Angular and NgRx 16 – Signals Store

we will start in a few minutes

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Hi, I'm…

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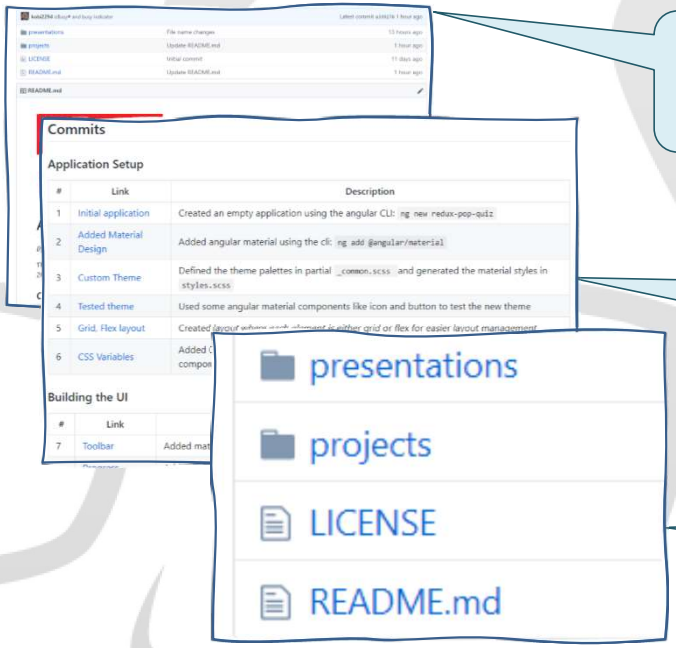
We have a GitHub Repository!

kobi-hari-courses/2306-dev-geek-week-ngrx



Session Summary

Project Code with Commits Summary

This presentation and other Useful Links

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Our Agenda

- The Redux Pattern
- NgRx Store – Selectors, Actions, Reducers
- NgRx Effects – Reactivity On Steroids
- NgRx Component Store – Local Stores

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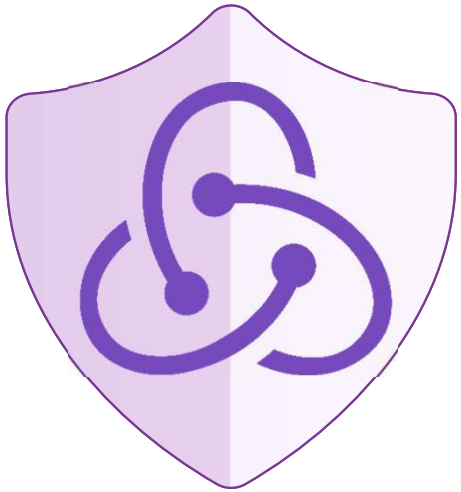


