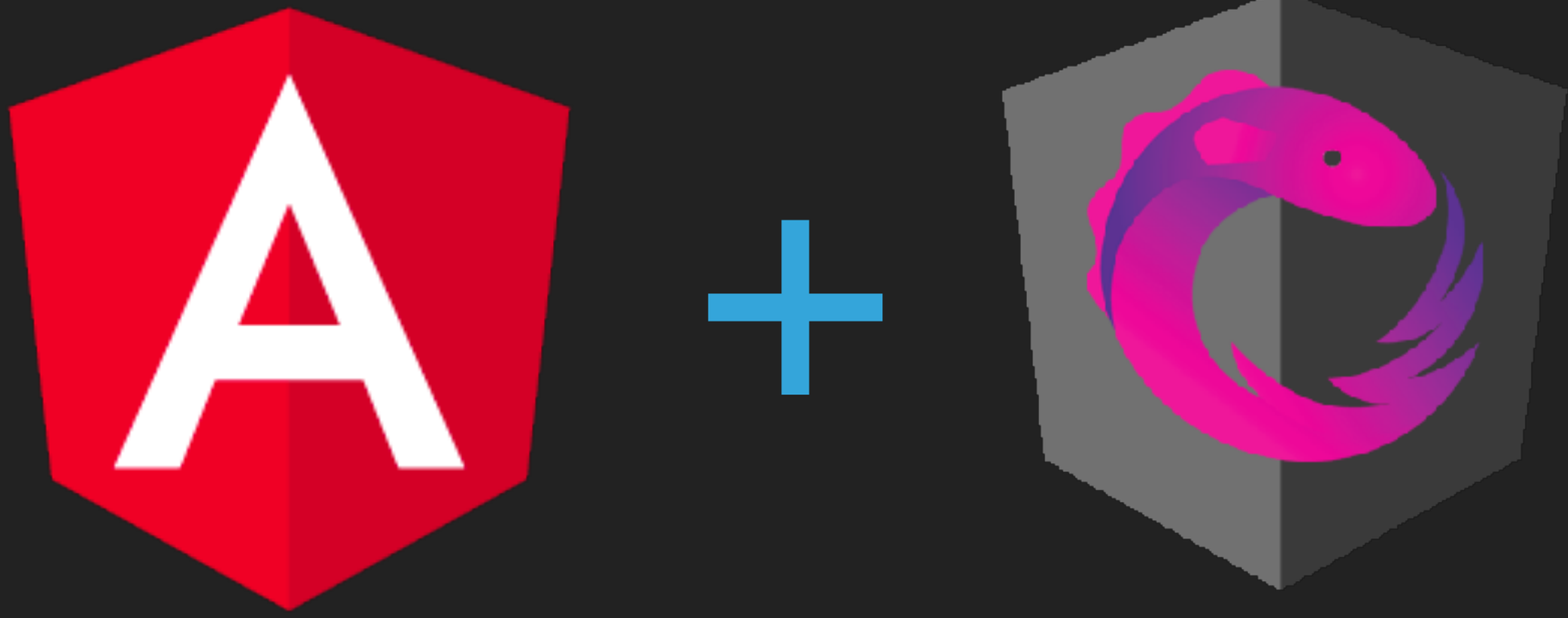


IMPLEMENTING THE REDUX PATTERN TO MAKE SCALABLE APPS

ANGULAR + NGRX

ANGULAR

(NOT TO BE CONFUSED WITH ITS EVIL OLDER SIBLING ANGULARJS)

What is Angular

ANGULAR VERSION HISTORY

- AngularJS / Angular 1.x.x
- Angular 2 : Complete rewrite, breaking change
- Angular 3: Skipped since @angular/router was ahead
- Angular 4
- Angular 5: Current Stable Release

WHY ANGULAR

ADVANTAGES

- Front end decoupled from back end code: Replaces server side templating engines plus JQuery approach (Java - JSTL, .Net Razor, Python Jinja)

- Code Organization (Components) & Productivity: More Declarative than Imperative

