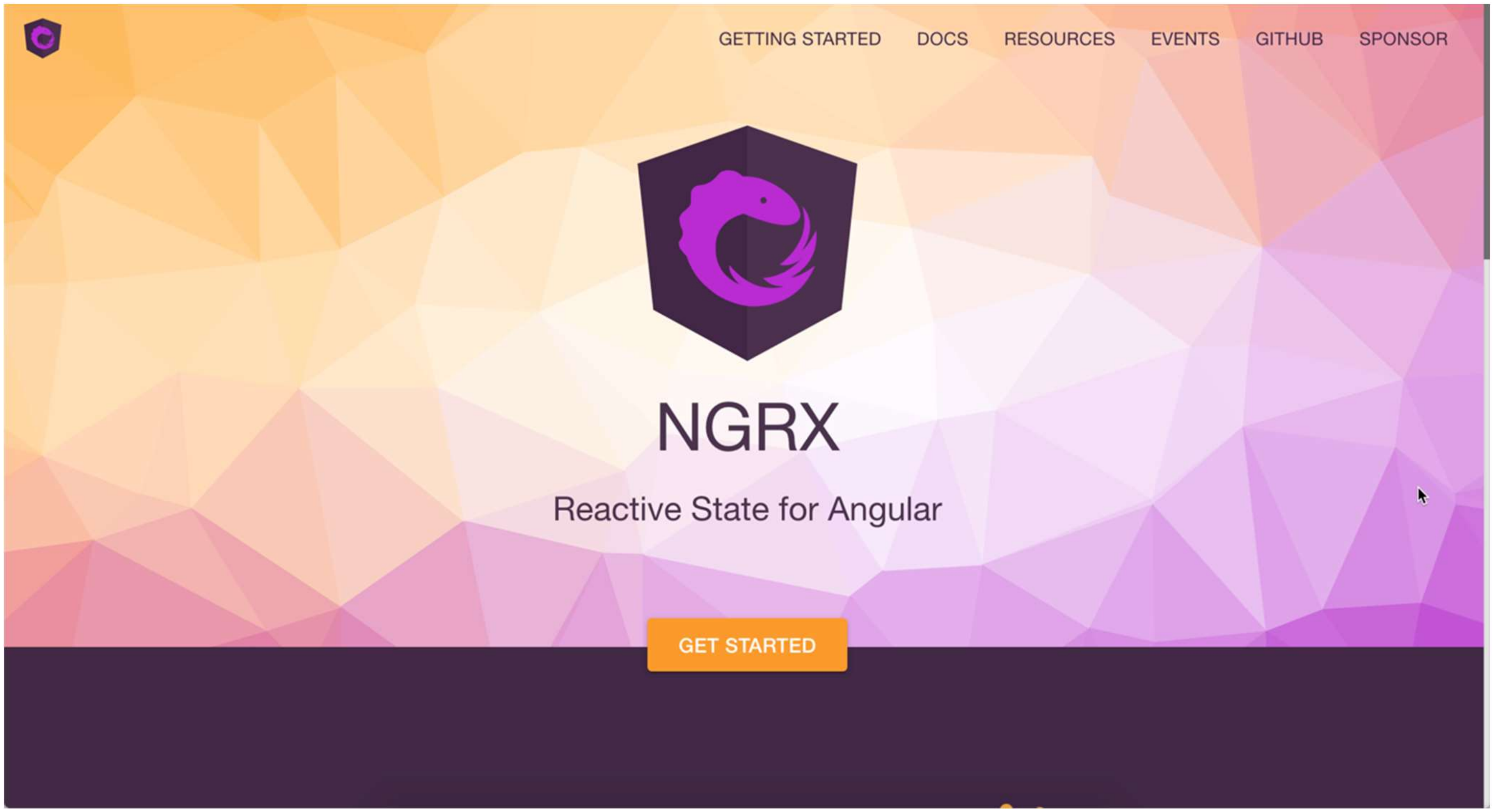
- Larger applications - In a data store – all based on observables

```
counter$: Observable<number>;

constructor(private store: Store<State>){
       this.counter$ = store.pipe(
          select('counter’)
       );
}

increment(){
       this.store.dispatch(counterIncrement());
}
```

@ngrx/store Terminology and concepts

Working with `@ngrx/store`, the officially endorsed state management library for Angular

https://ngrx.io/



Important Store terminology / concepts

Store

"The store can be seen as your client side database. But more importantly, it reflects the state of your application. You can see it as the single source of truth."

"The store holds all the data. You modify it by dispatching ***actions*** *to it."*

Actions

*“Actions are the payload that contains needed information to alter your store. Basically, an action has a **type** and a **payload** that your reducer function will take to alter the state.”*

Reducer

“Reducers are functions that know what to do with a given action and the previous state of your app.

Reducers will take the previous state from your store and apply a pure function to it. From the result of that pure function, you will have a new state. The new state is put in the store.”

Dispatcher

"Dispatchers are simply an entry point for you to dispatch your action. In Ngrx, there is a dispatch method directly on the store. I.e., you call `this.store.dispatch({…})`"

Source: https://www.toptal.com/angular-js/ngrx-angular-reaction-application

Reducers, Store and Components - The complete picture

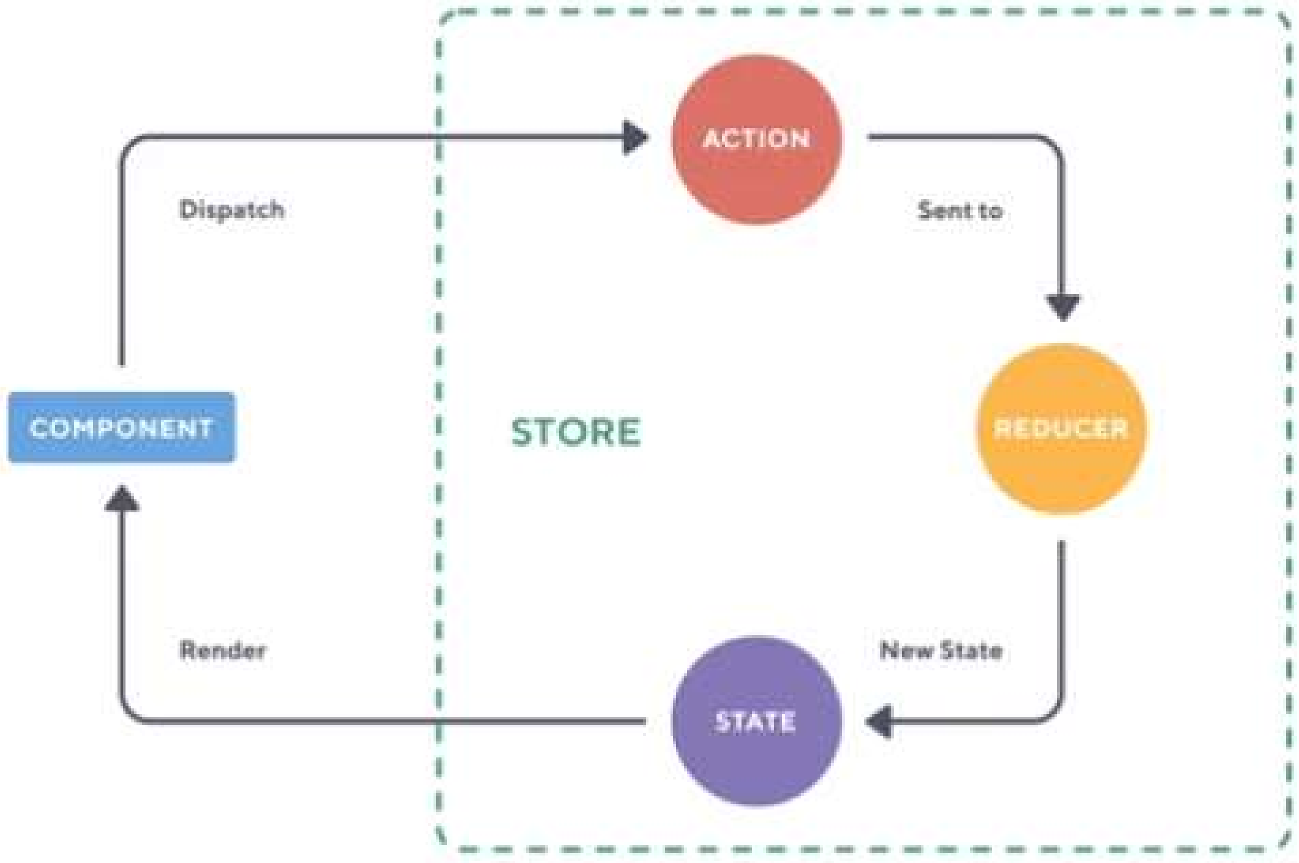
The **Component** first dispatches an Action. When the **Reducer** gets the Action, it will update the state(s) in the **Store**.