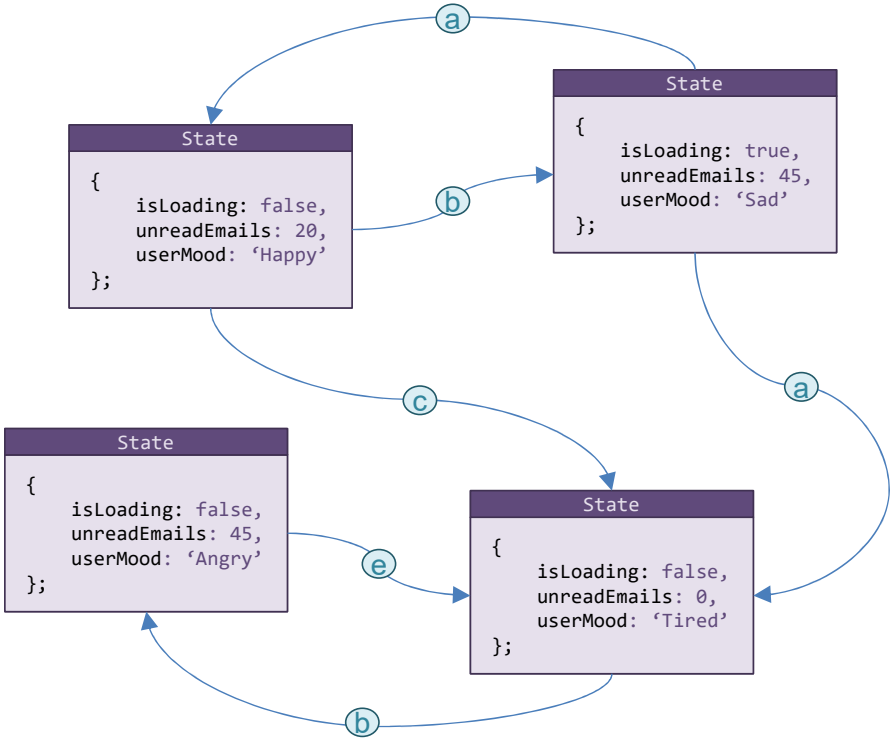
The “Redux” Pattern

The Redux Pattern

- Single Point of Truth
- Immutability
- Pure functions - Reducers

What is a “State”

- State is an object holding all the changeable data in the application
- Any change to data means that you move from one state to another
- State is replaced as a result of an Action



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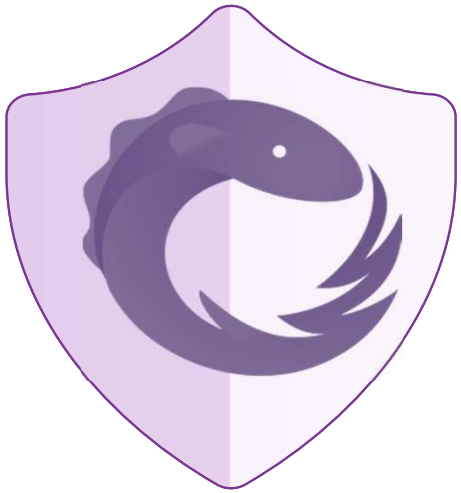
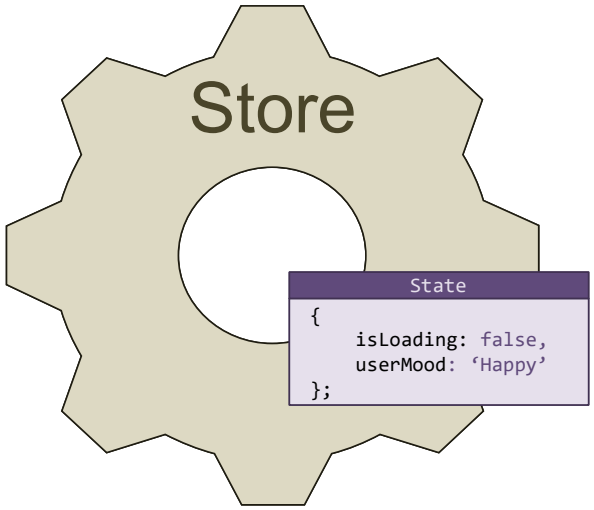


