



Global Knowledge®

# Angular + TypeScript Module Forms

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— WORLDWIDE LOCATIONS —

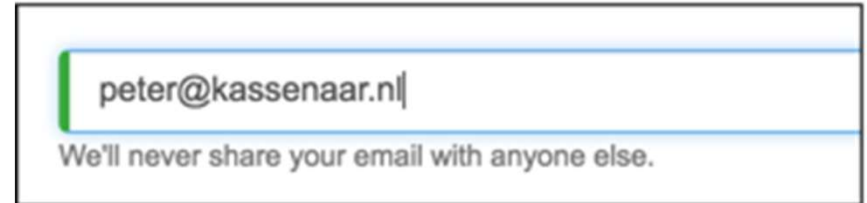
BELGIUM CANADA COLOMBIA DENMARK EGYPT FRANCE IRELAND JAPAN KOREA MALAYSIA MEXICO NETHERLANDS NORWAY QATAR  
SAUDI ARABIA SINGAPORE SPAIN SWEDEN UNITED ARAB EMIRATES UNITED KINGDOM UNITED STATES OF AMERICA

# Contents

- Form Fundamentals
- **Template Driven** Forms
- **Reactive Forms** (aka *Model Driven Forms*)
- Subscribing to Form events

# Forms in Web Applications - Tasks

- Initialize Default Values

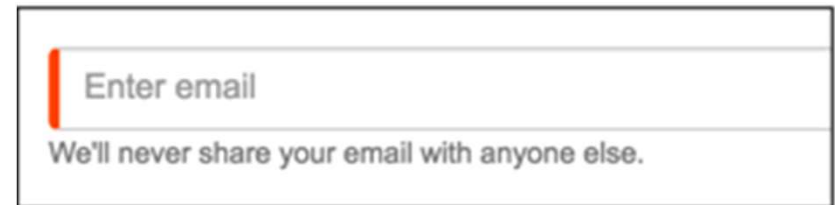


peter@kassenaar.nl

We'll never share your email with anyone else.

# Forms in Web Applications - Tasks

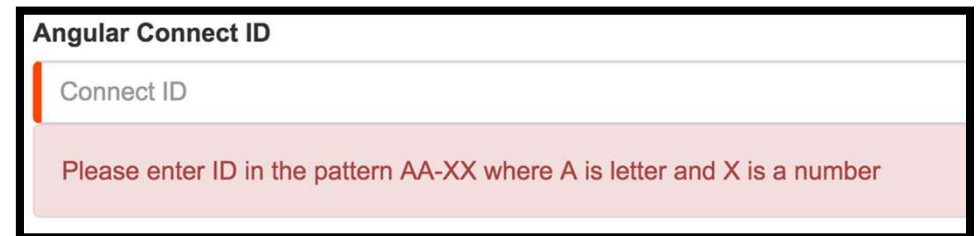
- Initialize Default Values
- Validate Data



The image shows a rectangular form with a thin black border. Inside, there is a text input field with a light gray border and a red vertical bar on the left side. The placeholder text "Enter email" is centered in the field. Below the input field, the text "We'll never share your email with anyone else." is displayed in a smaller font.

# Forms in Web Applications - Tasks

- Initialize Default Values
- Validate Data
- Display Validation messages



The screenshot shows a web form titled "Angular Connect ID". It contains a text input field with the placeholder text "Connect ID". Below the input field, there is a red error message: "Please enter ID in the pattern AA-XX where A is letter and X is a number". The entire form is enclosed in a black border.

# Forms in Web Applications - Tasks

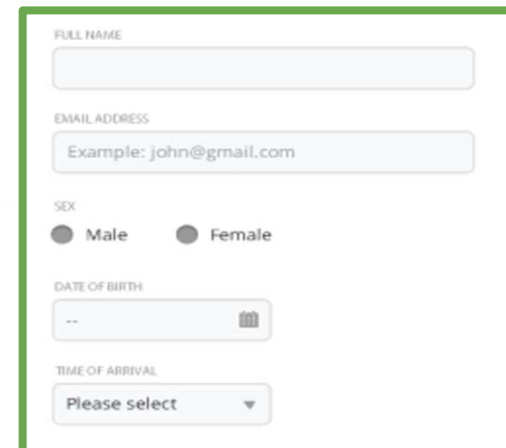
- Initialize Default Values
- Validate Data
- Display Validation messages
- **Serialize User Data**



# Forms in Web Applications - Tasks

- Initialize Default Values
- Validate Data
- Display Validation messages
- Serialize User Data
- Dynamic Forms & Dynamic Controls

```
{
  key: 'email',
  type: 'input',
  templateOptions: {
    type: 'email',
    label: 'Email address',
    placeholder: 'Enter email'
  }
},
{
  key: 'password',
  type: 'input',
  templateOptions: {
    type: 'password',
    label: 'Password',
    placeholder: 'Password'
  }
},
}
```



# Forms in Web Applications - Tasks

- Initialize Default Values
- Validate Data
- Display Validation messages
- Serialize User Data
- Dynamic Forms & Dynamic Controls
- Custom Controls & Custom Validation