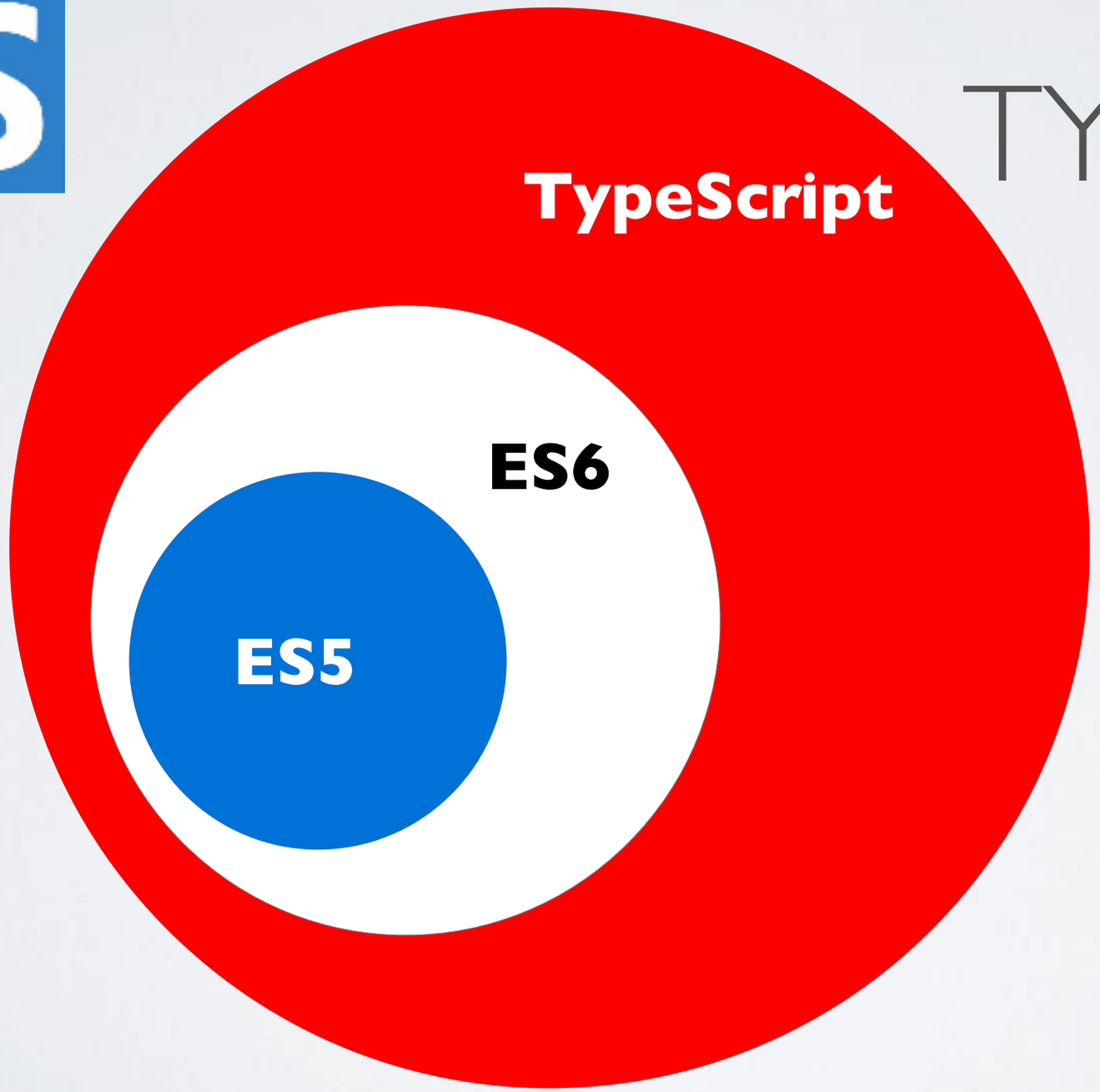
- Rapid Development & CLI code generation

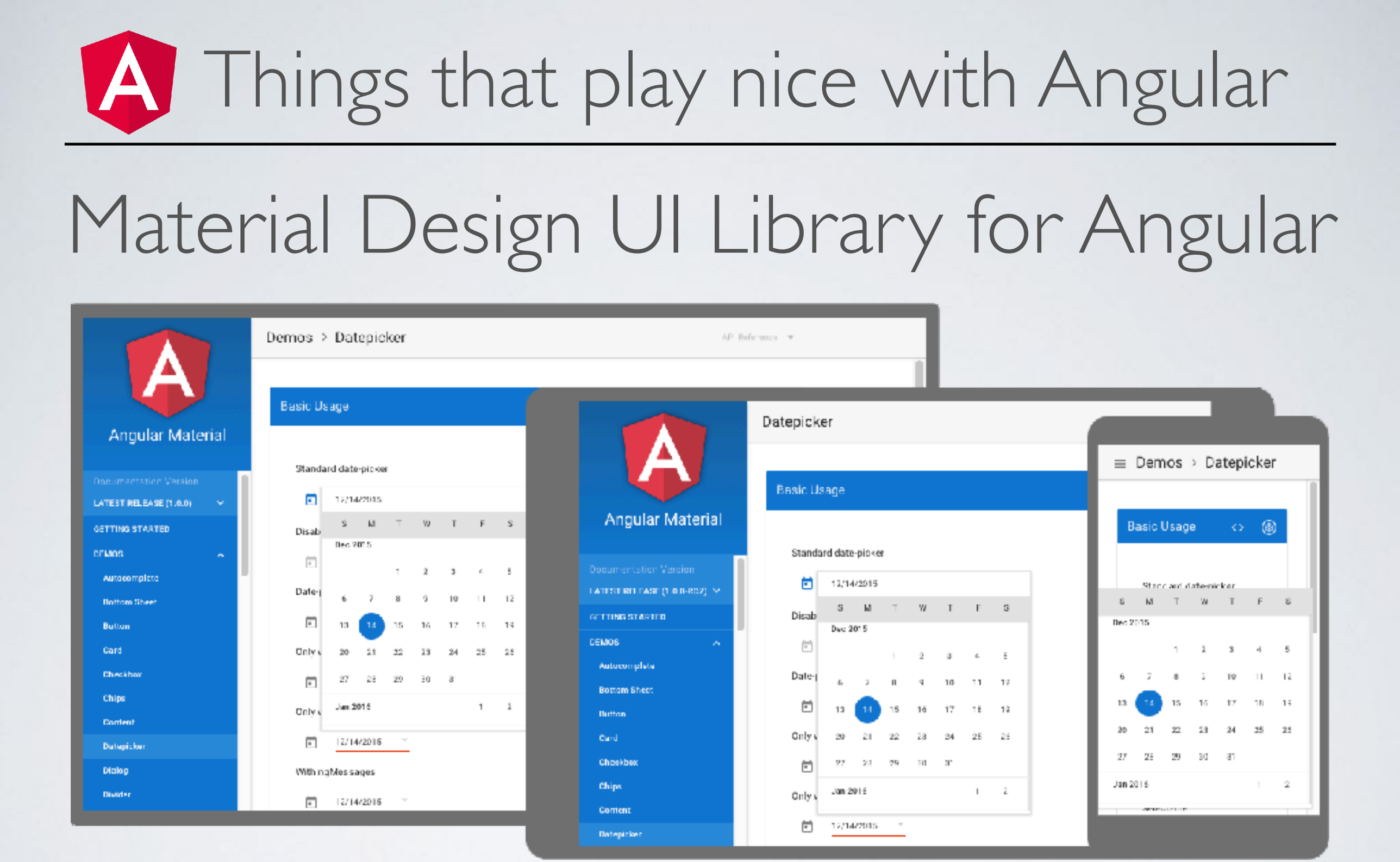
- Dynamic Content in HTML template

- Unit Testing Ready

- Cross Platform (browsers, device)

WHAT IS TYPESCRIPT?