NgRx Store

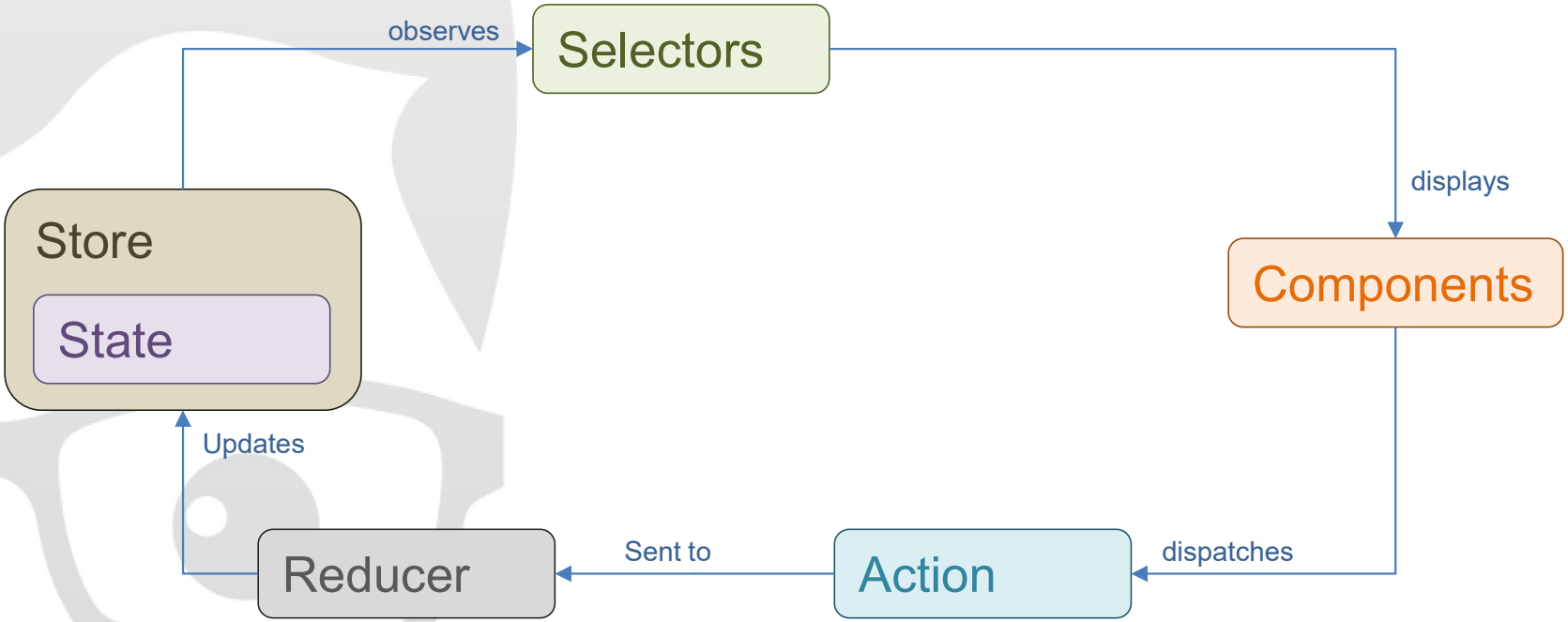
Selectors, Actions and Reducers

The Store

- The store is a service that holds the state
- The structure of the state is private (!)
- Reading or Updating the state is done indirectly using `Selectors` and `Actions`



The Circle of Life



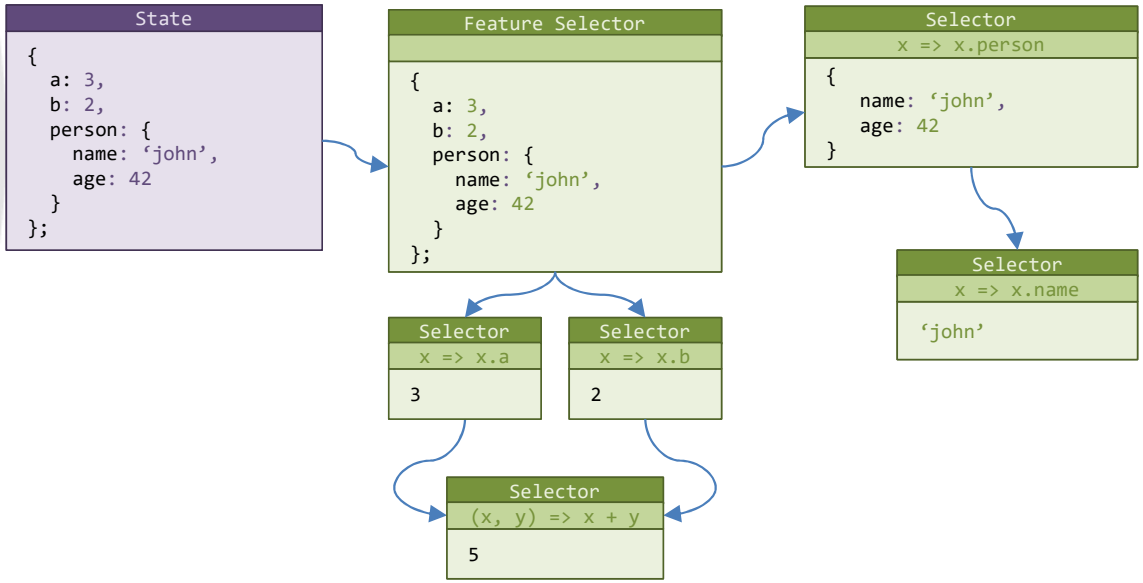
Demo - Setting up the Store

- ✓ Installing the packages
- ✓ Creating State and Store
- ✓ Instrumenting The dev-tools
- ✓ Creating features
- ✓ Providing the feature

Do you want to see me code?