Search the table ...							
	Inv No	Date	Name	Amount	Price	Cost	Note
690	Inv No 690	7/15/2012	Name 690	444	671	297924	Note 690
691	Inv No 691	7/15/2012	Name 691	657	865	568305	Note 691
692	Inv No 692	7/15/2012	Name 692	804	92	73968	Note 692
693	Inv No 693	7/15/2012	Name 693	625	135	84375	Note 693
694	Inv No 694	7/15/2012	Name 694	906	608	550848	Note 694
695	Inv No 695	7/15/2012	Name 695	360	393	141480	Note 695
696	Inv No 696	7/15/2012	Name 696	293	600	175800	Note 696
697	Inv No 697	7/15/2012	Name 697	166	309	51294	Note 697



# Angular 2 – Types of Forms

**Template Driven Forms**

**Model Driven  
(Reactive Forms)**

# Angular 2 – Types of Forms

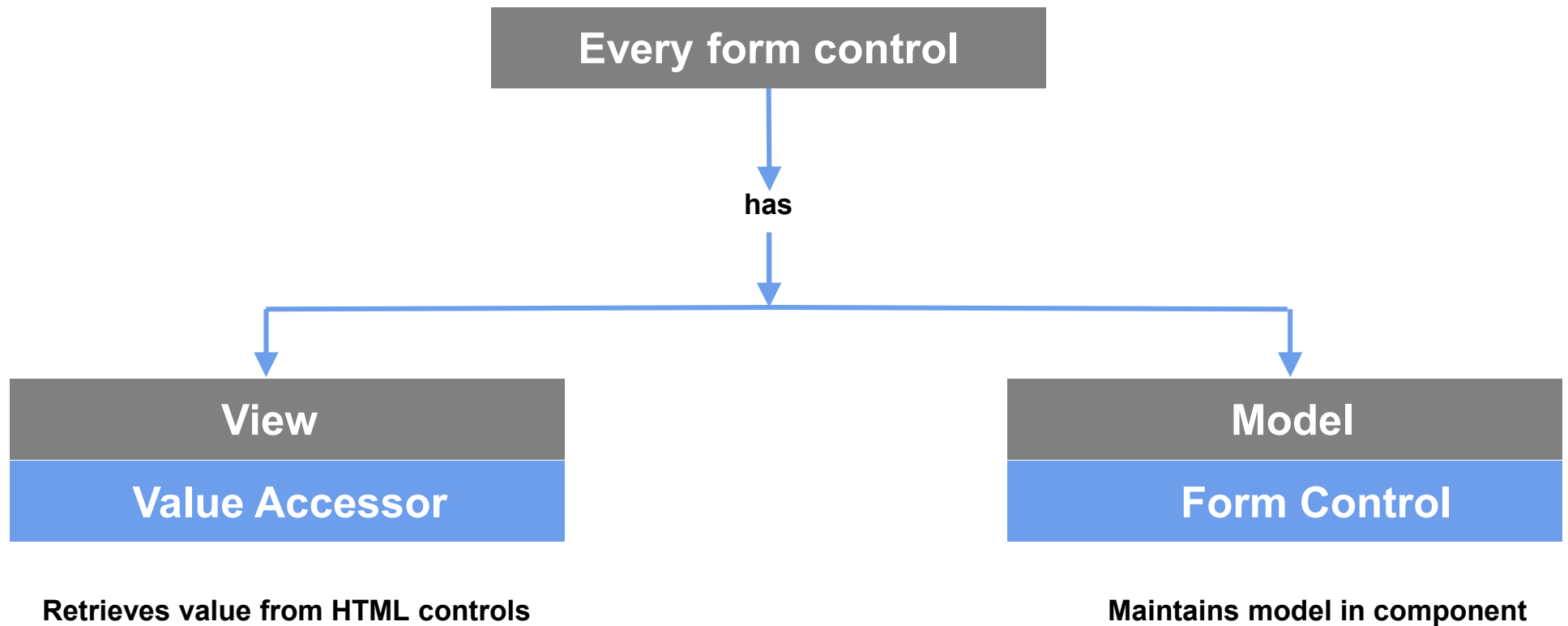
## Template Driven Forms

- Source of truth is the Template
- Define templates. Angular generates form model o/t fly
- Less descriptive
- Quickly Build simple forms – Less control
- Less testable