Things that play nice with Angular

Material Design UI Library for Angular

material.angular.io

Things that play nice with Angular

AngularFire

github.com/angular/angularfire2

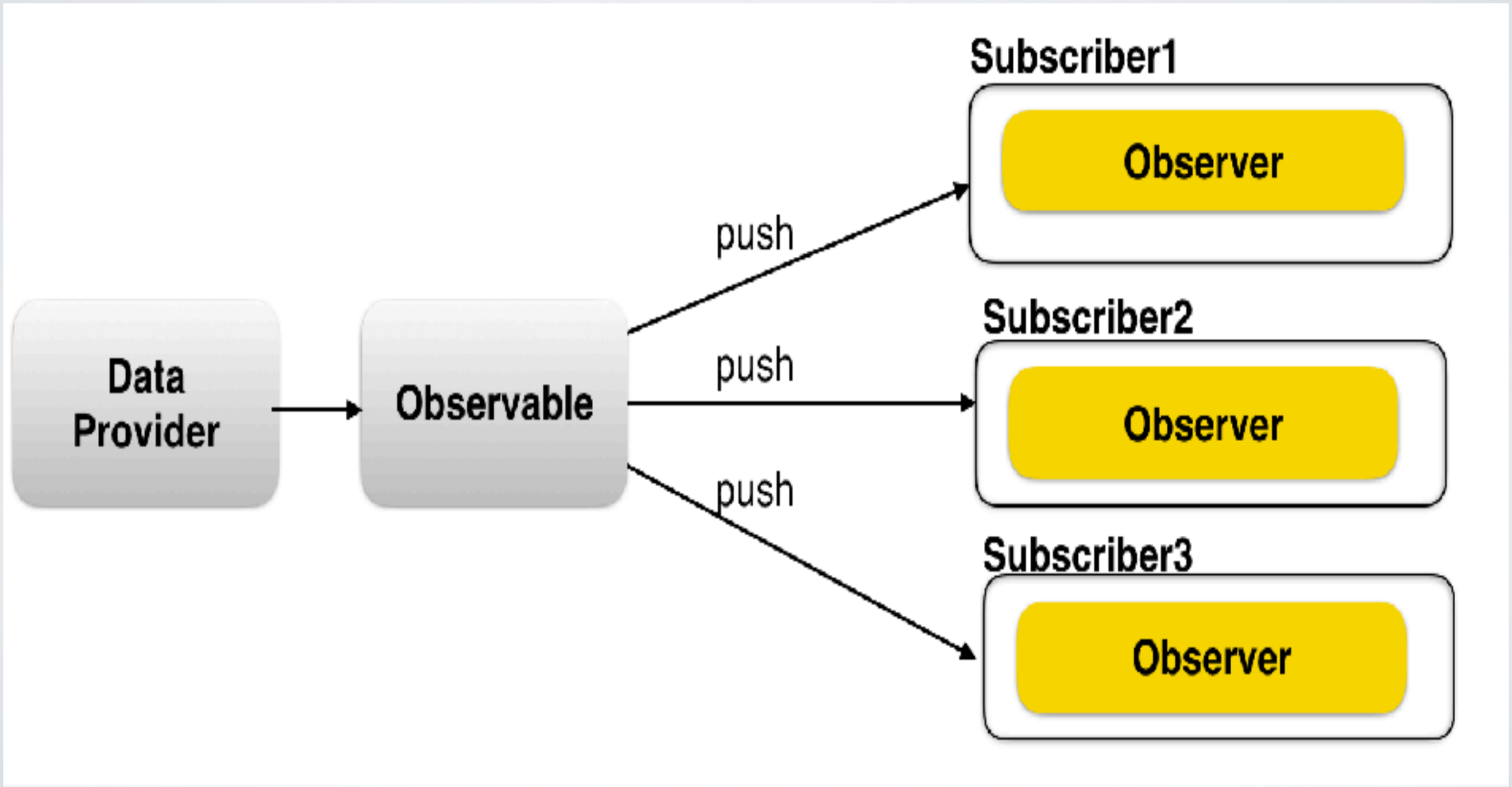
