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State Management with Redux und @ngrx/store

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ANGULARarchitects.io

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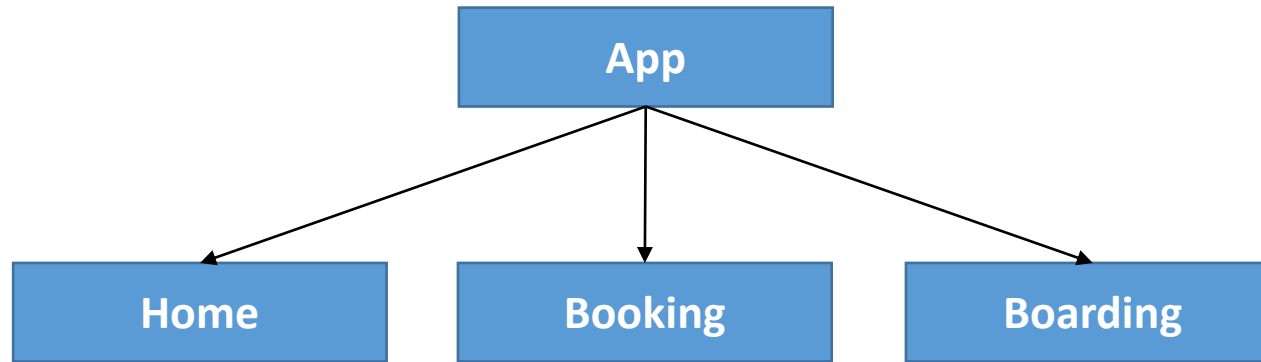
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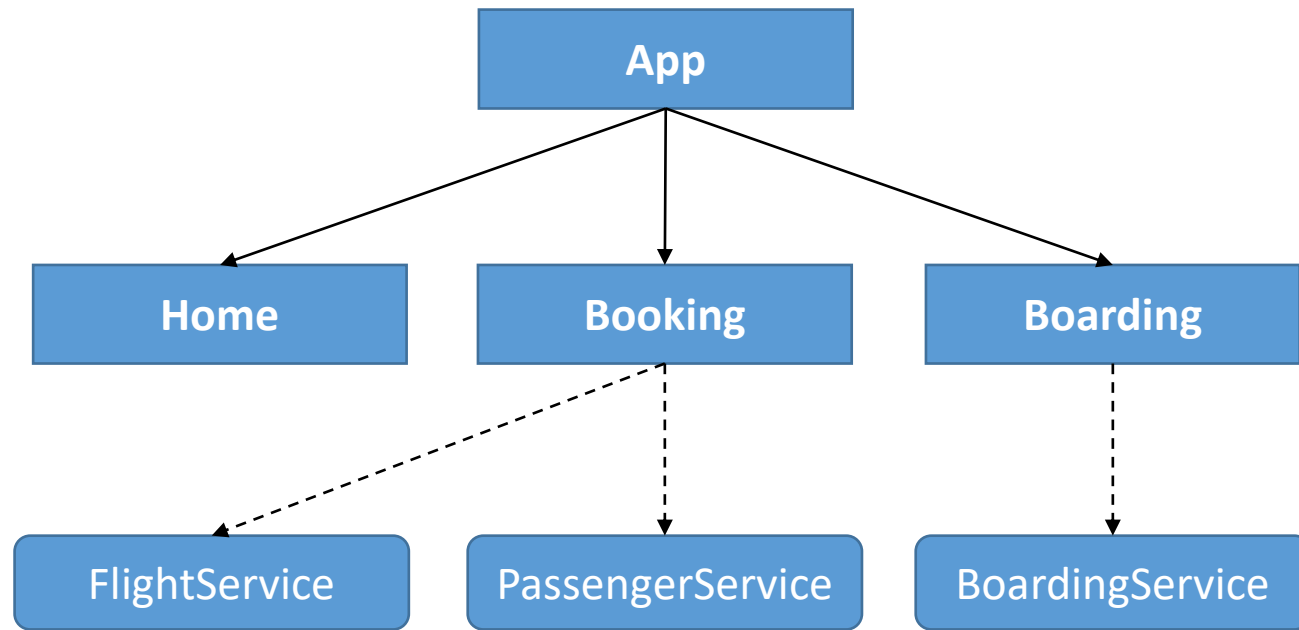