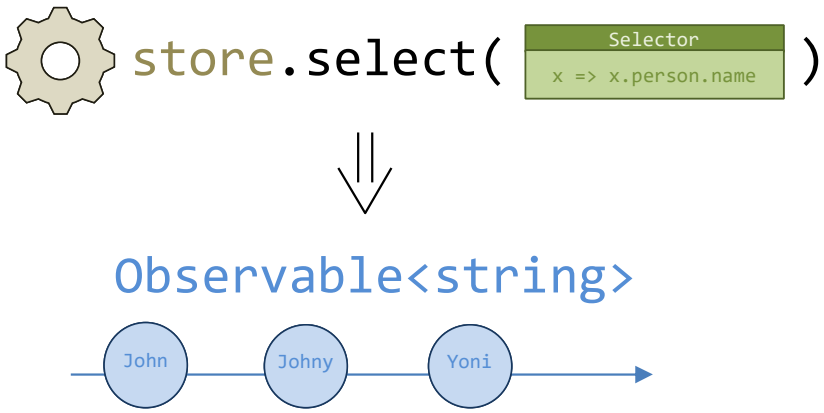
Selectors

- Selectors select a piece of the state
- A selector is based on:
  - Parent selector (or many)
  - Projection function
- They can also select “calculated expression” of the state



Selecting from the store

- Selectors are used to create observables
- These observables are memoized and optimized



Demo – Using Selectors

- ✓ Atomic Selectors
- ✓ Adding Extra Selectors
- ✓ Deriving Selectors from multiple sources
- ✓ Using selectors in Components

Do you want to see me code?

Actions

- Action is a simple JSON
- It must contain a “`type`” property
- It may contain additional properties (called the “`payload`”)
- NgRx provides “Action Creators”
- Actions describe `events`.
- By convention the `type` should look like this:

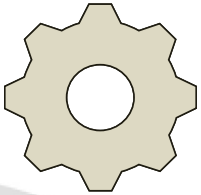
  `‘[SOURCE] name’`

Action

```
{
   type: ‘[USER] set loading’,
   value: true
};
```

Dispatching Actions

- Use the `Store` to dispatch actions



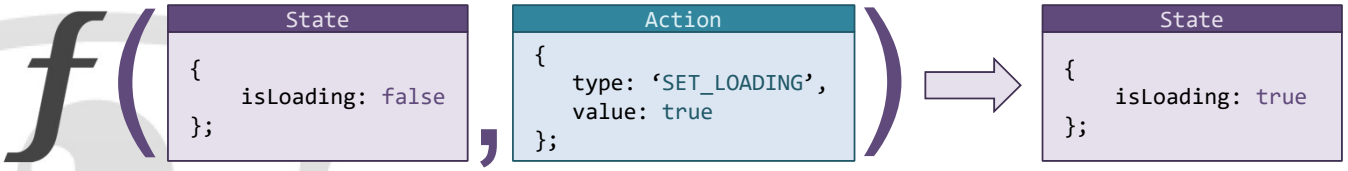
```
store.dispatch(
  Action
  {
    type: '[USER] set loading',
    value: true
  };
)
```

Action Groups

- NgRx 16 now has a new concept for actions:
  `Action Group`
- `Action Groups` are used to group together actions from the same source
- Angular uses Typescript Templates to pull some neat compiler tricks

Reducers

- Reducer is a “Pure Function”
- It calculates new state from old state, and an action



Demo – Using Action Groups and Reducers

- ✓ Creating Action groups
- ✓ Using the `props` functions to define payload
- ✓ Dispatching actions
- ✓ Implementing the Reducers

EUROPE! Do you want to see me code?