The Store has been injected to the Component, so the View will update based on the store state change (it is `subscribed`).

https://hongbo-miao.gitbooks.io/angular2-server/content/part4/add-ngrx-store.html

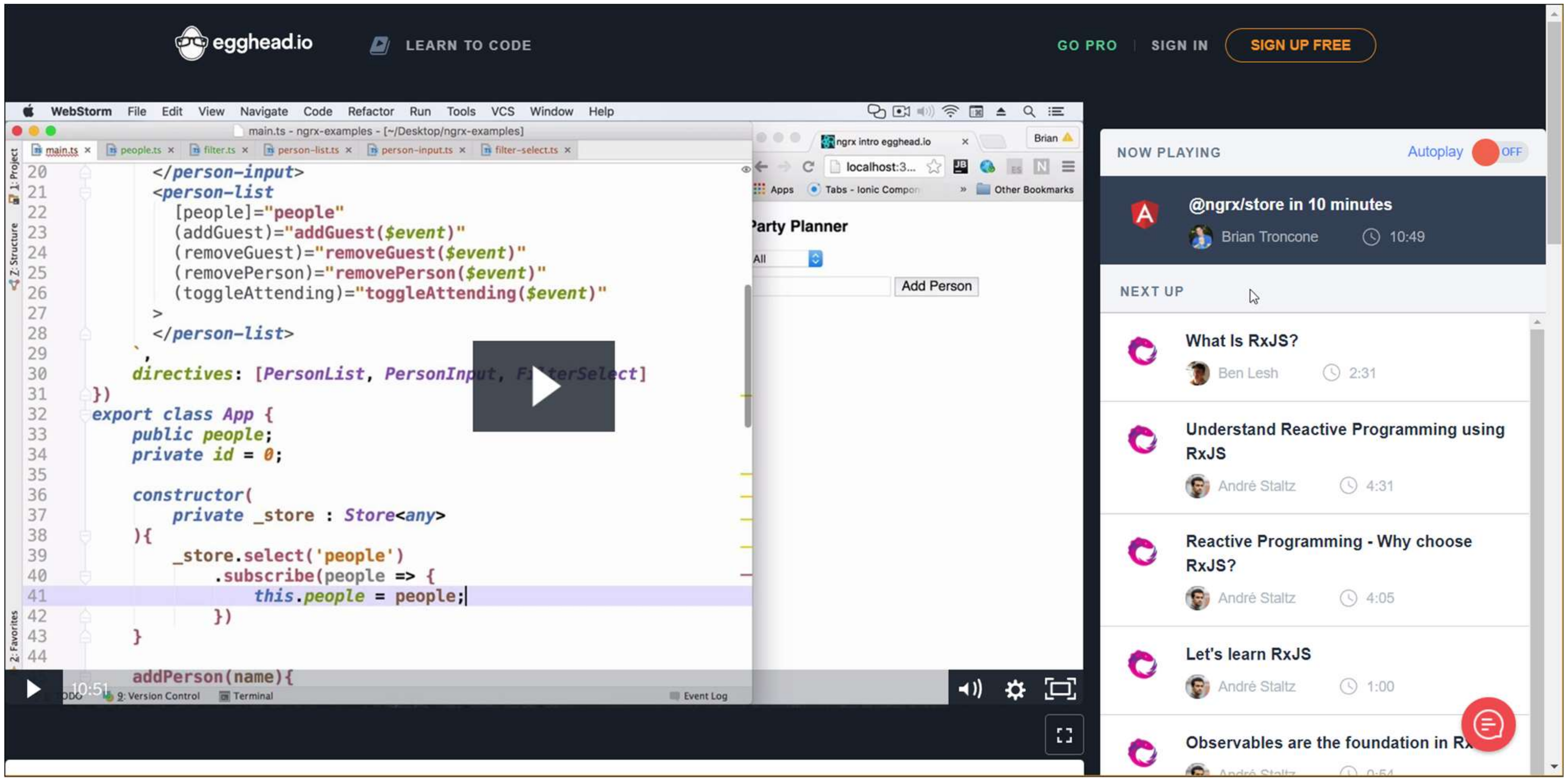
REDUX ARCHITECTURE

One-way dataflow



https://platform.ultimateangular.com/courses/ngrx-store-effects/lectures/3788532

Store concepts in a video (a little bit old now)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Party Planner
All
Add Person
NOW PLAYING
Autoplay OFF
@ngrx/store in 10 minutes
Brian Troncone 10:49
NEXT UP
What Is RxJS?
Ben Lesh 2:31
Understand Reactive Programming using RxJS
André Staltz 4:31
Reactive Programming - Why choose RxJS?
André Staltz 4:05
Let's learn RxJS
André Staltz 1:00
Observables are the foundation in RxJS
10:51

```
        </person-input>
        <person-list
          [people]="people"
          (addGuest)="addGuest($event)"
          (removeGuest)="removeGuest($event)"
          (removePerson)="removePerson($event)"
          (toggleAttending)="toggleAttending($event)"
        >
        </person-list>
      `,
      directives: [PersonList, PersonInput, FilterSelect]
})
export class App {
      public people;
      private id = 0;

      constructor(
          private _store : Store<any>
      ){
          _store.select('people')
              .subscribe(people => {
                  this.people = people;
              })
      }

      addPerson(name){
```

https://egghead.io/lessons/angular-2-ngrx-store-in-10-minutes

Setting up @ngrx/store

- Install core files & store files
- Create new project or add to existing project
- Via `npm install` or `ng add`
- Older versions have different installations!

```
npm install @ngrx/store --save
```