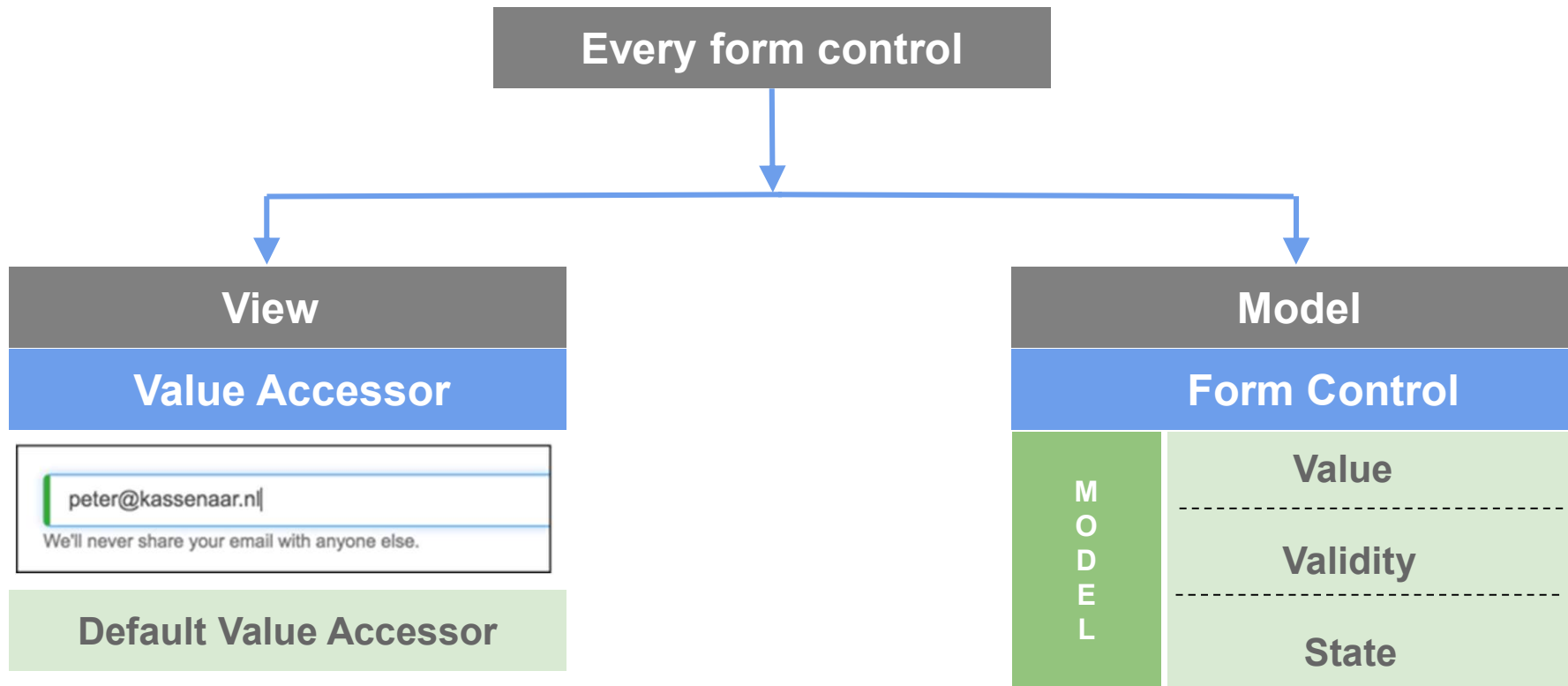
## Model Driven (Reactive Forms)

- Source of truth is the component class / directive
- Instantiate Form model and Control model yourself
- More Descriptive
- Code all the details. Takes more time, gives more control
- Very good testable

# Angular 2 Forms - Fundamentals



# In more detail



# Angular 2 Forms - Base class

```
export abstract class AbstractControl {  
    _value: any;  
  
    ...  
  
    private _status: string;  
    private _errors: {[key: string]: any};  
    private _pristine: boolean = true;  
    private _touched: boolean = false;  
  
    ...  
  
    get value(): any { return this._value; }  
    get valid(): boolean { return this._status === VALID; }  
  
    ...  
  
    abstract setValue(value: any, options?: Object): void;  
  
    ...  
}
```

<https://github.com/angular/angular/blob/master/modules/%40angular/forms/src/model.ts>

# Summary – what have we learned so far

**1**

**Template Driven Forms**

Less to code

**2**

**Model Driven Forms**

More to code

**3**

**Model**

Value/Validity/State

# Angular 2 – Types of Forms


**Template Driven Forms**

**Model Driven  
(Reactive Forms)**

# Let's build a template driven form!

- Step 1 – Add (or check) `FormsModule` in `app/main.ts`

```
import {platformBrowserDynamic} from '@angular/platform-browser-dynamic';  
import {FormsModule} from '@angular/forms';  
  
import {AppModule} from './app.module';
```



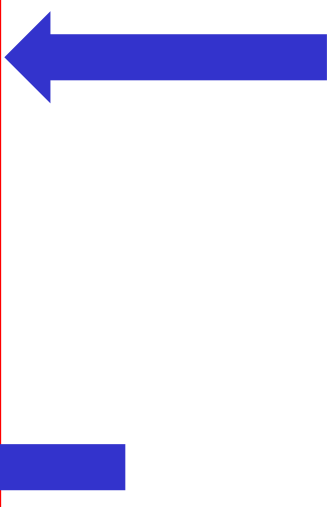


## Step 2 – Add FormsModule to app.module.ts

```
import {NgModule}      from '@angular/core';
import {BrowserModule} from '@angular/platform-browser';
import {FormsModule}    from '@angular/forms';

import {AppComponent}   from './app.component';

@NgModule({
  imports      : [BrowserModule, FormsModule],
  declarations: [AppComponent],
  bootstrap   : [AppComponent]
})
export class AppModule {
}
```



## Step 3 – write form in HTML

```
<form novalidate>
  <div class="form-group">
    <label for="inputEmail">Email address</label>
    <input type="email" class="form-control" id="inputEmail"
      placeholder="Enter email" name="email">
    <small class="form-text text-muted">
      We'll never share your email with anyone else.
    </small>
  </div>
  <div class="form-group">
    <label for="inputPassword">Password</label>
    <input type="password" class="form-control" id="inputPassword"
      placeholder="Password" name="password">
  </div>

  <button type="submit" class="btn btn-primary">Submit</button>
</form>
```

This is just plain HTML. No Angular stuff here...