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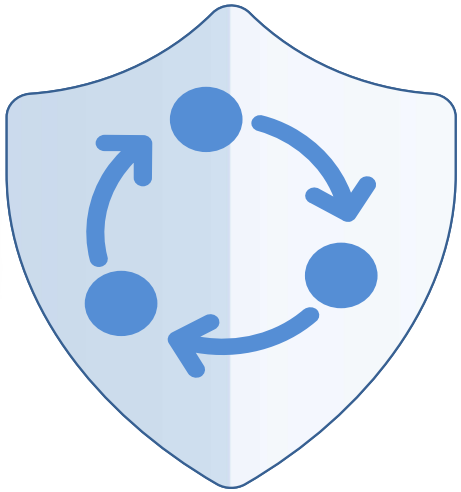


NgRx Effects

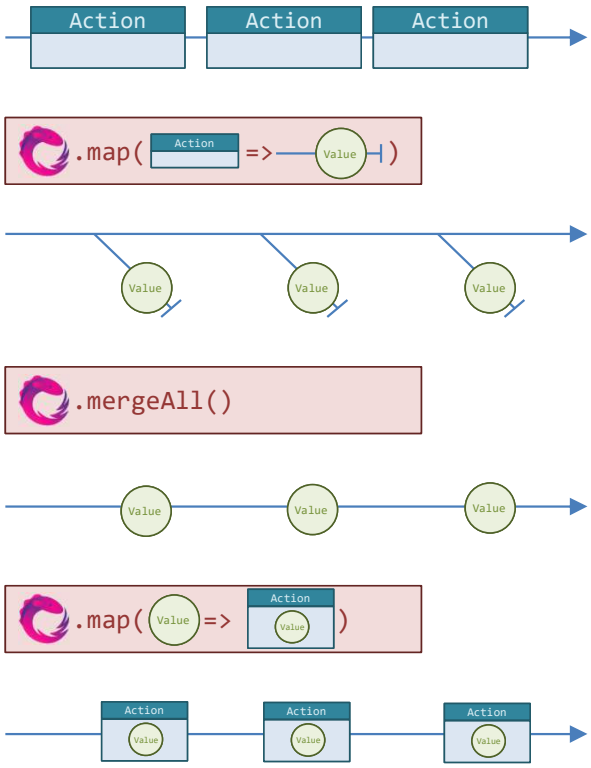
Reactivity On Steroids

What are "Effects"

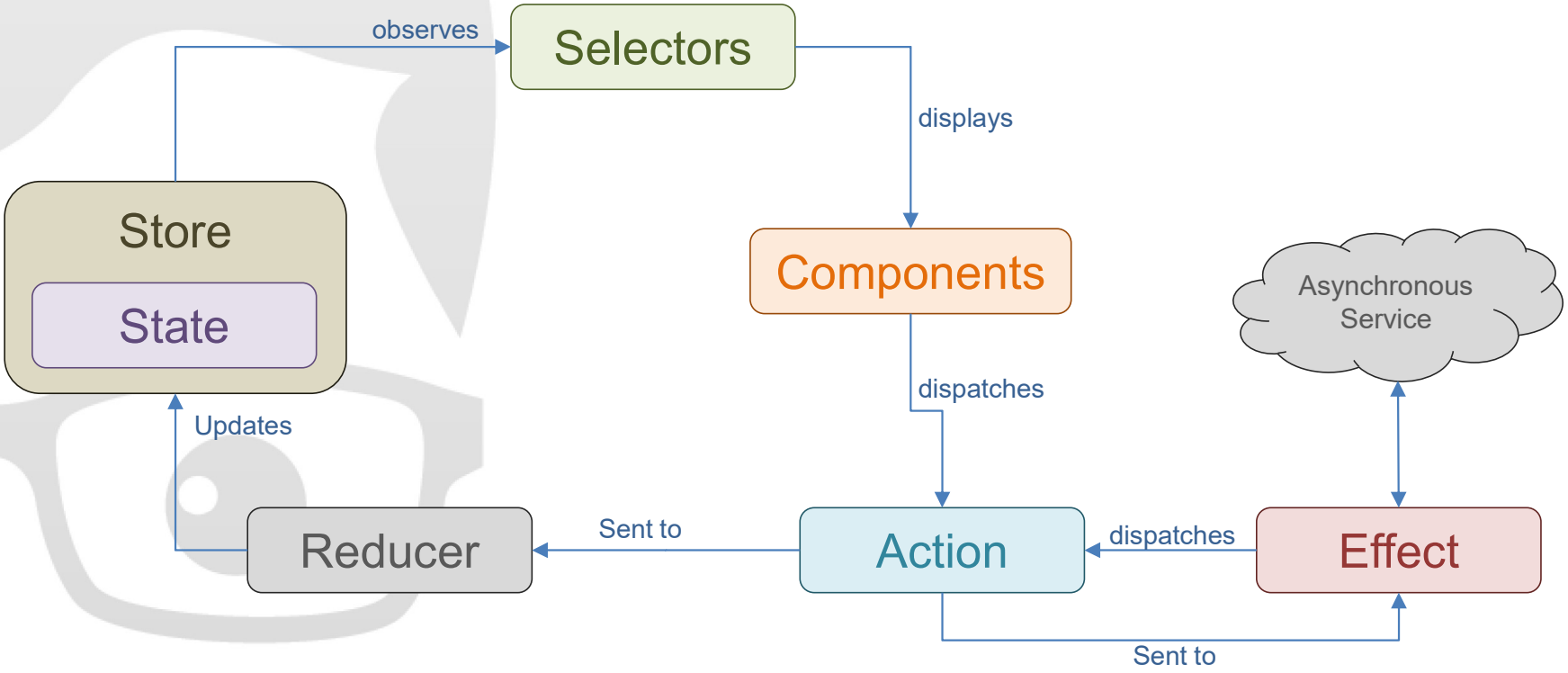
- Effects are Observables
  - That the store subscribes to
  - That yield actions
  - That get dispatched automatically