OR

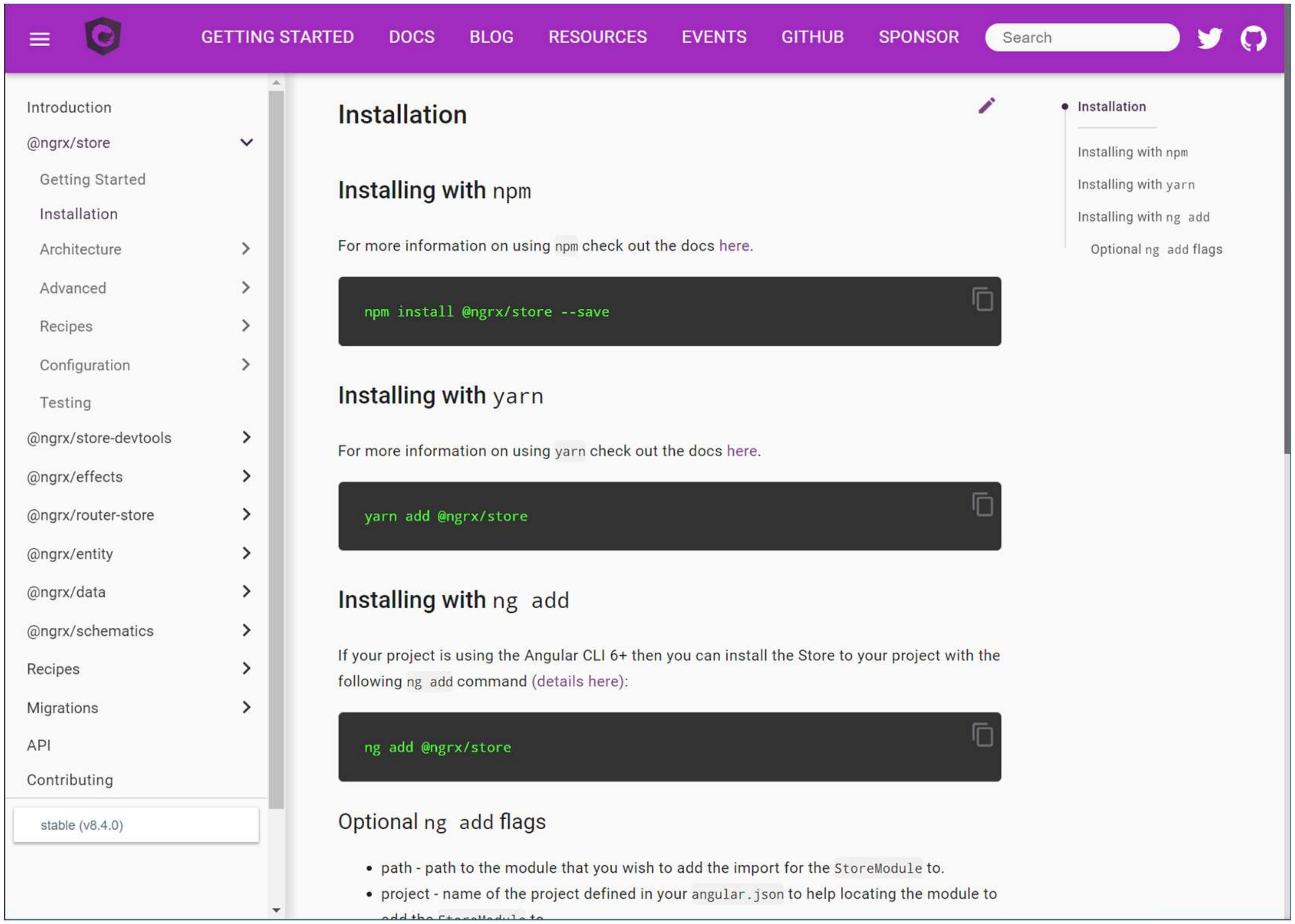
```
ng add @ngrx/store
```

Adding via Angular CLI

- **`ng add @ngrx/store`**
- Option flags, see https://ngrx.io/guide/store/install

- Adding via Angular CLI will do the following
  - Update dependencies in `package.json` and `npm install`
  - Create `src/app/reducers` folder.
  - Create `src/app/reducers/index.ts` file with an empty `State` interface, an empty reducers map, and an empty metaReducers array.
  - Update `src/app/app.module.ts`.

Installation docs



Installation

Installing with npm

For more information on using npm check out the docs here.

```
npm install @ngrx/store --save
```

Installing with yarn

For more information on using yarn check out the docs here.

```
yarn add @ngrx/store
```

Installing with ng add

If your project is using the Angular CLI 6+ then you can install the Store to your project with the following ng add command (details here):

```
ng add @ngrx/store
```

Optional ng add flags

- path - path to the module that you wish to add the import for the StoreModule to.
- project - name of the project defined in your angular.json to help locating the module to

https://ngrx.io/guide/store/install

Creating your first store

Set up a simple store – explaining all the concepts

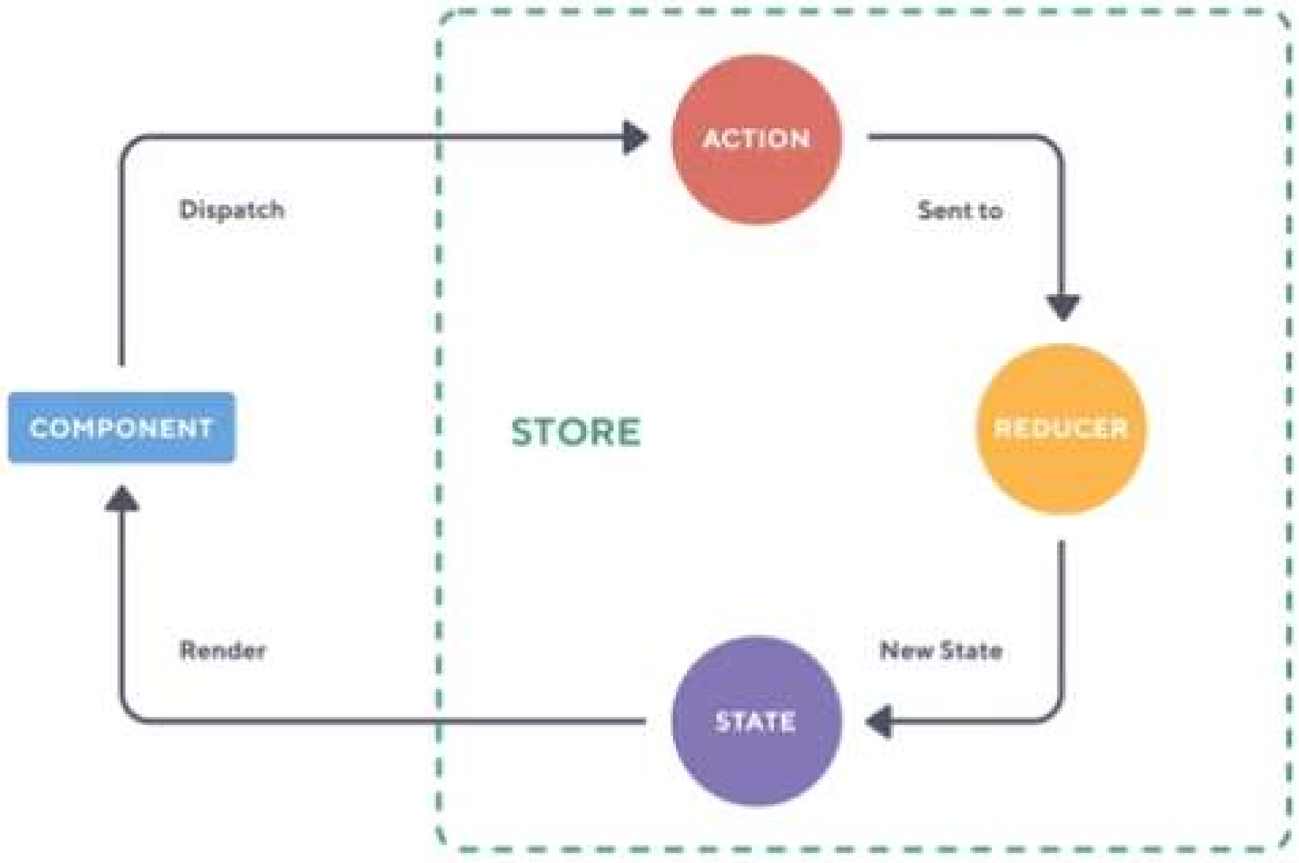
Step 0 – install core files

- We’re adding the store manually to explain all concepts

```
npm install @ngrx/store --save
```

REDUX ARCHITECTURE

One-way dataflow

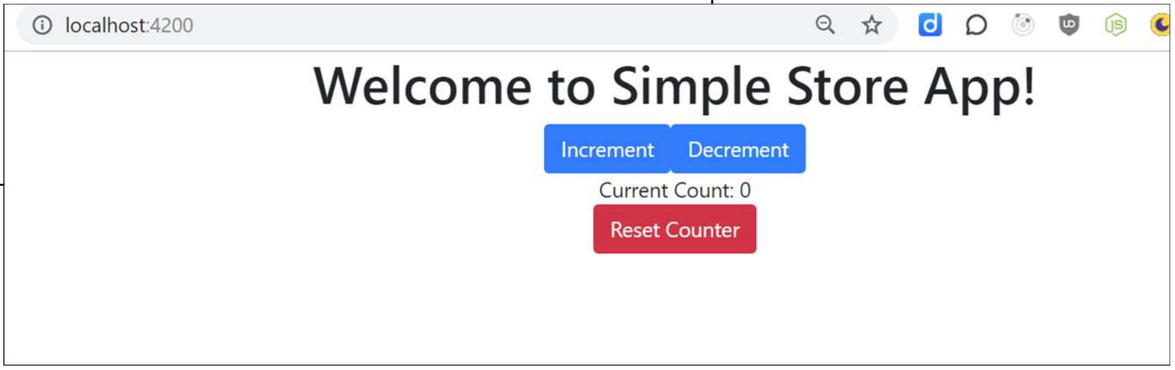


https://platform.ultimateangular.com/courses/ngrx-store-effects/lectures/3788532

Start somewhere, then work clockwise

- 1. For instance, first create a **component**

```
<!-- Simple Component, holding a counter store -->
<div>
  <h1>
    Welcome to {{ title }}!
  </h1>
  <button (click)="increment()">Increment</button>
  <button (click)="decrement()">Decrement</button>
  <div>Current Count: {{ count$ | async }}</div>

  <button class="btn btn-danger" (click)="reset()">
    Reset Counter
  </button>
</div>
```



Welcome to Simple Store App!