RFP - Observable Streams

ReactiveX

Javascript implementation: Rxjs

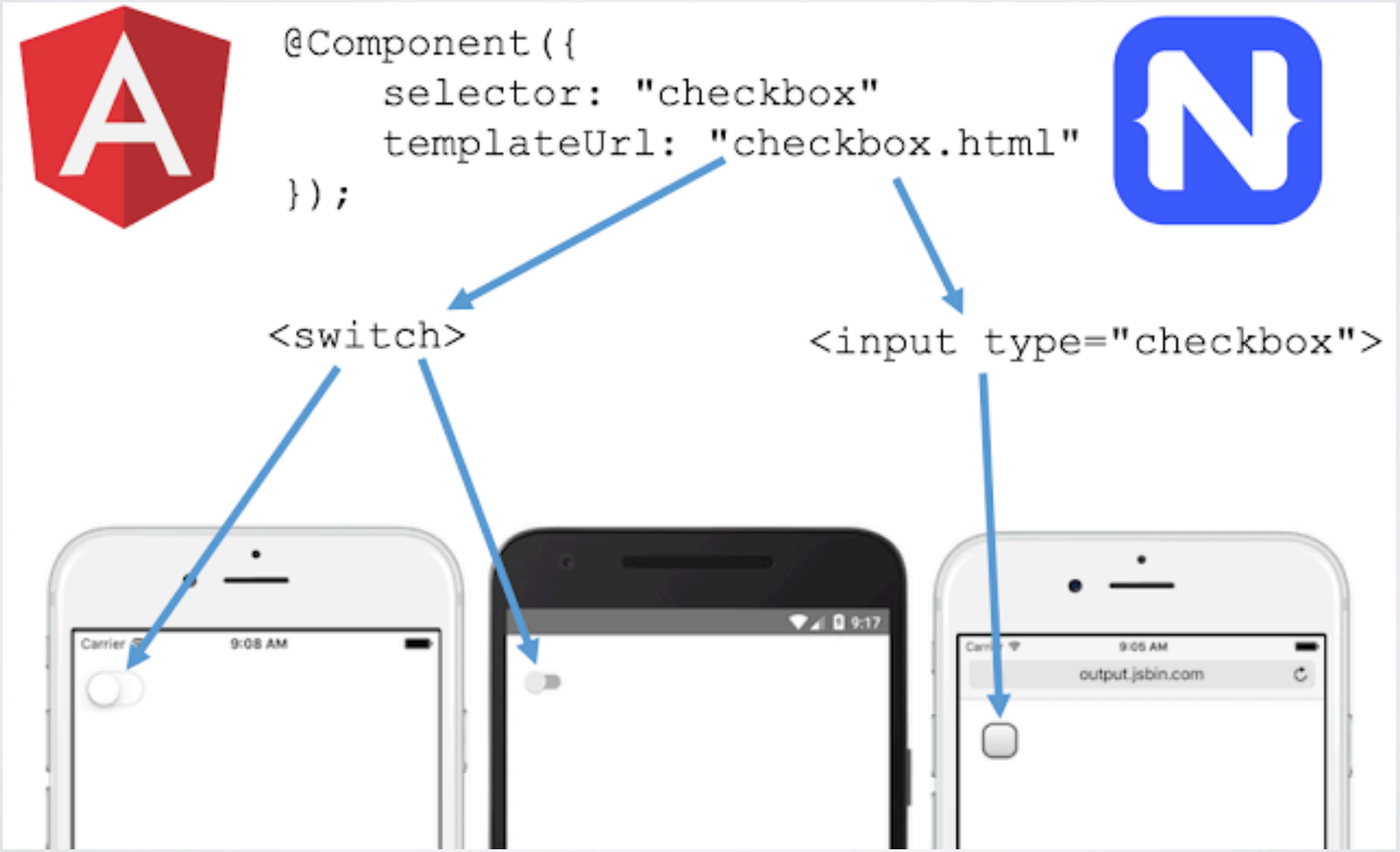
http://reactivex.io/rxjs/

Observable Streams



Things that play nice with Angular