## Step 4. Defining a Template Driven Form

- Add `#myForm="ngForm"` to the `<form>` tag
  - This declares a local variable with the name `#myForm` to the `<form>` element. It is of type `NgForm`
- Add `ngModel` to each and every form field
  - No value necessary

```
<form novalidate #myForm="ngForm">
  <div class="form-group">
    <input type="email" class="form-control" id="inputEmail"
      placeholder="Enter email" name="email" ngModel>
  </div>
  <div class="form-group">
    <input type="password" class="form-control" ngModel
      id="inputPassword" placeholder="Password" name="password">
  </div>
```

# Just checking – Sample results pane

```
<div class="form-result">
  <h3>Validity</h3>
  <div class="validity" [ngClass]="{'invalid-form': !myForm.valid}">
    <div *ngIf="myForm.valid">Valid</div>
    <div *ngIf="!myForm.valid">Invalid</div>
  </div>
  <h3>Results</h3>
  <div class="result">
    {{ myForm.value | json }}
  </div>
</div>
```

Just to show runtime results of the Validity and Value of the form using

`myForm.valid`

`myForm.value`

# Results so far

## 17a - Angular 2 - Template Driven Forms

### Email address

We'll never share your email with anyone else.

### Password

### Validity

Valid

### Results

```
{ "email": "", "password": "" }
```

# Checkpoint

- The `#myForm` exposes the value and the validity of the form as a whole.
- `ngModel` adds the individual controls to the `#myForm`.
- You can now check it's value and state in the results pane
- Try what happens if you remove one of the `ngModel` directives!
- Check for yourself: the value of a form is a JSON-object.



# Addressing individual controls

# Retrieve values from individual controls

- Do the same as with the form
- Add for example `#email="ngModel"` to input field
- Now, the value, validity and state (i.e. its `ValueAccessors!`) are accessible through the local template variable

```
<label for="inputEmail">Email address</label>
<pre>value: {{ email.value }} - valid : {{ email.valid}}</pre>
<input type="email" class="form-control" id="inputEmail"
      placeholder="Enter email" name="email" ngModel #email="ngModel">
<small class="form-text text-muted">
  We'll never share your email with anyone else.
</small>
```



# Required fields

- Add HTML5 attribute required to the input field.
- No checking on type yet!
  - It's just required.

```
<input type="email" class="form-control" id="inputEmail"  
placeholder="Enter email" name="email" ngModel #email="ngModel" required>
```

## 17a - Template Driven Forms /app.component2.html | .ts

### Email address

value: - valid : false

We'll never share your email with anyone else.

### Password

### Validity

Invalid

### Results

```
{ "email": "", "password": "" }
```

## 17a - Template Driven Forms /app.component2.html | .ts

### Email address

value: test - valid : true

We'll never share your email with anyone else.

### Validity

Valid

### Results





# Using ngModelGroup

# Adding ngModelGroup

- Combining form fields into logical groups

```
<div ngModelGroup="customer" #customer="ngModelGroup">
  <div class="form-group">
    ...
  </div>
</div>
```

Use a local template variable (i.e. `#customer="ngModelGroup"`) only if you want to have access to the state and validity of the group as a whole.

# ngModelGroup creates a nested object

17a - ngModelGroup  
/app.component3.html | .ts

---

**Email address**

value: info@kassenaar.com - valid : true

info@kassenaar.com

We'll never share your email with anyone else.

**Password**

value: test - valid : true

....

**Prefix**

Mr.

**First Name**

Peter

**Last Name**

Kassenaar

value {  
 "namePrefix": "Mr.",  
 "firstName": "Peter",  
 "lastName": "Kassenaar"  
}  
valid: true

Submit

**Validity**

Valid

**Results**

```
{ "email": "info@kassenaar.com", "password": "test", "customer":  
  { "namePrefix": "Mr.", "firstName": "Peter", "lastName":  
    "Kassenaar" } }
```