Current Count: 0

2. Create your actions

- Create a new file, `../store/counter.actions.ts`
- The architecture can be complex, with nested (sub) folders etc, but it doesn't matter for the internals

```
// counter.actions.ts - the Actions for our counter
import {createAction} from '@ngrx/store';

// export our actions as constants
export const increment = createAction('COUNTER - increment');
export const decrement = createAction('COUNTER - decrement');
export const reset = createAction('COUNTER - reset');
```

3. Create your reducers

- A reducer is simply an exported function with a name.
- It takes two parameters:
  - Current `state`, or otherwise empty object/initial state
  - `action`, of type `Action`
- We're going to create more complex actions, with `payload` later on
- You'll need the exported reducer function to support AOT-compiling
- https://ngrx.io/guide/store/reducers

```
// Import store stuf and available actions
import {Action, createReducer, on} from '@ngrx/store';
import {decrement, increment, reset} from './counter.actions';

// Initial state: counter=0
export const initialState = 0;

// Internal variable/function with reducers. It receives a state from
// the actual (exported) counterReducer below
const reducer = createReducer(initialState,
  on(increment, state => state + 1),
  on(decrement, state => state - 1),
  on(reset, state => 0)
);


// The exported reducer function is necessary
// as function calls are not supported by the AOT compiler.
export const counterReducer = (state = 0, action: Action) => {
  return reducer(state, action);
};
```

4. Adding store and reducer to module

- Register the state container with your application.
- Import reducers
- Use `StoreModule.forRoot()` to add it to the module
- More complex: we can have a *map* of reducers, or child modules holding their own stores
  - `metaReducer`: https://ngrx.io/guide/store/metareducers

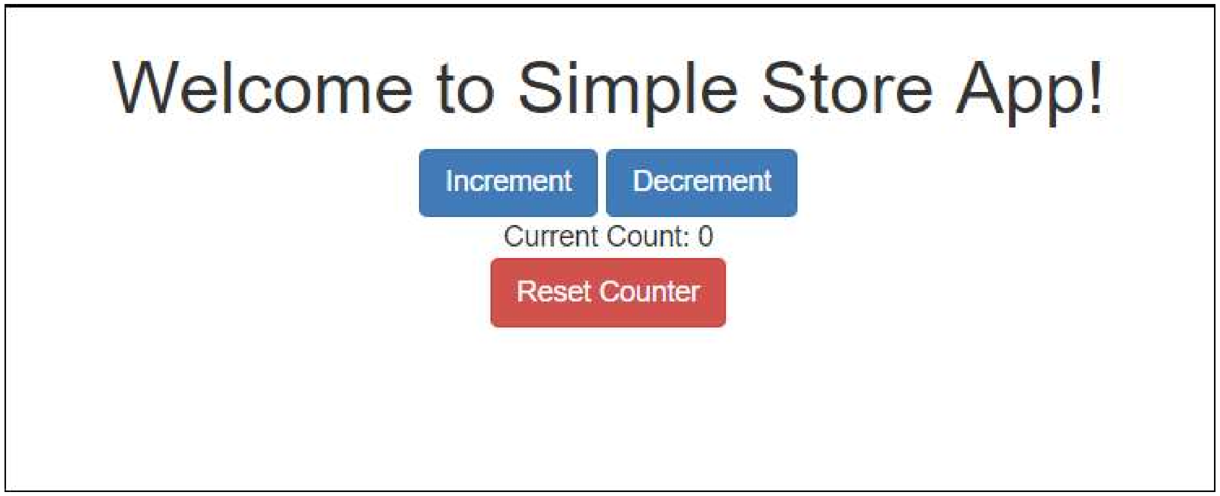
```
…
// 1. import store stuff
import {StoreModule} from '@ngrx/store';
import {counterReducer} from './store/counter.reducer';

@NgModule({
  declarations: [
    AppComponent,
    …
  ],
  imports: [
    BrowserModule,
    // 2. Add the StoreModule to the AppModule,
    // to make the store known inside the application
    StoreModule.forRoot({count: counterReducer}),
  ],
  providers: [],
  bootstrap: [AppComponent]
})
export class AppModule {
}
```

5. Using/calling the Store in component

- Import and inject the `Store` service to components
- Initialize the store with correct Type
  - More complex: create a custom `AppState` interface
- Use `store.pipe(select())` to select slice(s) of the state
- Add methods to dispatch actions
  - `increment()`
  - `decrement()`
  - `etc..`

```typescript
// app.component.ts
import {Component, OnInit} from '@angular/core';
import {Observable} from 'rxjs';
import {Store, select} from '@ngrx/store';

// Import all possible actions
import {increment, decrement, reset} from './store/counter.actions';

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html'
})
export class AppComponent implements OnInit {
  title = 'Simple Store App';
  count$: Observable<number>;

  constructor(private store: Store<{ count: number }>) {}

  ngOnInit() {
    // Select the 'count' property from the store and
    // assign it to count$ variable.
    this.count$ = this.store.pipe(
      select('count')
    );
  }

  // dispatch actions for the store. They are imported above
  increment() {
    this.store.dispatch(increment());
  }
  …
}
```

Run the app


Welcome to Simple Store App!

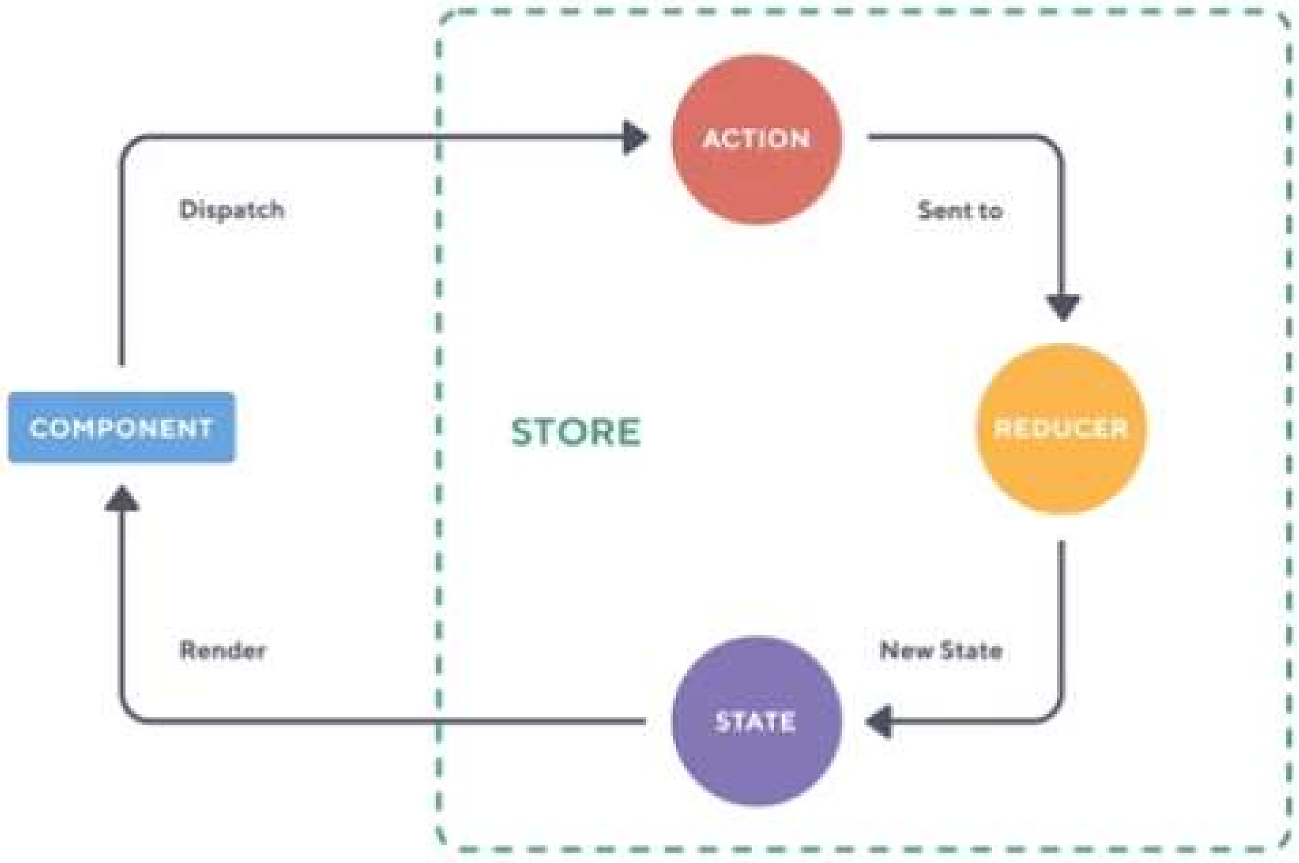
Current Count: 0

Add new components, subscribe to store,

enhance store, etc.