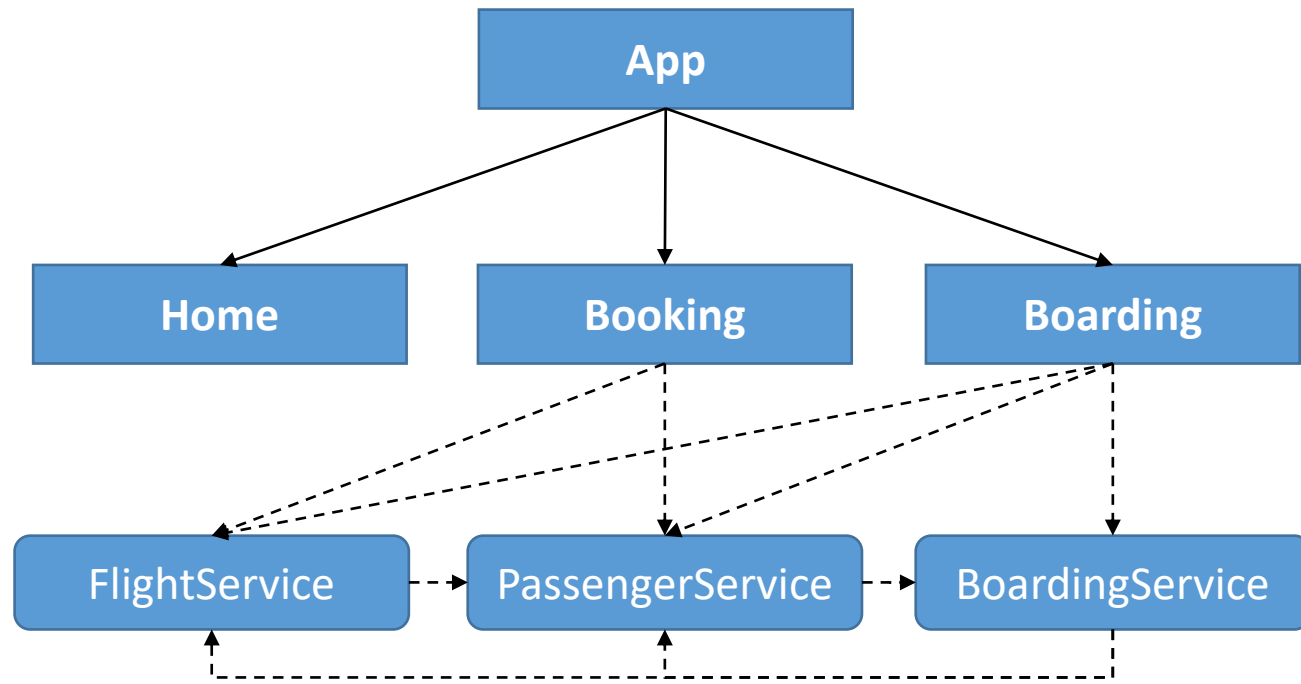
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Motivation







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Redux

- Redux makes complex UI manageable
- Origin: React Ecosystem
- Implementation used here: @ngrx/store
- Alternative: @ngxs/store
- Or: @dataroma/akita

npm install @ngrx/store --save



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Alternatives

@datorama/akita vs @ngrx/store vs @ngxs/store

Enter an npm package...