# Submitting forms

# Define a (click) handler on the button

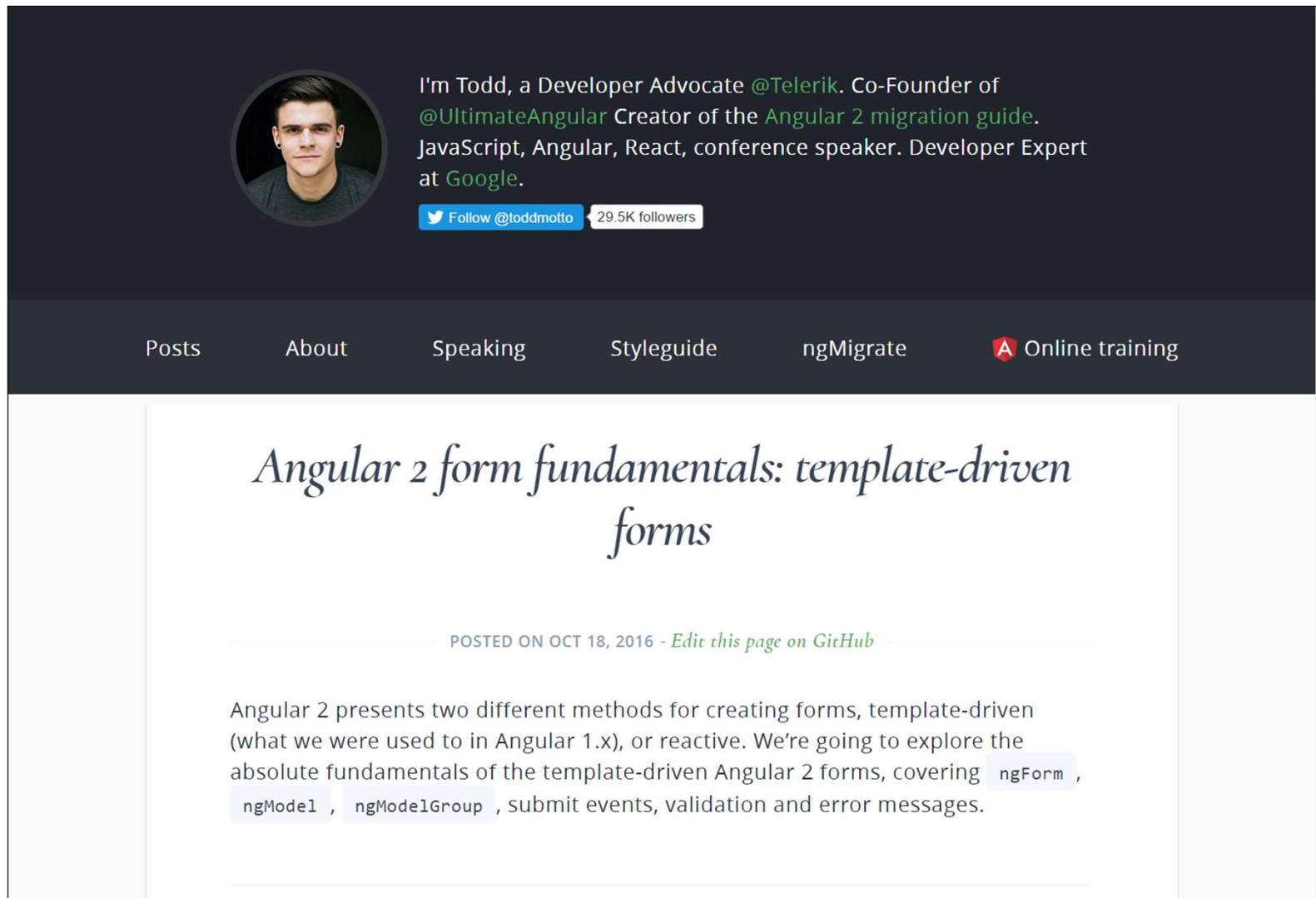
- Only activate the button if the form is valid
- Pass `myForm` as a parameter
- Note: no actual need for two-way databinding with `[(ngModel)]`

```
<button type="submit" class="btn btn-primary"
  (click)="onSubmit(myForm)"
  [disabled]="!myForm.valid">
  Submit
</button>
```

```
onSubmit(form){
  console.log('Form submitted: ', form.value);
  alert('Form submitted!' + JSON.stringify(form.value))
}
```



# More on Template Driven Forms



The screenshot shows a dark-themed header for a personal website. On the left is a circular profile picture of a man. To the right of the picture is a bio: "I'm Todd, a Developer Advocate @Telerik. Co-Founder of @UltimateAngular Creator of the Angular 2 migration guide. JavaScript, Angular, React, conference speaker. Developer Expert at Google." Below the bio is a blue "Follow @toddmotto" button and a white box showing "29.5K followers". A horizontal navigation bar below the header contains links: "Posts", "About", "Speaking", "Styleguide", "ngMigrate", and "Online training" (with a red 'A' icon). The main content area has a large, italicized title "Angular 2 form fundamentals: template-driven forms". Below the title is a line with "POSTED ON OCT 18, 2016 - [Edit this page on GitHub](#)". The first paragraph of the article reads: "Angular 2 presents two different methods for creating forms, template-driven (what we were used to in Angular 1.x), or reactive. We're going to explore the absolute fundamentals of the template-driven Angular 2 forms, covering `ngForm` , `ngModel` , `ngModelGroup` , submit events, validation and error messages."