REDUX ARCHITECTURE

One-way dataflow



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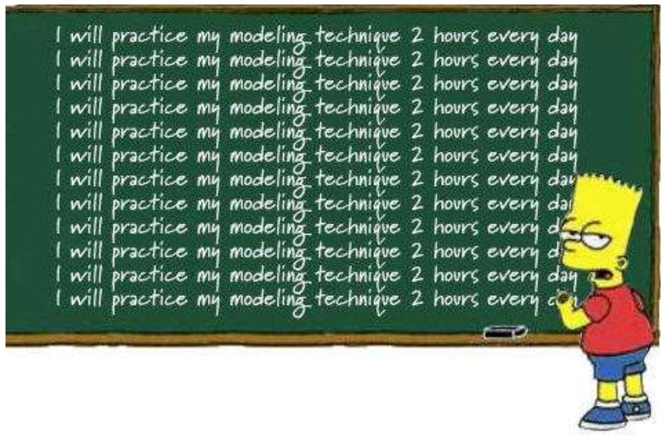
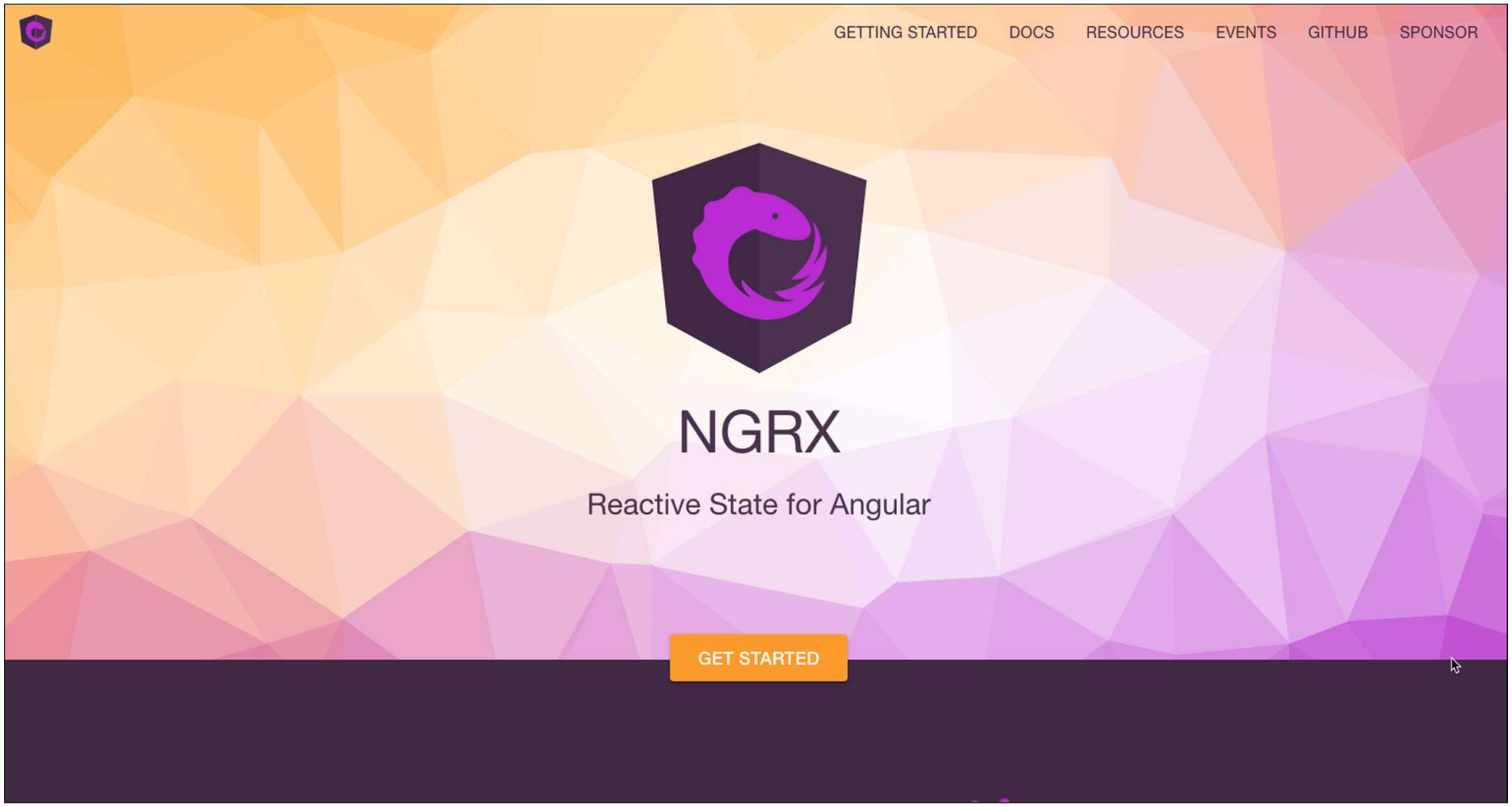
Workshop

- Create a new app, follow the previous steps to add a Store
- OR: Start from `../200-ngrx-simple-store`
- Make yourself familiar with the store concepts and data flow. Study the example code.
- Create some extra actions on the reducer. For example:
  - Add `+5` with one click
  - Subtract `-5` with one click
  - Reset counter to 0 if `counter >= 25`;