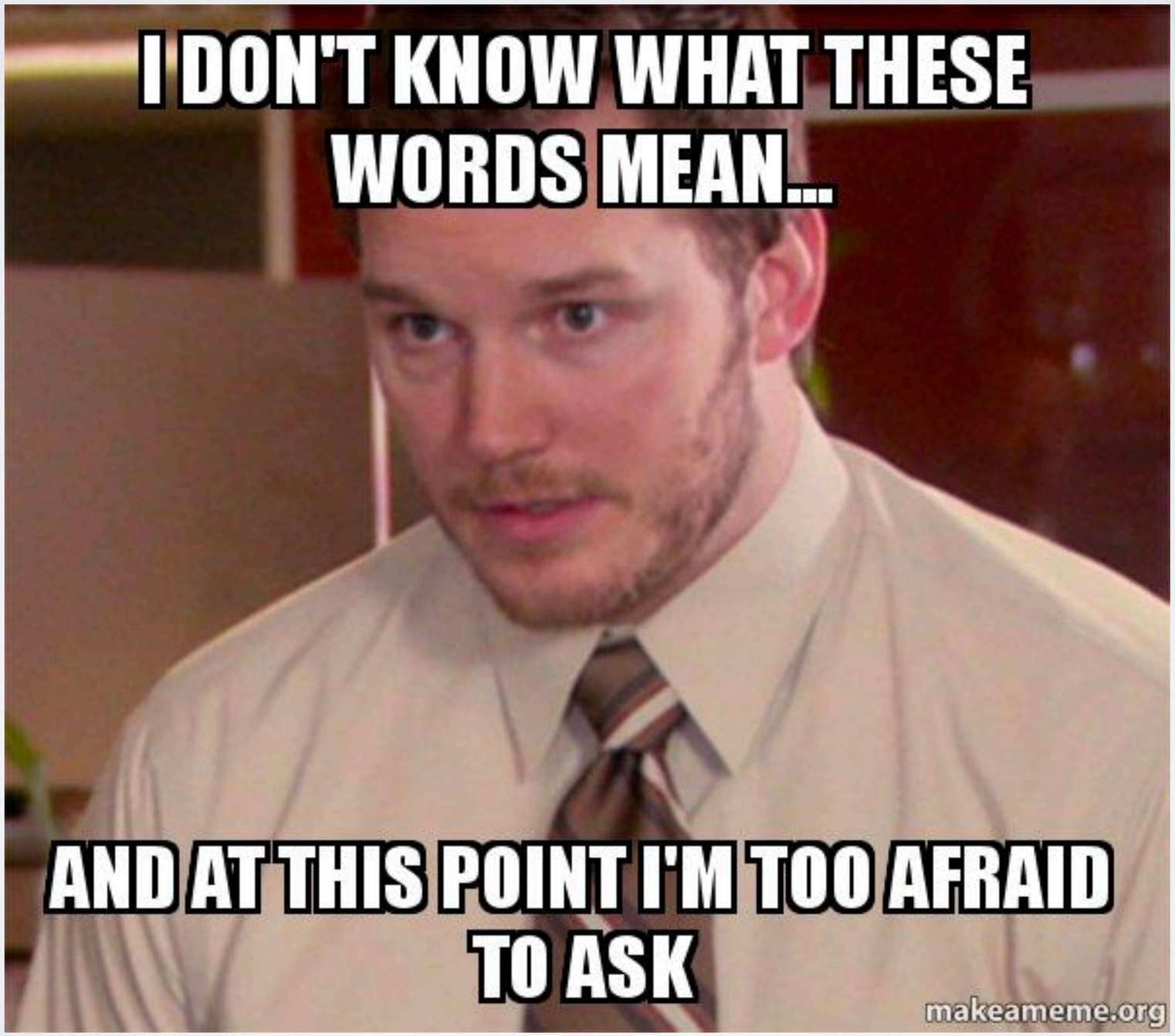
Angular + NativeScipt = Cross Mobile



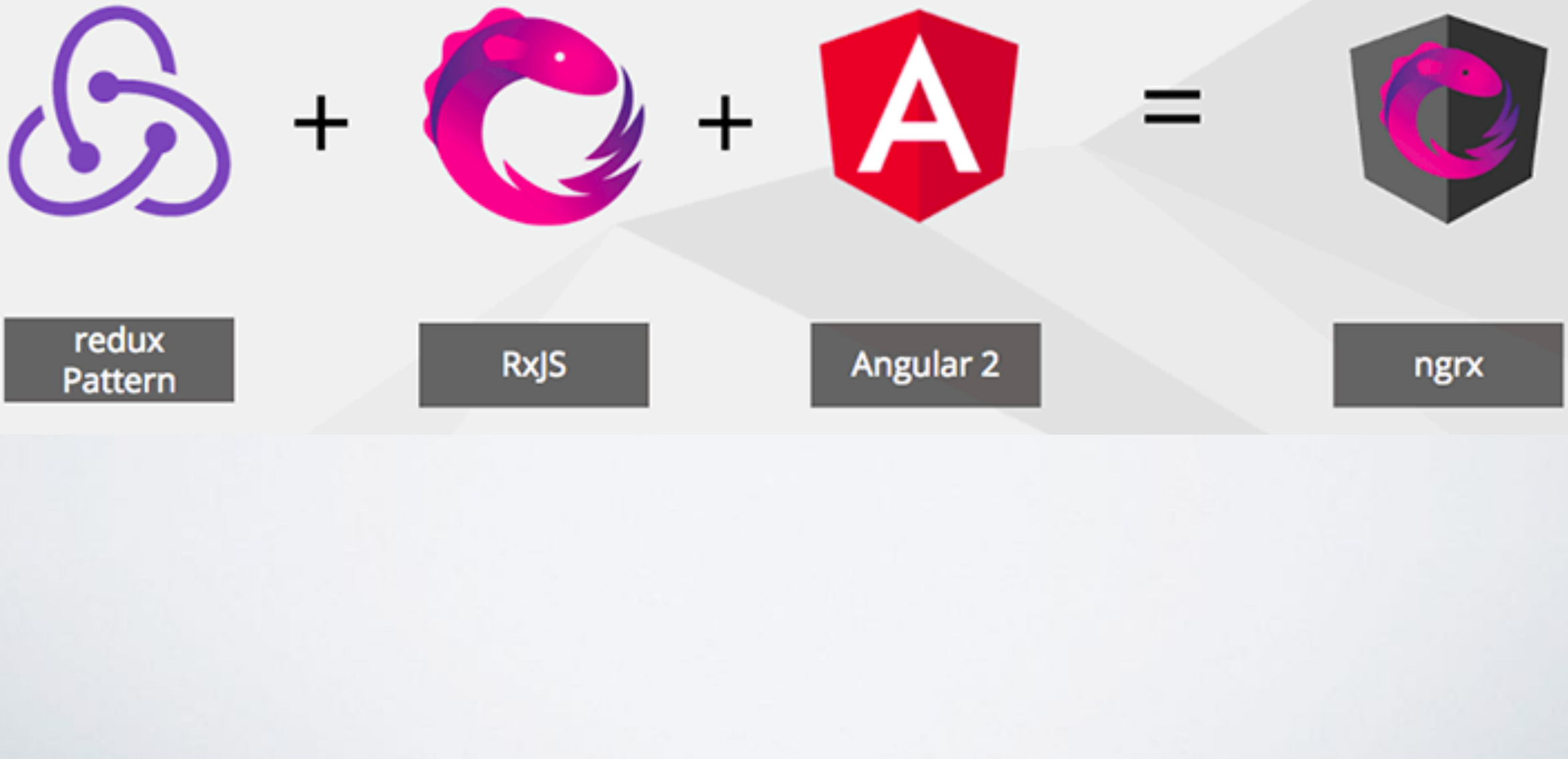
Redux Pattern

Ngrx:

"RxJS powered state management for Angular applications, inspired by Redux"