@datorama/akita x

@ngrx/store x

@ngxs/store x

+ @angular-redux/store

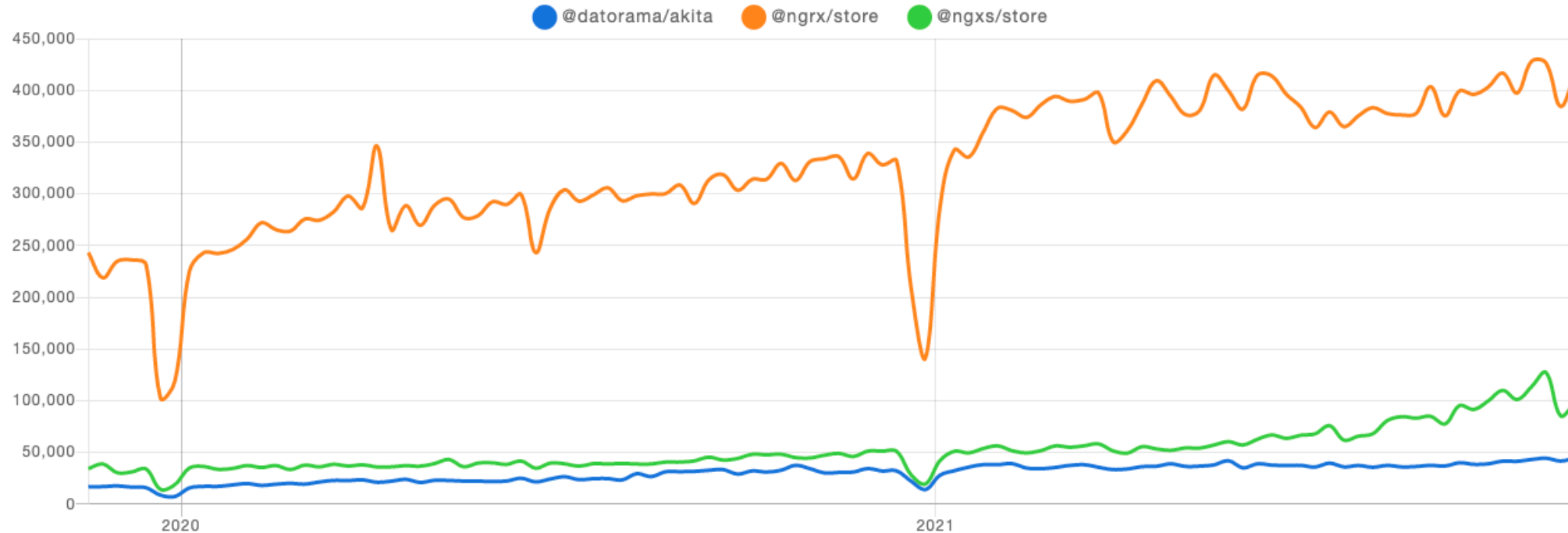
+ ngxs

+ akita

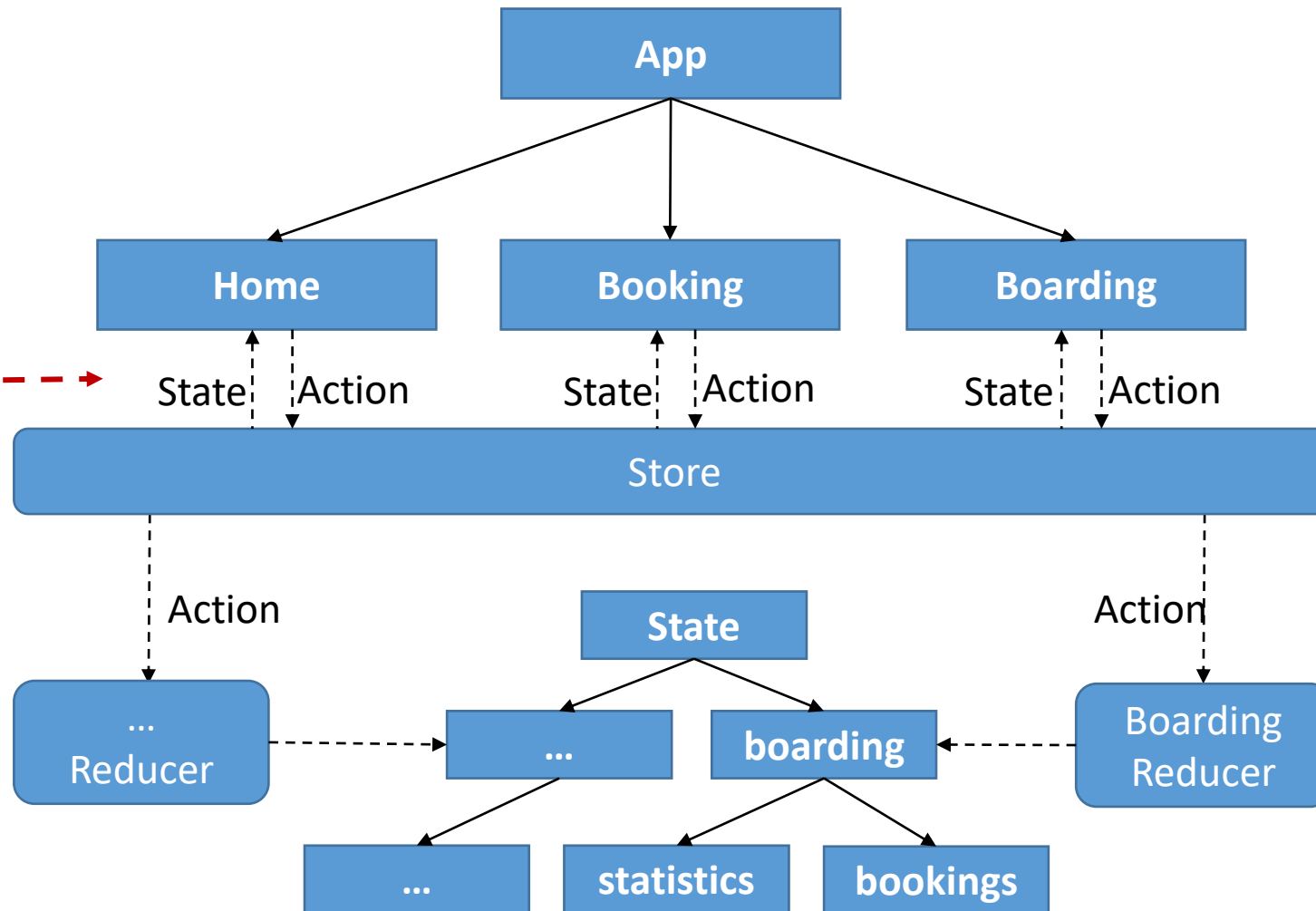
+ mobx

+ store2

Downloads in past 2 Years v



*Publish/Subscribe
via Observables*



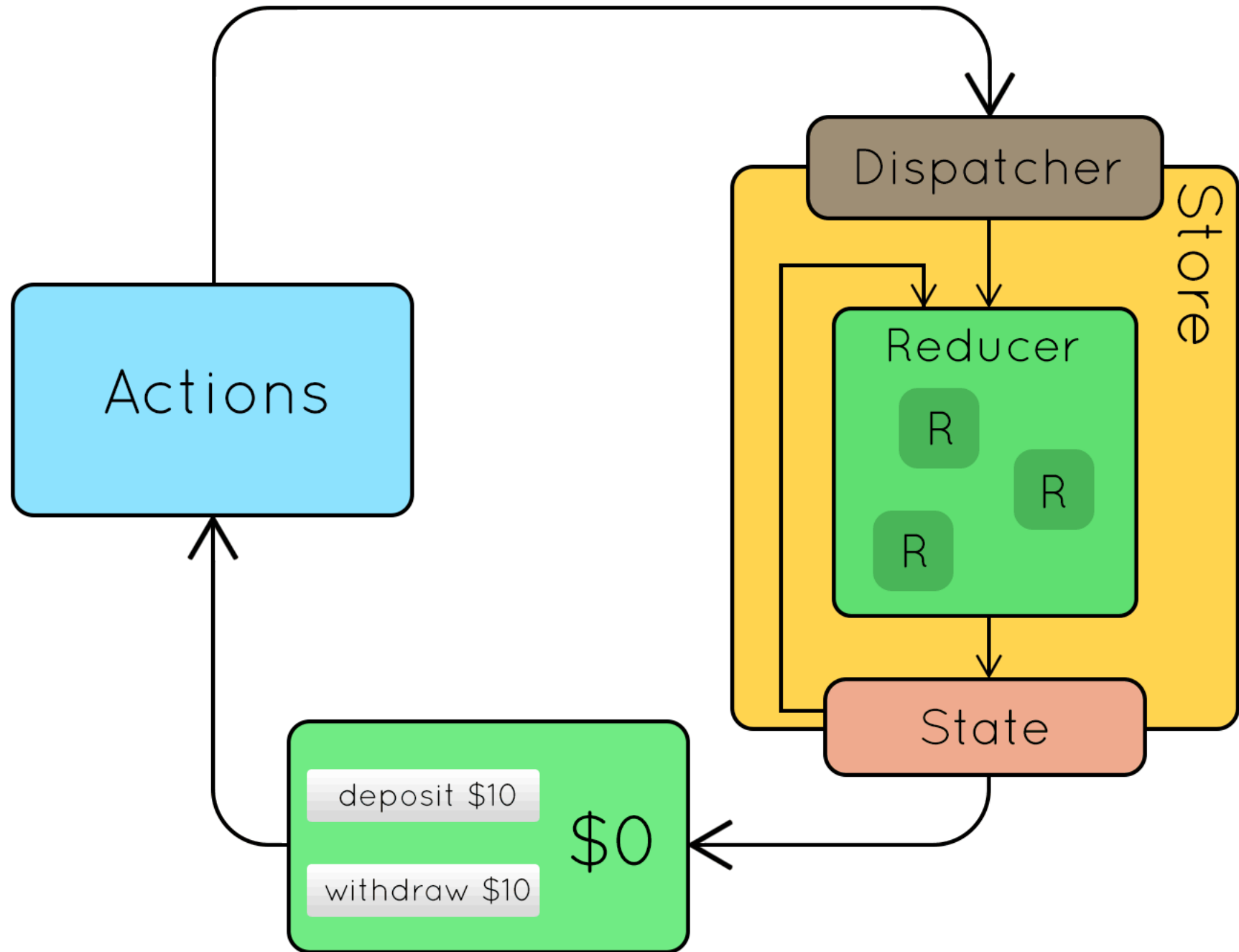
Single Immutable State Tree



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State

State

```
export interface FlightBookingState {  
  flights: Flight[];  
  statistics: FlightStatistics;  
  basket: object;  
}
```



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State

```
export interface FlightBookingState {  
  flights: Flight[];  
  statistics: FlightStatistics;  
}
```

```
export interface FlightStatistics {  
  countDelayed: number;  
  countInTime: number;  
}
```



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AppState

```
export interface AppState {  
  flightBooking: FlightBookingState;  
  currentUser: UserState;  
}
```



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Actions

Actions

- Actions express *events* that happen throughout your application
- `dispatch(flightsLoaded({ flights })))`



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Parts of an Action

- Type
- Payload



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Defining an Action

```
export const flightsLoaded = createAction(  
  '[FlightBooking] FlightsLoaded',  
  props<{flights: Flight[]}>()  
);
```



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Reducer