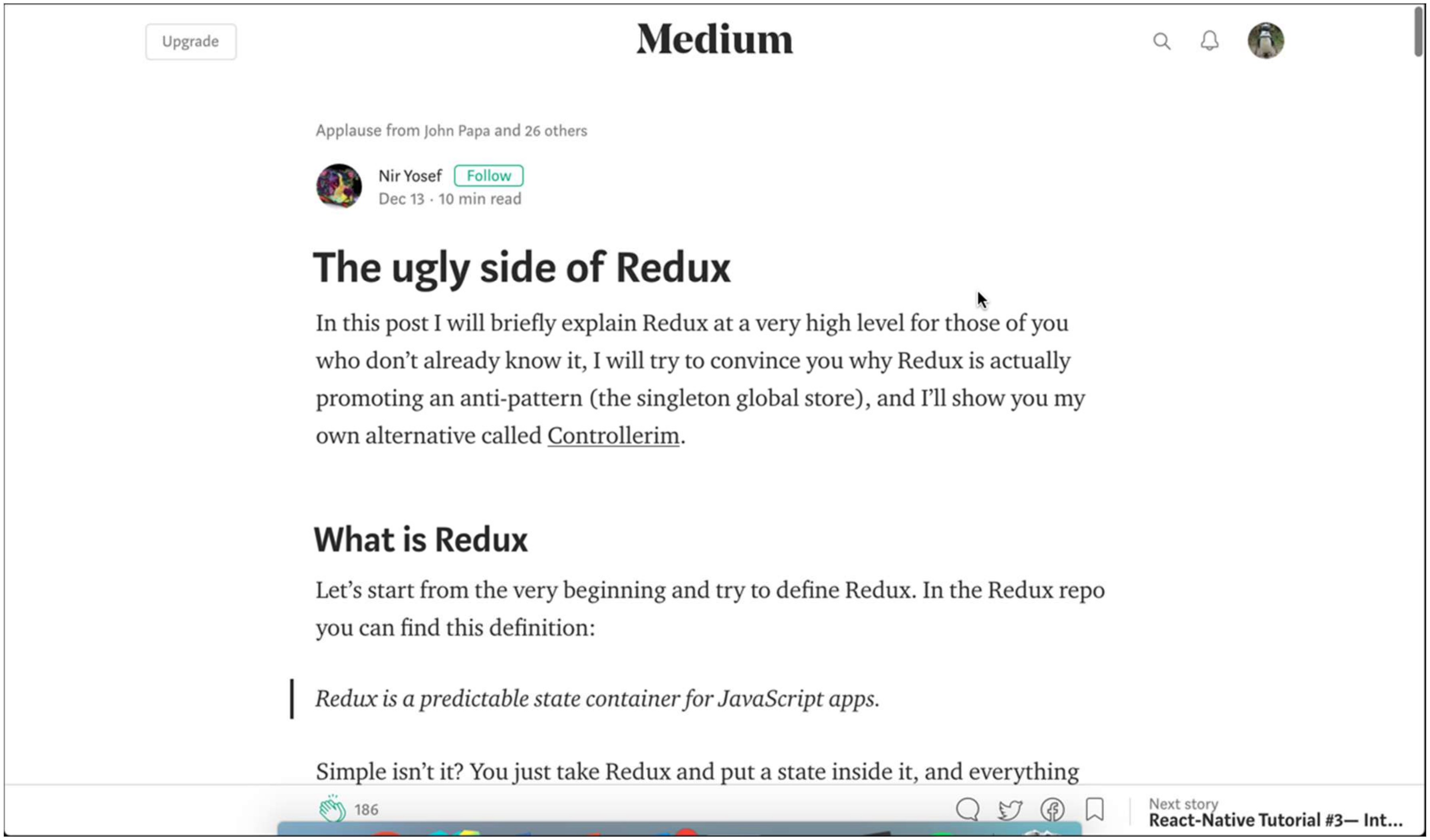


Official site



https://ngrx.io/

Think about this – "The Ugly side of Redux"


Upgrade

Medium

Applause from John Papa and 26 others

Nir Yosef Follow
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The ugly side of Redux

In this post I will briefly explain Redux at a very high level for those of you who don't already know it, I will try to convince you why Redux is actually promoting an anti-pattern (the singleton global store), and I'll show you my own alternative called Controllerim.

What is Redux

Let's start from the very beginning and try to define Redux. In the Redux repo you can find this definition:

> *Redux is a predictable state container for JavaScript apps.*

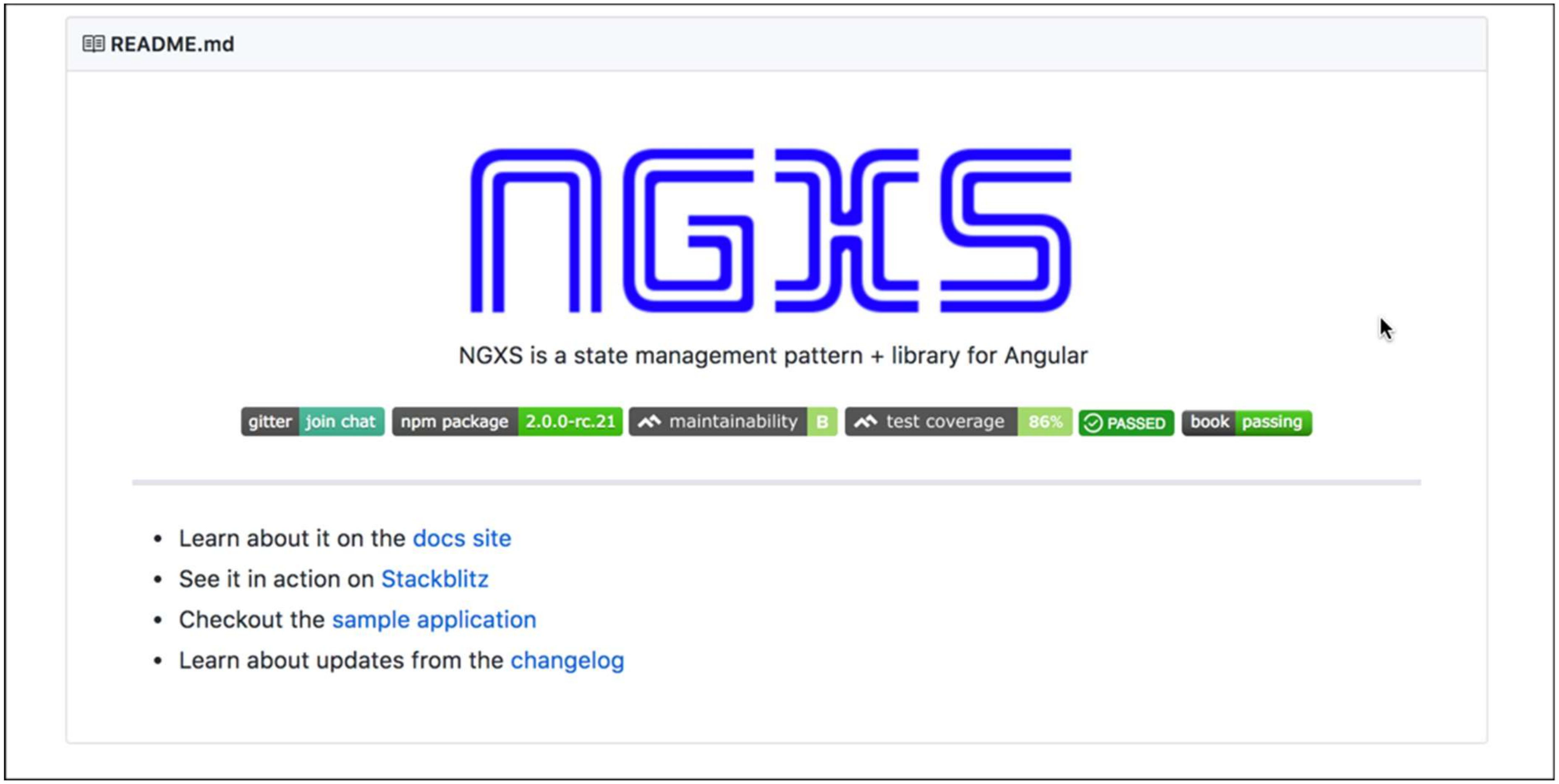
Simple isn't it? You just take Redux and put a state inside it, and everything

186

Next story
React-Native Tutorial #3— Int...