ngrx supercharges the redux pattern with RxJS

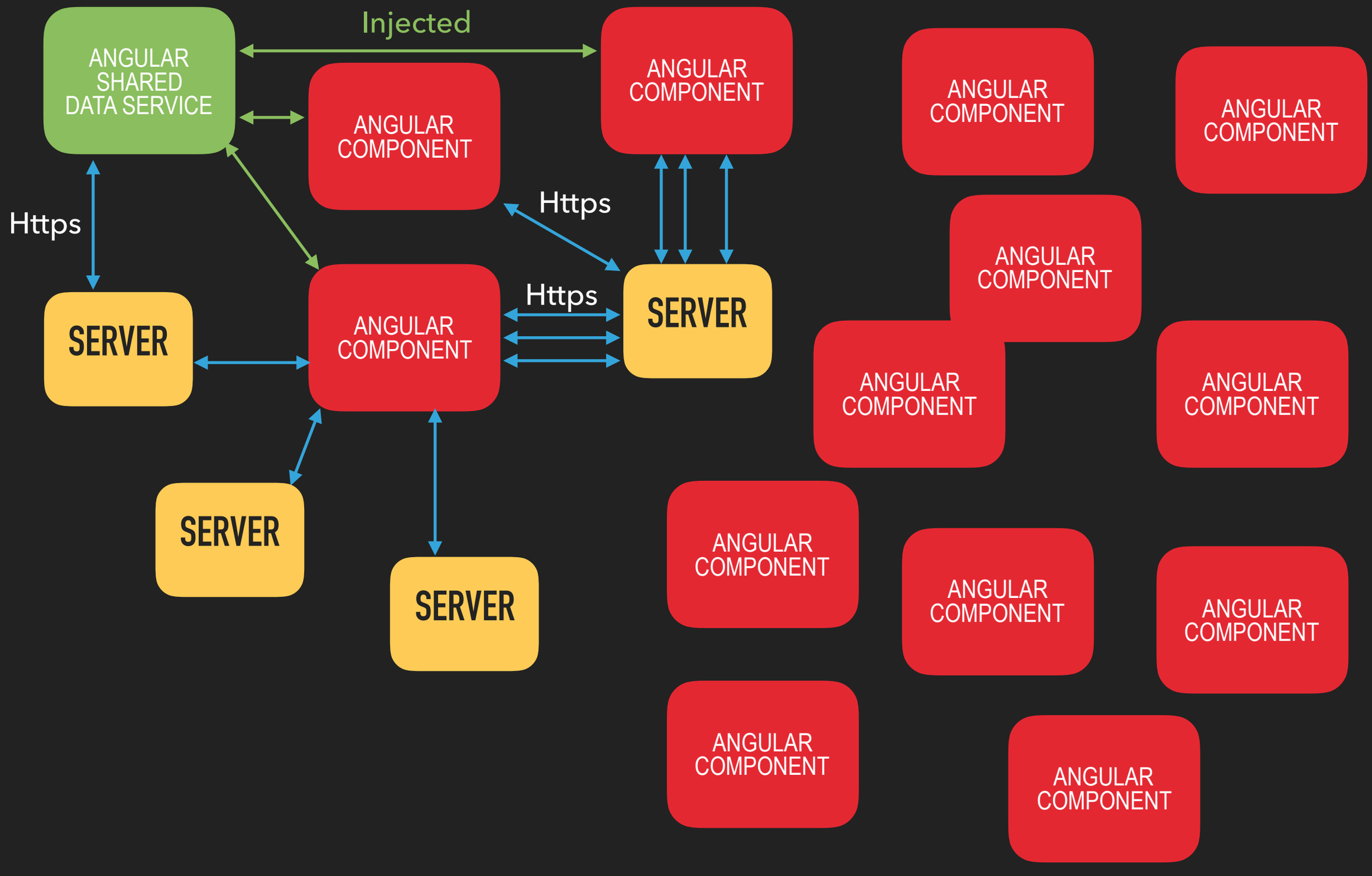


redux Pattern + RxJS + Angular 2 = ngrx

NGRX MIGHT BE THE RIGHT TOOL IF . . .

- User workflows are complex
- Your app has a large variety of user workflows (ex: both regular users and administrators)
- Users can collaborate
- You're using web sockets or Server Sent Events
- You're loading data from multiple endpoints to serve a single view

THE PROBLEM


ANGULAR SHARED DATA SERVICE
Injected
ANGULAR COMPONENT
ANGULAR COMPONENT
ANGULAR COMPONENT
ANGULAR COMPONENT
ANGULAR COMPONENT
Https
Https
Https
SERVER
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ANGULAR COMPONENT

THE SOLUTION:

DATA FLOW

@ngrx/STORE

Action Stream

REDUCER

(state, action) =>
state

STATE

{ ...appState }

@ngrx/
Effects

Https

SERVER

ACTION

{ type: addToDo
payload: ski }

Dispatch
Action

Dispatch Action

ANGULAR
COMPONENT

Components
Subscribes to
State

BENEFITS OF THE REDUX PATTERN

THESE ARCHITECTURAL DECISIONS:

- Single Source of Truth: The Store - centralized client side state
- One Way Data Flow
- State is only updated through pure functions (reducers)

PROVIDE THESE BENEFITS:

- Provides insight into race conditions bugs
- Deterministic State Reproduction
- Deterministic View Renders
- State updates are transactional
- Testing is easier
- More performant - Angular change detection OnPush setting

MORE PERFORMANT CHANGE DETECTION: "ONPUSH"

```
@Component({
  // ...
  changeDetection: ChangeDetectionStrategy.OnPush
})
```

```
let squirl = {
    tail: 'bushy',
    color: 'red-brown'
    age: 2,
    energyLevel: 'high',
    favoriteFood: 'pizza'
};
```

!! Mutating the state, same reference

```
squirl.age = 12;
squirl.energyLevel = 'low';
```

Replacing state, new reference

```
squirl = {
    tail: 'bushy',
    color: 'red-brown'
    age: 12,
    energyLevel: 'low',
    favoriteFood: 'pizza'
};
```

DETERMINISTIC STATE/VIEWS WITH ACTIONS, TRANSACTIONAL LOG

- Show redux dev tools, in demo app

DISPATCHING AN ACTION

```
<bc-toolbar (openMenu)="openSidenav()">
  Book Collection
</bc-toolbar>
```

```
openSidenav() {
  this.store.dispatch(new layout.OpenSidenav());
}
```

THE ACTION

```ts
import { Action } from '@ngrx/store';

export const OPEN_SIDENAV = '[Layout] Open Sidenav';
export const CLOSE_SIDENAV = '[Layout] Close Sidenav';

export class OpenSidenav implements Action {
  readonly type = OPEN_SIDENAV;
}

export class CloseSidenav implements Action {
  readonly type = CLOSE_SIDENAV;
}

export type Actions = OpenSidenav | CloseSidenav;
```

```
{
  type: '[Layout] Open Sidenav',
}
```