Reducer

- Function that executes Action
- Pure function (stateless, etc.)
- Each Reducer gets each Action
 - Check whether Action is relevant
 - This prevents cycles



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Reducer

- Reducers are responsible for handling transitions from one state to the next state in your application
- Using on

(currentState, action) => newState



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Reducer for FlightBookingState

```
export const flightBookingReducer = createReducer(  
  initialState,  
  
  on(flightsLoaded, (state, action) => {  
    const flights = action.flights;  
    return { ...state, flights };  
  })  
)
```



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Store

Store

- Manages state tree
- Allows to read state (via Selectors / Observables)
- Allows to modify state by dispatching actions



Registering @ngrx/store

Registering @ngrx/Store

```
@NgModule{  
  imports: [  
    [...]  
    StoreModule.forRoot(reducers)  
  ],  
  [...]  
}  
export class AppModule { }
```



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Registering @ngrx/Store

```
@NgModule{  
  imports: [  
    [...]  
    StoreModule.forRoot(reducers),  
    !environment.production ? StoreDevtoolsModule.instrument() : []  
  ],  
  [...]  
}  
export class AppModule { }
```

@ngrx/store-devtools



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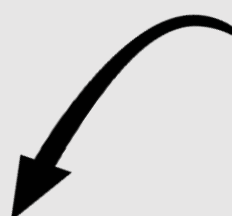


ngrx and Feature Modules

Registering @ngrx/Store

```
@NgModule({  
  imports: [  
    [...]  
    StoreModule.forFeature('flightBooking', flightBookingReducer)  
  ],  
  [...]  
})  
export class FlightBookingModule { }
```

State branch for feature



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NgRx Store



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Selectors

- Selectors are pure functions used for obtaining slices of store state (also called state streams)
- `select(tree => tree.flightBooking.flights): Observable<Flight[]>`
- We can use [createSelector](#) or [createFeatureSelector](#)



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Defining selectors

```
export const selectFlightsWithProps =  
  (props: { blacklist: number[] }) =>  
    createSelector(selectFlights, (flights) =>  
      flights.filter((f) => !props.blacklist.includes(f.id)));
```



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Using selectors for manipulation (filtering)

```
export const selectFlightBookingState =  
  createSelector<fromFlightBooking.State>  
    (fromFlightBooking.flightBookingFeatureKey);  
  
export const selectFlights =  
  createSelector(selectFlightBookingState, (s) => s.flights);
```



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NgRx Store & Selectors



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Effects



Challenge

- Reducers are synchronous by definition
- What to do with asynchronous operations?