https://medium.com/@niryo/the-ugly-side-of-redux-6591fde68200

Alternative State Management solution

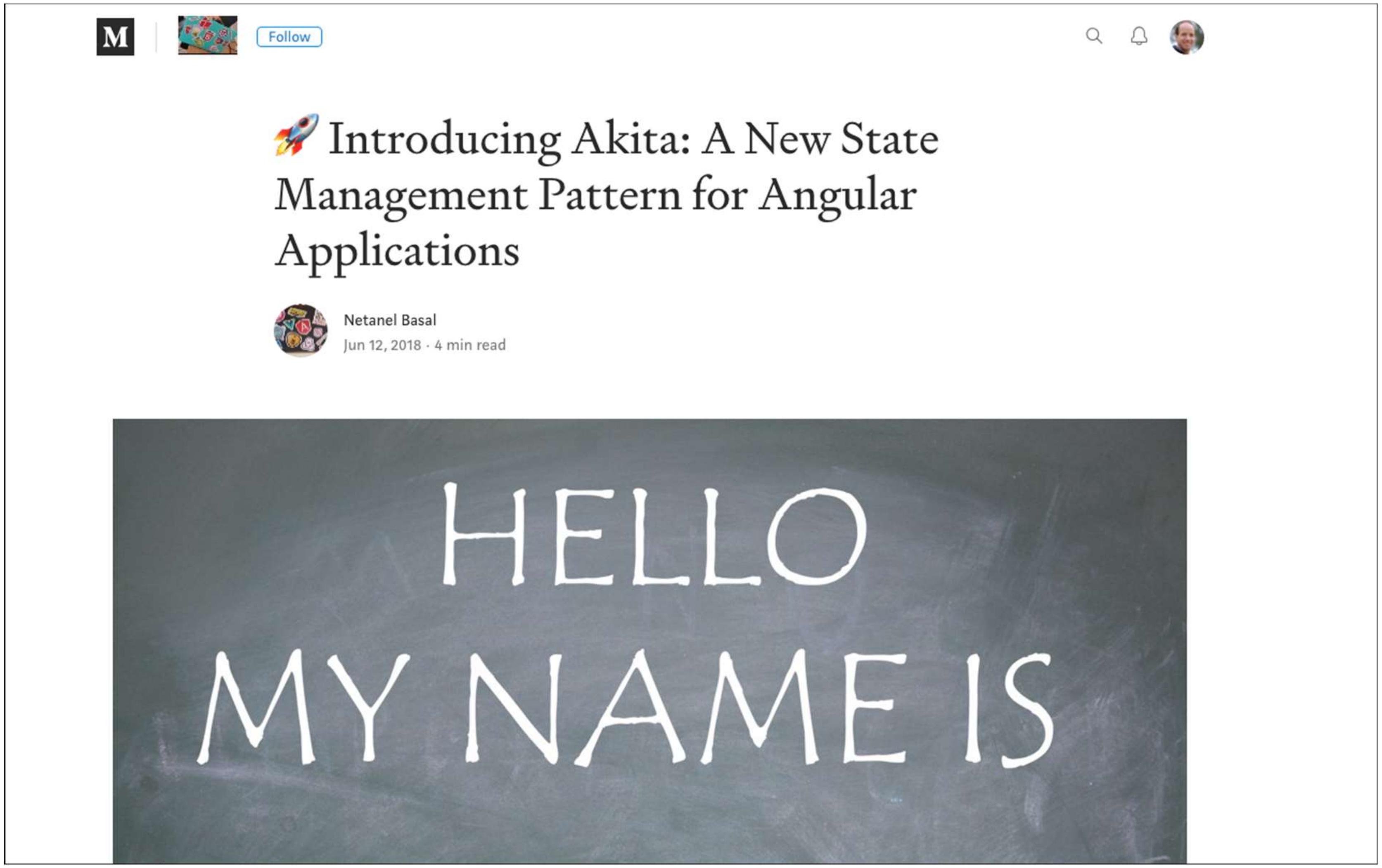


NGXS is a state management pattern + library for Angular

- Learn about it on the docs site
- See it in action on Stackblitz
- Checkout the sample application
- Learn about updates from the changelog

https://github.com/amcdnl/ngxs

Akita – another state management alternative

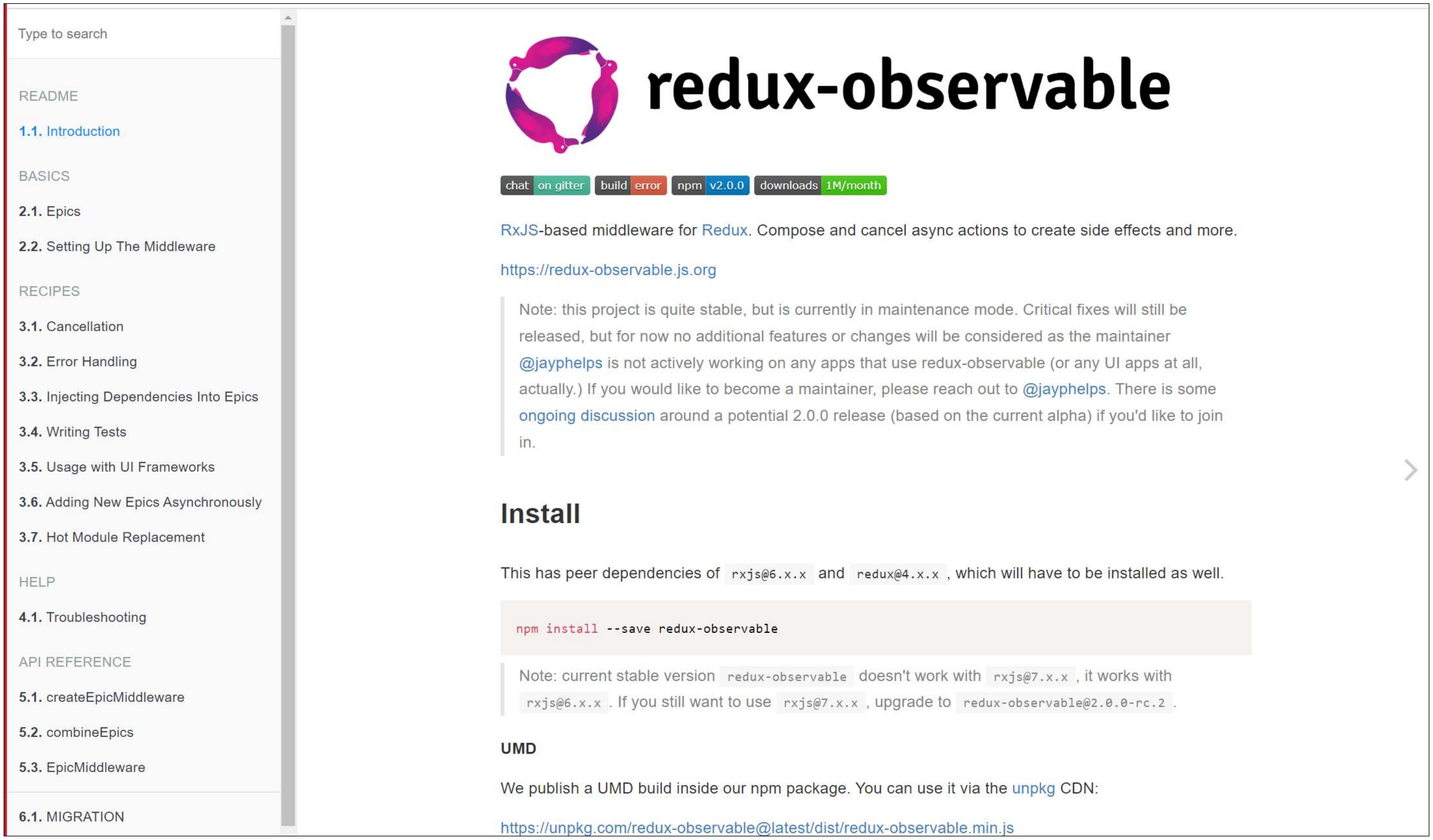


🚀 Introducing Akita: A New State Management Pattern for Angular Applications

Netanel Basal
Jun 12, 2018 · 4 min read

https://netbasal.com/introducing-akita-a-new-state-management-pattern-for-angular-applications-f2f0fab5a8

Redux-Observable – yet another option



Type to search

redux-observable

chat on gitter | build error | npm v2.0.0 | downloads 1M/month

RxJS-based middleware for Redux. Compose and cancel async actions to create side effects and more.

https://redux-observable.js.org

> Note: this project is quite stable, but is currently in maintenance mode. Critical fixes will still be released, but for now no additional features or changes will be considered as the maintainer @jayphelps is not actively working on any apps that use redux-observable (or any UI apps at all, actually.) If you would like to become a maintainer, please reach out to @jayphelps. There is some ongoing discussion around a potential 2.0.0 release (based on the current alpha) if you'd like to join in.

Install

This has peer dependencies of `rxjs@6.x.x` and `redux@4.x.x` , which will have to be installed as well.

```
npm install --save redux-observable
```

> Note: current stable version `redux-observable` doesn't work with `rxjs@7.x.x` , it works with `rxjs@6.x.x` . If you still want to use `rxjs@7.x.x` , upgrade to `redux-observable@2.0.0-rc.2` .