<https://toddmotto.com/angular-2-forms-template-driven>



# Model Driven Forms

Or: *Reactive Forms*

# Reactive Forms

- Based on *reactive programming* we already know
  - Events, Event Emitters
  - Observables
- Every form control is an observable!

```
export abstract class AbstractControl {  
  
    ...  
    private _valueChanges: EventEmitter<any>;  
    ...  
    get valueChanges(): Observable<any> {  
        return this._valueChanges;  
    }  
    ...  
}
```

# Differences - key things to remember

- No more `ngForm` → use `[formGroup]`
- No more `ngModel` → use `formControlName`
- Import the `ReactiveFormsModule`
- Form state lives in the Component, *not* in the View
- Possible validations are in the Component, not in the View
- The view is *not* generated for you.
- You need to write the HTML yourself

# Form Controls are observables

- Import & instantiate in the Component
- Build your model in `constructor` or `ngOnInit`.
- Listen to changes (`.subscribe()`) and act accordingly:

```
export class AppComponent1 implements OnInit {  
  
  myReactiveForm: FormGroup;  
  
  constructor(private FormBuilder: FormBuilder) {  
  }  
  
  ngOnInit() {  
    this.myReactiveForm = this.FormBuilder.group({  
      email    : '',  
      password: ''  
    })  
  }  
}
```



# Subscribe to those observables

```
// 1. complete form
```

```
this.myReactiveForm.valueChanges.subscribe((value)=>{  
    console.log(value);  
});
```

```
// 2. watch just one control
```

```
this.myReactiveForm.get('email').valueChanges.subscribe((value)=>{  
    console.log(value);  
});
```



# Building reactive forms

# Step 1 – import ReactiveFormsModule

- app.module.ts

```
import {NgModule}      from '@angular/core';
import {BrowserModule} from '@angular/platform-browser';
import {FormsModule, ReactiveFormsModule} from '@angular/forms';
import ...

@NgModule({
  imports      : [
    BrowserModule,
    FormsModule,
    ReactiveFormsModule,
    ...
  ],
  ...
})
export class AppModule {
}
```



## Step 2 – use [formGroup] and formControlName

```
<form novalidate [formGroup]="myReactiveForm">
  <div class="form-group">
    <label for="inputEmail">Email address</label>
    <input type="email" class="form-control" id="inputEmail"
      placeholder="Enter email" name="email"
      formControlName="email">
  </div>
  ...
  // all other controls
</form>
```

## Step 3 – Build your form in Component

```
export class AppComponent1 implements OnInit {
  myReactiveForm: FormGroup;
  constructor(private FormBuilder: FormBuilder) {
  }
  ngOnInit() {
    // 1. Define the model of Reactive Form.
    // Notice the nested FormBuilder.group() for group Customer
    this.myReactiveForm = this.FormBuilder.group({
      email    : '',
      password: '',
      customer: this.FormBuilder.group({
        prefix: '',
        firstName: '',
        lastName: ''
      })
    })
  }
}
```

# Subscribe to changes

```
ngOnInit() {  
    ...  
  
    // 2. Subscribe to changes at form level or...  
    this.myReactiveForm.valueChanges.subscribe((value)=>{  
        console.log('Changes at form level: ', value);  
    });  
  
    // 3. Subscribe to changes at control level.  
    this.myReactiveForm.get('email').valueChanges.subscribe((value)=>{  
        console.log('Changes at control level: ', value);  
    });  
}
```

# Submitting a reactive form

- Can be based on `.valueChanges()` (though not very likely) for any given form control or complete form
- Use just `.click()` event handler for submit button

```
<button type="submit" class="btn btn-primary"
  (click)="onSubmit()"
  [disabled]="!myReactiveForm.valid">
  Submit
</button>
```

```
onSubmit() {
  console.log('Form submitted: ', this.myReactiveForm.value);
  // TODO: do something useful with form
}
```



# Form Validation

# 1. Validating Template driven forms

Use HTML5-attributes like `required`, `pattern`,  
`minlength` and so on.

Under the hood, these are actually Angular directives!

Angular adds/removes corresponding classes.

```
<input type="password" class="form-control" ngModel  
      id="inputPassword" placeholder="Password" name="password"  
      #pw="ngModel" required minlength="6">
```

# Validating reactive forms

No more declarative attributes `required`, `minlength`, `maxlength` and so on.

Add `Validator` on the component class instead.

Configure validator per your needs.



# Angular 2 built-in validators

[angular/modules/@angular/forms/src/validators.ts](#)

```
export class Validators {  
  
    static required(control: AbstractControl): {[key: string]: boolean} {  
    }  
  
    static minLength(minLength: number): ValidatorFn {  
    }  
  
    static maxLength(maxLength: number): ValidatorFn {  
    }  
  
    static pattern(pattern: string): ValidatorFn {  
    }  
  
    static nullValidator(c: AbstractControl): {  
    }  
  
    . . .  
}
```

# Adding default Validators

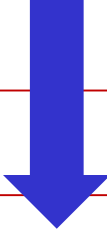
- Adding Validators to class definition
  - `email : ['', Validators.required],`
- Multiple validations? Add an array of Validators, using `Validators.compose()`

```
this.myReactiveForm = this.formBuilder.group({  
  email : ['', Validators.required],  
  password: ['', Validators.compose([Validators.required, Validators.minLength(6)])],  
  confirm: ['', Validators.compose([Validators.required, Validators.minLength(6)])],  
  ...  
});
```