THE SOLUTION:

DATA FLOW

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@ngrx/
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ANGULAR
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THE REDUCER

```
import * as layout from '../actions/layout';

export function reducer(state = initialState, action: layout.Actions): State {
  switch (action.type) {
    case layout.CLOSE_SIDENAV:
      return {
        showSidenav: false,
      };

    case layout.OPEN_SIDENAV:
      return {
        showSidenav: true,
      };

    default:
      return state;
  }
}
```

THE SOLUTION:

DATA FLOW

@ngrx/STORE

Action Stream

REDUCER

(state, action) =>
state

STATE

{ ...appState }

@ngrx/
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payload: ski }

Dispatch
Action

Dispatch Action

ANGULAR
COMPONENT

Components
Subscribes to
State

STATE

```
import * as layout from '../actions/layout';
```

```
export interface State {
  showSidenav: boolean;
}

const initialState: State = {
  showSidenav: false,
};
```

THE SOLUTION:

DATA FLOW

@ngrx/STORE

Action Stream

REDUCER

(state, action) =>
state

STATE

{ ...appState }

@ngrx/
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Https

SERVER

ACTION

{ type: addToDo
payload: ski }

Dispatch
Action

Dispatch Action

ANGULAR
COMPONENT

Components
Subscribes to
State

SELECTOR & COMPONENT

```ts
export const getShowSidenav = (state: State) => state.showSidenav;
```

```ts
export class AppComponent {
  showSidenav$: Observable<boolean>;
  loggedIn$: Observable<boolean>;

  constructor(private store: Store<fromRoot.State>) {
    this.showSidenav$ = this.store.select(fromRoot.getShowSidenav);
    this.loggedIn$ = this.store.select(fromAuth.getLoggedIn);
  }
```

TEMPLATE

```
<bc-sidenav [open]="showSidenav$ | async">
  <bc-nav-item (navigate)="closeSidenav()" *ngIf="loggedIn$ | async" routerLink="/"
    My Collection
  </bc-nav-item>
  <bc-nav-item (navigate)="closeSidenav()" *ngIf="loggedIn$ | async" routerLink="/b
    Browse Books
  </bc-nav-item>
  <bc-nav-item (navigate)="closeSidenav()" *ngIf="!(loggedIn$ | async)">
    Sign In
  </bc-nav-item>
  <bc-nav-item (navigate)="logout()" *ngIf="loggedIn$ | async">
    Sign Out
  </bc-nav-item>
</bc-sidenav>
```

THE SOLUTION:

DATA FLOW

@ngrx/STORE

Action Stream

REDUCER

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state

STATE

{ ...appState }

@ngrx/
Effects

Https

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payload: ski }

Dispatch
Action

Dispatch Action

ANGULAR
COMPONENT

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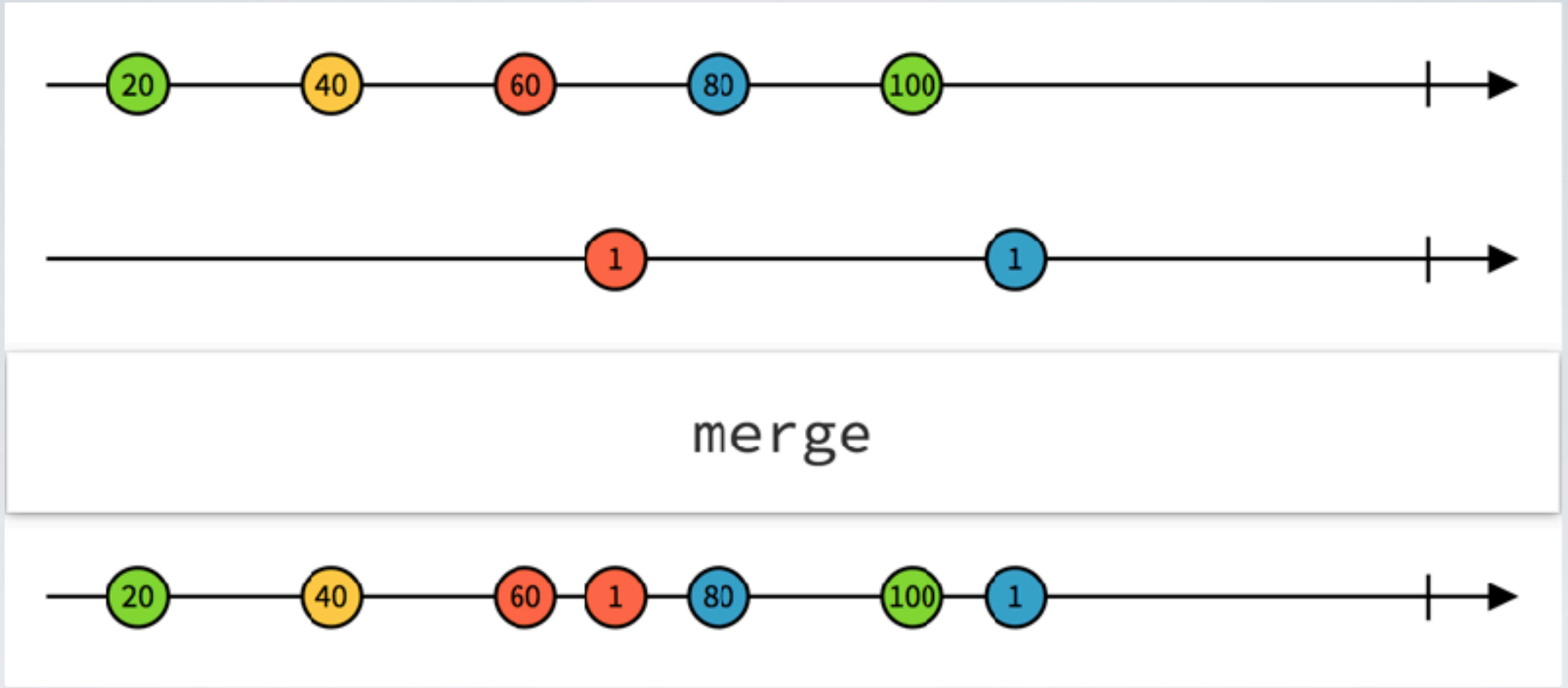
State