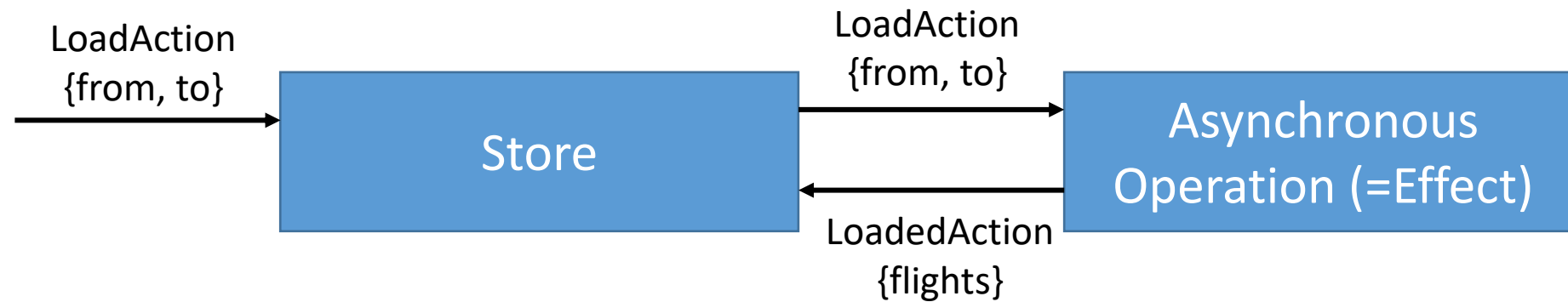


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Solution: Effects



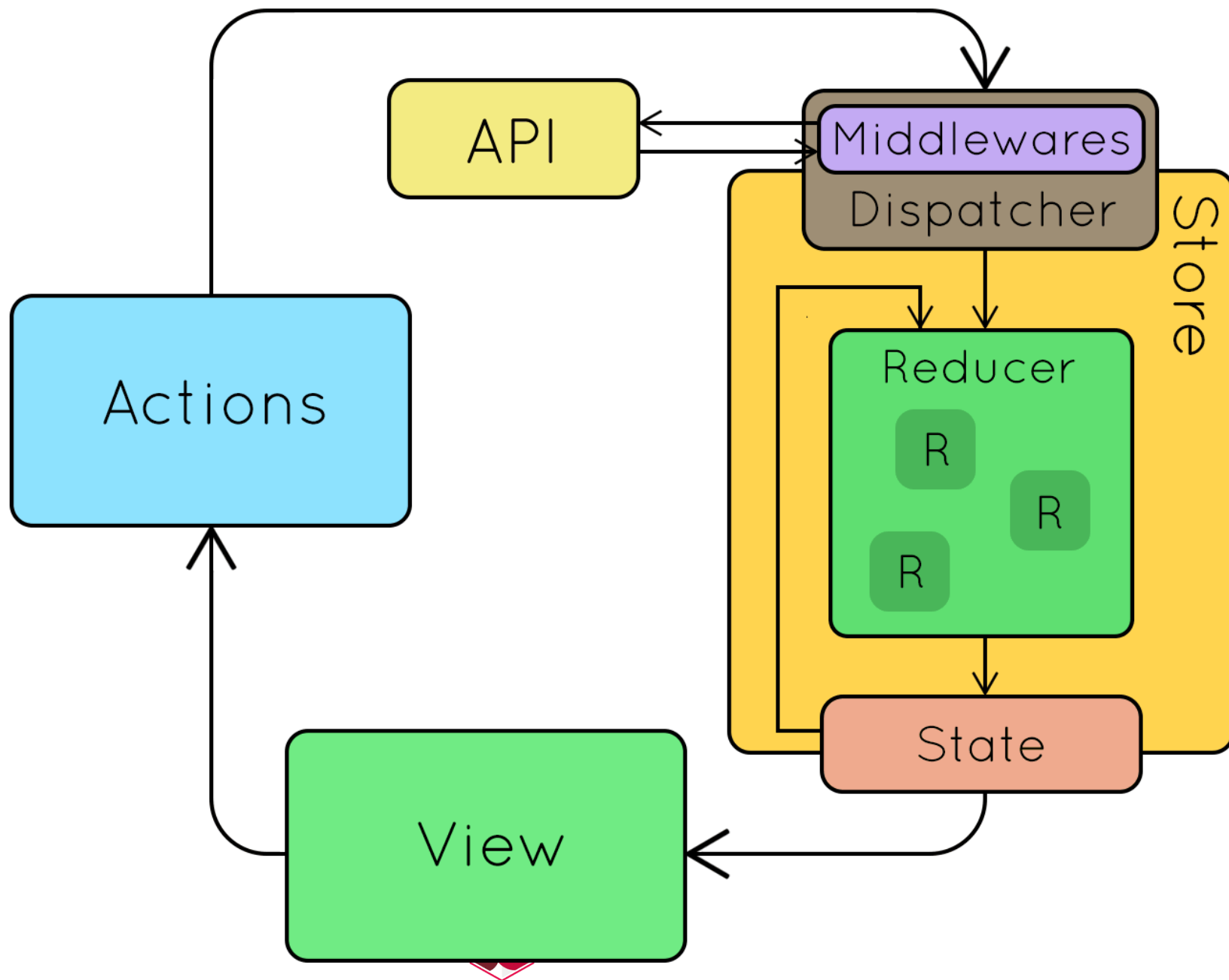
ng add @ngrx/effects



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Effects are Observables



Implementing Effects

```
@Injectable()
export class FlightBookingEffects {

  [...]

}
```



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Implementing Effects

```
@Injectable()
export class FlightBookingEffects {

  constructor(
    private flightService: FlightService, private actions$: Actions) {
  }

  [...]

}
```



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Implementing Effects

```
@Injectable()
export class FlightBookingEffects {

  constructor(
    private flightService: FlightService, private actions$: Actions) {
  }

  myEffect$ = createEffect(() => this.actions$.pipe(
    ofType(loadFlights)));
}
```



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Implementing Effects

```
@Injectable()
export class FlightBookingEffects {

  constructor(
    private flightService: FlightService, private actions$: Actions) {
  }

  myEffect$ = createEffect(() => this.actions$.pipe(
    ofType(loadFlights),
    switchMap(a => this.flightService.find(a.from, a.to, a.urgent)))));
}
```



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Implementing Effects

```
@Injectable()
export class FlightBookingEffects {

  constructor(
    private flightService: FlightService, private actions$: Actions) {
  }

  myEffect$ = createEffect(() => this.actions$.pipe(
    ofType(loadFlights),
    switchMap(a => this.flightService.find(a.from, a.to, a.urgent)),
    map(flights => flightsLoaded({flights})))));
}
```



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Implementing Effects

```
@NgModule({  
  imports: [  
    StoreModule.provideStore(appReducer, initialState),  
    EffectsModule.forRoot([SharedEffects]),  
    StoreDevtoolsModule.instrument()  
  ],  
  [...]  
})  
export class AppModule { }
```



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Implementing Effects

```
@NgModule({  
  imports: [  
    [...]  
    EffectsModule.forFeature([FlightBookingEffects])  
  ],  
  [...]  
})  
export class FeatureModule {  
}
```



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NgRx Effects



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@ngrx/entity and @ngrx/schematics

- ng add @ngrx/entity
- ng add @ngrx/schematics
- ng g module passengers
- ng g entity Passenger --module passengers.module.ts



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@ngrx/store-devtools

- Add Chrome / Firefox extension to use Store Devtools
 - Works with Redux & NgRx
 - <https://ngrx.io/guide/store-devtools>