# Adding Custom Validators

- Creating a Password-confirm validator
- Steps:
  1. Create a validation function, taking `AbstractControl` as a parameter
  2. Write your logic
  3. Don't forget: pass the function in as a configuration parameter for the group or form you are validating!

```
function passwordMatcher(control: AbstractControl) {  
    return control.get('password').value === control.get('confirm').value  
        ? null : {'nomatch': true};  
    // we *could* return just true/false here, but by returning an object  
    // we're more flexible in composing our validators.  
}
```



```
this.myReactiveForm = this.formBuilder.group({  
    email    : ['', Validators.required],  
    password: ['', Validators.compose([Validators.required, Validators.minLength(6)])],  
    confirm  : ['', Validators.compose([Validators.required, Validators.minLength(6)])],  
    },  
    {validator: passwordMatcher} // pass in the validator function  
);
```

# More on FormBuilder class

- <https://angular.io/docs/ts/latest/api/forms/index/FormBuilder-class.html>
- Information on using and configuring FormBuilder

**FormBuilder** STABLE  
CLASS

**What it does**

Creates an `AbstractControl` from a user-specified configuration.

It is essentially syntactic sugar that shortens the `new FormGroup()`, `new FormControl()`, and `new FormArray()` boilerplate that can build up in larger forms.

**How to use**

To use, inject `FormBuilder` into your component class. You can then call its methods directly.

```
1. import {Component, Inject} from '@angular/core';
2. import {FormBuilder, FormGroup, validators} from '@angular/forms';
3.
4. @Component({
5.   selector: 'example-app',
6.   template: `
```

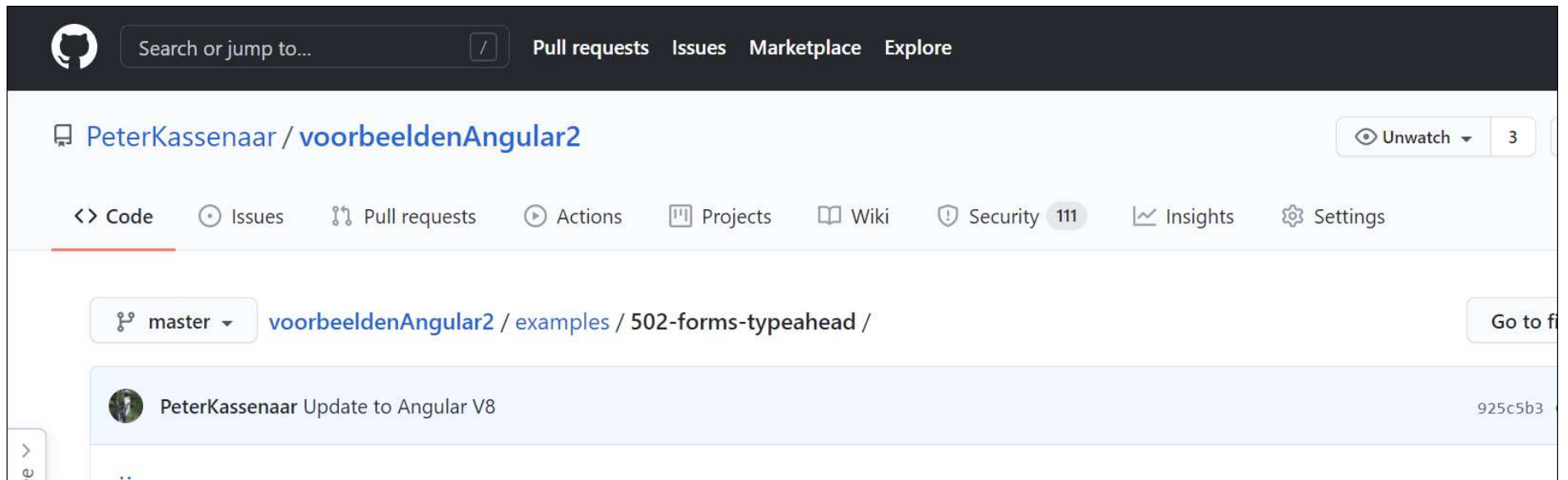


# Subscribing to form events

Working with Observables (again). Typeahead demo

# Example

- `.../voorbeeldenAngular2/examples/502-forms-typeahead`



# Define a form

```
<form novalidate [formGroup]="searchForm">
  <div class="form-group">
    <label for="searchYouTube">Search YouTube</label>
    <input type="text" class="form-control" id="searchYouTube"
      formControlName="searchYouTube"
      placeholder="Search YouTube" name="search">
  </div>
</form>
```