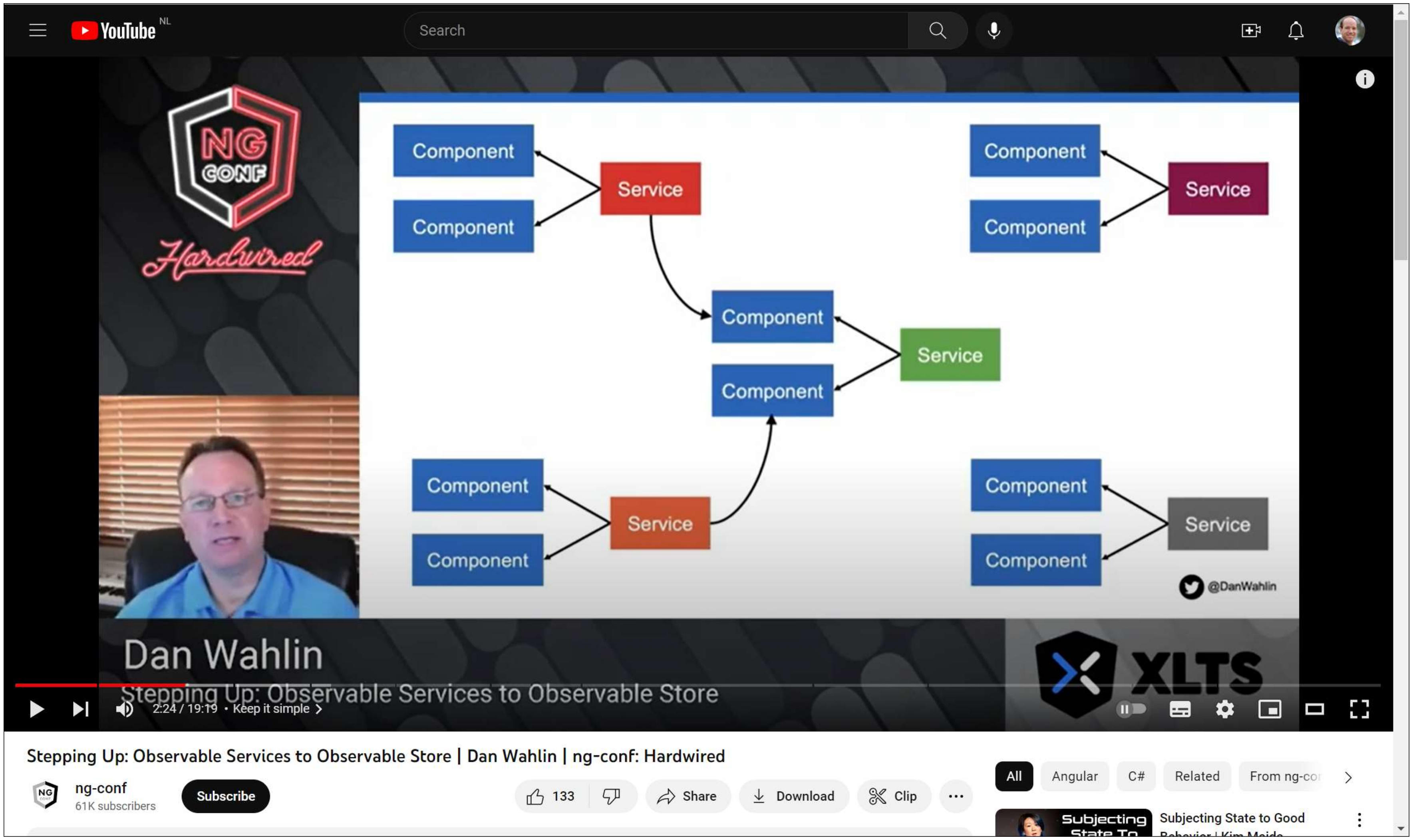
UMD

We publish a UMD build inside our npm package. You can use it via the unpkg CDN:

https://unpkg.com/redux-observable@latest/dist/redux-observable.min.js

https://redux-observable.js.org/

Or – Dan Wahlin, Observable Store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Subjecting State to Good

https://github.com/DanWahlin/Observable-Store

Next Steps

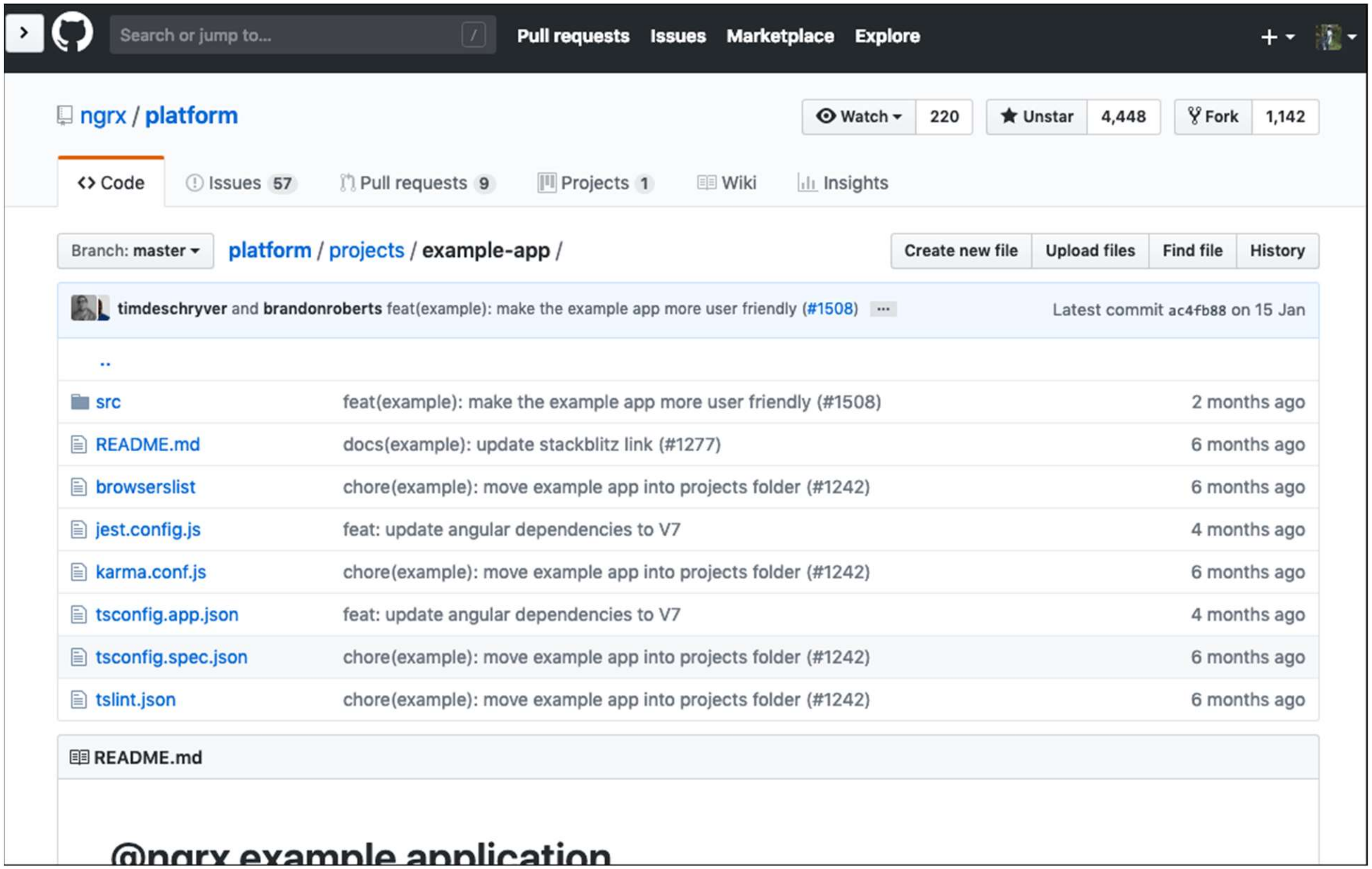
- @ngrx/effects - Side Effect model for @ngrx/store to model event sources as actions.
- @ngrx/router-store - Bindings to connect the Angular Router to @ngrx/store
- @ngrx/store-devtools - Store instrumentation that enables a powerful time-travelling debugger
- @ngrx/entity - Entity State adapter for managing record collections.
- @ngrx/schematics - Scaffolding library for Angular applications using NgRx libraries

https://ngrx.io/docs

Sample Store apps

Some study material

Ngrx store platform sample app



platform / projects / example-app /

timdeschryver and brandonroberts feat(example): make the example app more user friendly (#1508) ··· Latest commit ac4fb88 on 15 Jan

..

src	feat(example): make the example app more user friendly (#1508)	2 months ago
README.md	docs(example): update stackblitz link (#1277)	6 months ago
browserslist	chore(example): move example app into projects folder (#1242)	6 months ago
jest.config.js	feat: update angular dependencies to V7	4 months ago
karma.conf.js	chore(example): move example app into projects folder (#1242)	6 months ago
tsconfig.app.json	feat: update angular dependencies to V7	4 months ago
tsconfig.spec.json	chore(example): move example app into projects folder (#1242)	6 months ago
tslint.json	chore(example): move example app into projects folder (#1242)	6 months ago

README.md

@ngrx example application

https://github.com/ngrx/platform/tree/master/projects/example-app

More info

NgRx 8 — Meet the new, upcoming factory methods of the next major release

Gregor Woiwode Follow
Apr 27 · 6 min read

https://medium.com/@gregor.woiwode/ngrx-8-meet-the-new-upcoming-factory-methods-of-the-next-major-release-a97a079cc089