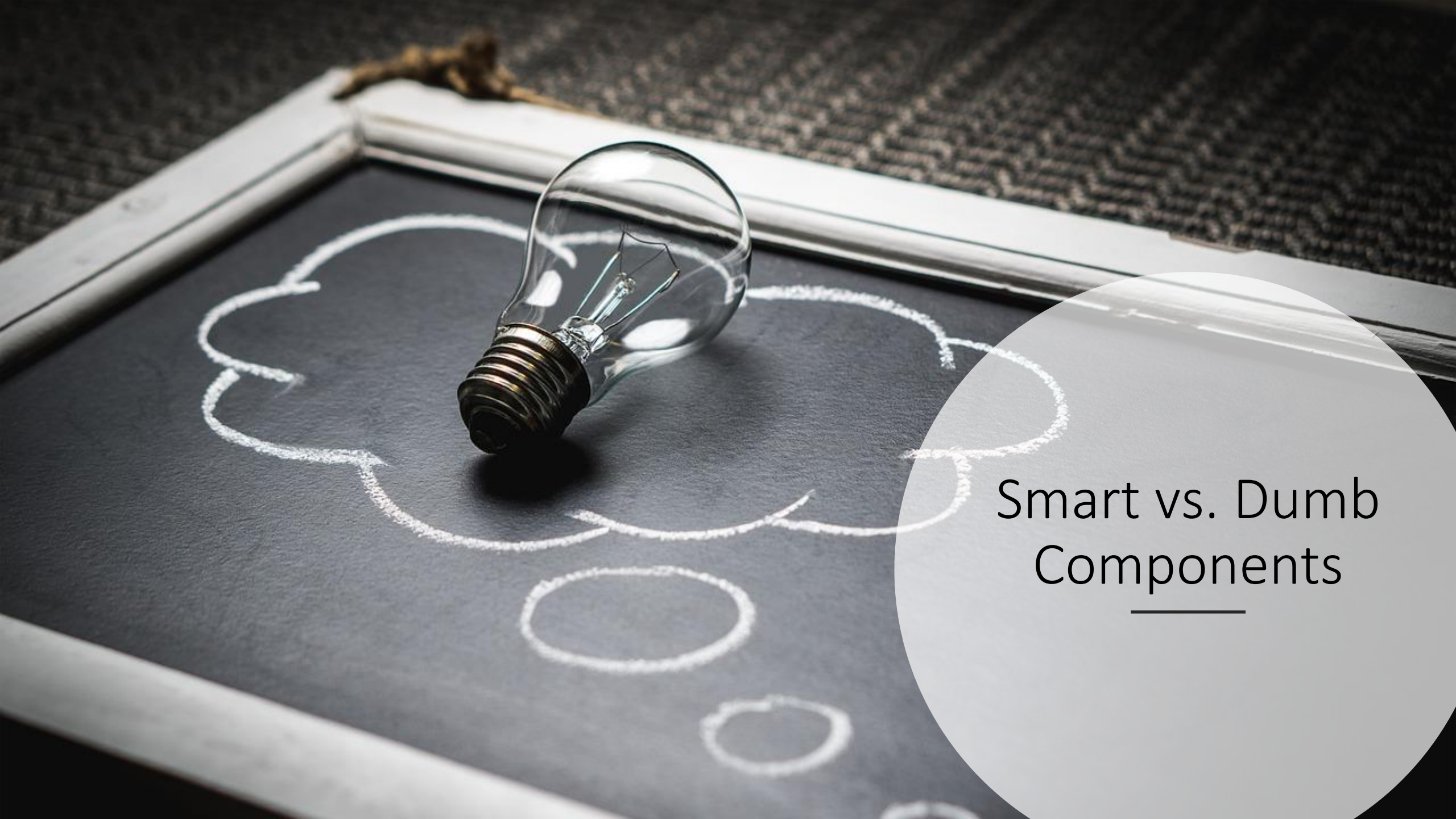


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Smart vs. Dumb Components

Thought experiment

- What if <flight-card> would directly talk with the store?
 - Querying specific parts of the state
 - Triggering effects
- Traceability?
- Performance?
- Reuse?



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Smart vs. Dumb Components

Smart Component

- Drives the "Use Case"
- Usually a "Container"

Dumb

- Independent of Use Case
- Reusable
- Usually a "Leaf"



Like this topic?

- Check out the NgRx Guide
- <https://ngrx.io/guide/store> and
- <https://ngrx.io/guide/data/architecture-overview>