Fun facts about `Effects`

- They are usually created from other observables of `actions`
- They are built using `RxJS operators`
- They are often mapped to asynchronous values
- They often cause…. Side effects (AH HA!!!!)



The Circle of Life – with `effects`



Actions drive the app

- `Actions` are not just for the store
- In the “Reactive” thinking, everything that can happen in the application is an `action`.
- `Effects` handle `Actions` by performing operations that are translated into other actions
- `Reducers` handle `Actions` by changing the current state of the application

Demo – Using `Effects`

- ✓ Installing the @ngrx/effects package
- ✓ Writing Effects as functions
- ✓ Reacting to Actions or State
- ✓ Invoking and Flattening async methods
- ✓ Handling Errors
- ✓ Registering the Effects

Watch me!

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NgRx Component Store

Local Store as a Service

Component Store

- Component Store is a service
- It is provided by a component
- It is usually tied to the life-cycle of the component
- It is like a “baby” store
  - It has `selectors`
  - It has “`reducer-like`” methods
  - It has `effects`
  - It has no `actions` (!!!)

Creating a component store

- Define a state: `T`
- Create a service that extends `ComponentStore<T>`
- You may set the initial state in the `constructor` by calling `super`

```
export interface MoviesState {
  movies: Movie[];
}

@Injectable()
export class MoviesStore extends ComponentStore<MoviesState> {

  constructor() {
    super({movies: []});
  }
}
```

Consuming the Store

- In the component, provide it using the “`providers`“ array
- In the component or any of its descendants, inject it using `dependency injection`.
- You can create observables of slices of data using the `select` method

```
@Component({
  template: `
    <li *ngFor="let movie of (movies$ | async)">
      {{ movie.name }}
    </li>
  `,
  providers: [ComponentStore],
})
export class MoviesPageComponent {
  readonly movies$ = this.componentStore.select(state => state.movies);

  constructor(
    private readonly componentStore: ComponentStore<{movies: Movie[]}>
  ) {}

```

Demo – Using `Component-store`

- ✓ Installing the @ngrx/component-store package
- ✓ Creating a store service
- ✓ Initializing the state
- ✓ Providing it in the component
- ✓ Injecting it into the component
- ✓ Consuming the state