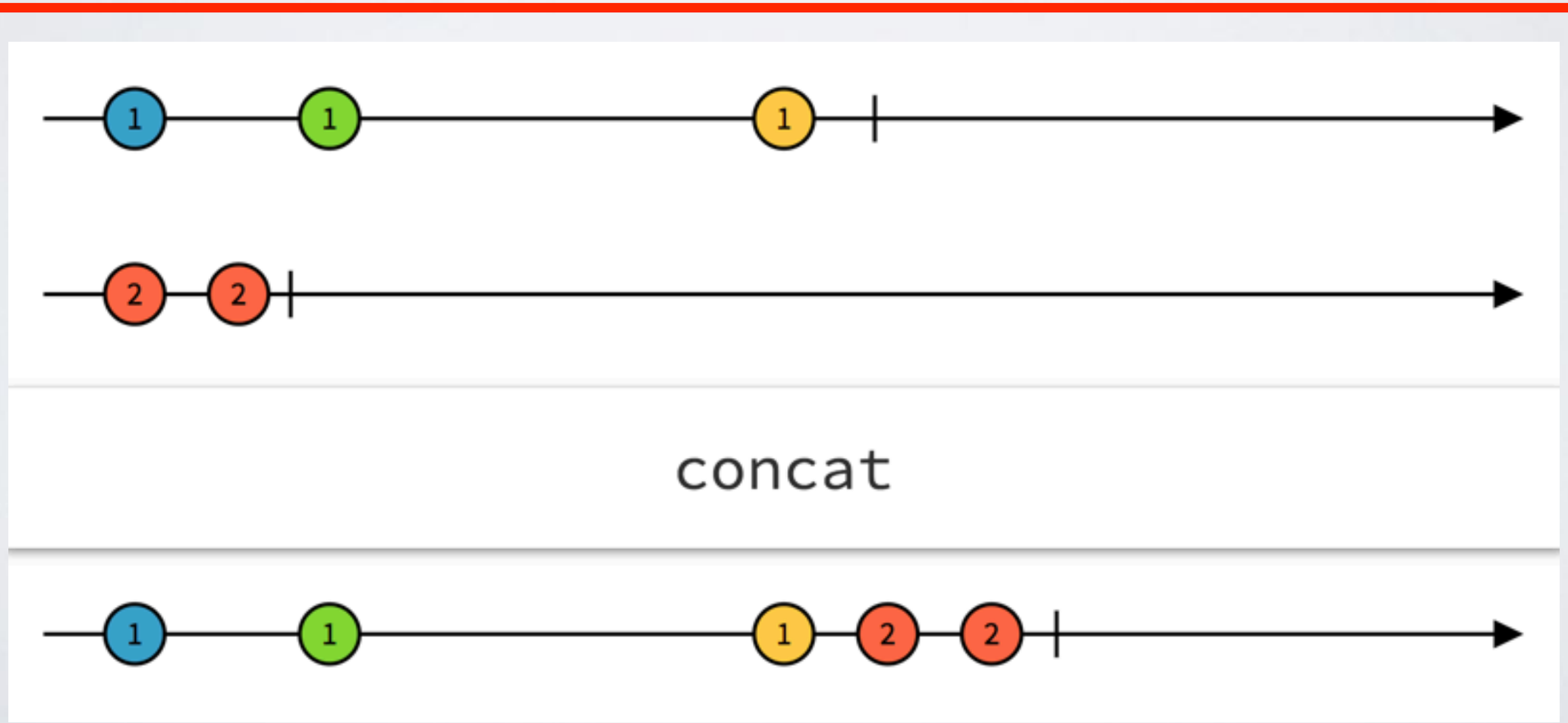
EFFECT

```
@Injectable()
export class BookEffects {
  @Effect()
  search$: Observable<Action> = this.actions$
    .ofType<book.Search>(book.SEARCH)
    .debounceTime(this.debounce, this.scheduler || async)
    .map(action => action.payload)
    .switchMap(query => {
      if (query === '') {
        return empty();
      }

      const nextSearch$ = this.actions$.ofType(book.SEARCH).skip(1);

      return this.googleBooks
        .searchBooks(query)
        .takeUntil(nextSearch$)
        .map((books: Book[]) => new book.SearchComplete(books))
        .catch(() => of(new book.SearchComplete([])));
    });
```

EFFECT

```
@Injectable()
export class DisclosuresEffects {

  @Effect() disclosuresContinue$ = this.actions$
    .ofType(LAST_PAGE_BEFORE_SOMETHING_AWESOME_CONTINUE)
    .map(toPayload)
    .exhaustMap(payload => concat(
        this.updateSecurityCert(toApiSecurityCertification(payload)),
        this.updateAccounts(),
        this.updateBillPay(),
        this.updateAccountConfigs(),
        this.orderTeddyBear(),
        this.updateDebitCardApps(),
        this.applyCoupon(),
        this.updateUserRelationships(),
        this.createWelcomeEmail(payload.emailDisclosures),
        this.sendWelcomeEmail(),
        [new CompleteAction()]
    )
    .catch(error => [new DisclosuresContinueErrorAction(error)])
  );
```


20
40
60
80
100
1
1
merge
20
40
60
1
80
100
1


1
1
1
2
2
concat
1
1
1
2
2

Additional resources:

https://github.com/apasternack/Presentations/tree/master/WestervilleWebMeetup_2.6.2018

THE END

STAY IN TOUCH

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