Phenome
Phenome
Phenomenal

Creating Selectors

- You can define observable properties by using the `select` method.
- You can compose selectors into a new selector
- You can also base selectors on `global store` selectors

```
1. export interface MoviesState {
2.   movies: Movie[];
3.   userPreferredMoviesIds: string[];
4. }
5.
6. @Injectable()
7. export class MoviesStore extends ComponentStore<MoviesState> {
8.
9.   constructor() {
10.     super({movies:[], userPreferredMoviesIds:[]});
11.   }
12.
13.   readonly movies$ = this.select(state => state.movies);
14.   readonly userPreferredMovieIds$ = this.select(state => state.userPreferredMoviesIds);
15.
16.   readonly userPreferredMovies$ = this.select(
17.         this.movies$,
18.         this.userPreferredMovieIds$,
19.         (movies, ids) => movies.filter(movie => ids.includes(movie.id))
20.   );
21. }
```

Demo – Component store `Selectors`

- ✓ Creating Selectors
- ✓ Deriving Selectors from other selectors
- ✓ Combining Global store Selectors
- ✓ Selecting Observables
- ✓ Selecting View Models
- ✓ Selecting Signals

Se-lec-tors!
Se-lec-tors!

Setting the state

- You can use `setState` and `patchState` to modify the current state.
  - setState takes a full state as parameter
  - patchState takes a partial state as parameter
  - Both can either take the final state, or a function that reduces it from the current state
- It is recommended to only use these in the service implementation

```
resetSelectedCharacters() {
    this..setState({selectedCharacterIds: []});
  }

selectCharacter(characterId: number): void {
    this.setState((state) => {
      return {
        ...state,
        selectedCharacterIds: [...state.selectedCharacterIds, characterId],
      };
    });
  }
```

Creating an Updater

- Updater is replacing "`action` + `reducer`"
- The `updater` method creates a function
- Calling the function is like dispatching an `action` that updates the state

```
@Injectable()
export class MoviesStore extends ComponentStore<MoviesState> {

  constructor() {
    super({movies: []});
  }

  readonly addMovie = this.updater((state, movie: Movie) => ({
    movies: [...state.movies, movie],
  }));
}
```

Consuming an Updater

- Updater can be called Imperatively or Declaratively
  - Pass arguments to call it Imperatively
  - Pass an Observable to call it Declaratively

```
this.store.addMovie({movie});

this.store.setMovie({this.form.valueChanges$})
```

Demo – Component store `Updaters`

- ✓ Using setState and patchState
- ✓ Passing callbacks to setState and patchState
- ✓ Defining an Updater
- ✓ Using Updater imperatively
- ✓ Using Updater Declaratively

Chalas…
Mitzinoo

Creating `Effects`

- Create effect using the "effect" method
  - It consumes an Observable of parameters
  - Use the `tap` operator to create side effect
  - Use `catchError` to handle errors

```
// Each new call of getMovie(id) pushed that id into movieId$ stream.
readonly getMovie = this.effect((movieId$: Observable<string>) => {
  return movieId$.pipe(
    // 👇 Handle race condition with the proper choice of the flattening operator.
    switchMap((id) => this.moviesService.fetchMovie(id).pipe(
      //👇 Act on the result within inner pipe.
      tap({
        next: (movie) => this.addMovie(movie),
        error: (e) => this.logError(e),
      }),
      // 👇 Handle potential error within inner pipe.
      catchError(() => EMPTY),
    )),
  );
});
```

- Or… you can use `tapResponse` as a shortcut.

```
readonly getMovie = this.effect((movieId$: Observable<string>) => {
  return movieId$.pipe(
    // 👇 Handle race condition with the proper choice of the flattening operator.
    switchMap((id) => this.moviesService.fetchMovie(id).pipe(
      //👇 Act on the result within inner pipe.
      tapResponse(
        (movie) => this.addMovie(movie),
        (error: HttpErrorResponse) => this.logError(error),
      ),
    )),
  );
});
```

Consuming Effects

- An `effect` is a function
- Calling it is like dispatching an action that is handled by an effect
- You can call it imperatively or declaratively

```
this.store.getMovie(movieId);

const movieId$ = this.activatedRoute.params
                        .pipe(map(p => p['id']));

this.store.setMovie(movieId$);
```

Demo – Component store `Effects`

- ✓ Creating effects
- ✓ Using tapResponse
- ✓ Consuming effects imperatively
- ✓ Consuming effects declaratively

Yalla…
Hayity Kan

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