# Define component

- Compose a class, subscribe to `.valueChanges()` event

```
import {Http, Response} from '@angular/http';
import {Observable} from 'rxjs/Observable'
import {FormControl, FormGroup} from "@angular/forms";
...
// import just the operators we need, not import 'rxjs/Rx'
import 'rxjs/add/operator/map';
import 'rxjs/add/operator/switchMap';
import 'rxjs/add/operator/debounceTime';

// define some constants
const BASE_URL = 'https://www.googleapis.com/youtube/v3/search';
const API_KEY = 'AIzaSyBdi3LXzf1xWXOAVgAwNkGvjnM1TwSV4VU';
// compose a url to search for, based on a query/keyword
const makeURL = (query: string) => `${BASE_URL}?q=${query}&part=snippet&key=${API_KEY}`;
```

```

@Component({
  selector    : 'component1',
  templateUrl: 'app/component1/app.component1.html'
})
export class AppComponent1 implements OnInit {
  videos: Observable<any[]>;

  // compose our form
  searchYouTube = new FormControl();
  searchForm    = new FormGroup({
    searchYouTube: this.searchYouTube,
  });

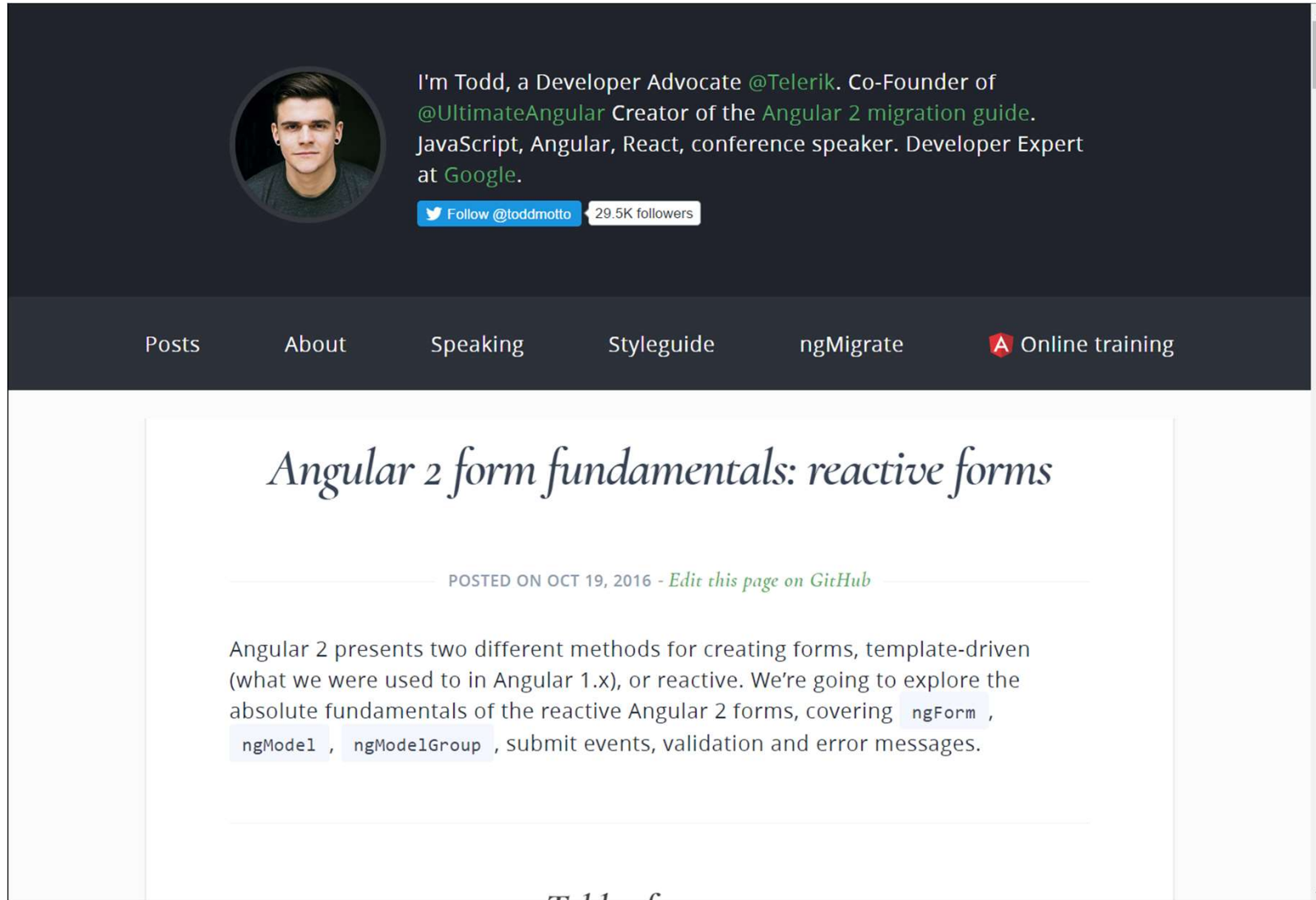
  constructor(private http: Http) {
  }

  ngOnInit() {
    // subscribe to Youtube input textbox and bind async (see html)
    this.videos = this.searchYouTube.valueChanges
      .debounceTime(600)           // wait for 600ms to hit the API
      .map(query => makeURL(query)) // turn keyword into a real youtube-URL
      .switchMap(url => this.http.get(url)) // wait for, and switch to the Observable that my http get call returns (mo
      .map((res: Response) => res.json())   // map its response to json
      .map(response => response.items);    // unwrap the response and return only the items array
  }
}

```

- See `.../502-typeahead` as an example
  - YouTube Search
  - Wikipedia Search

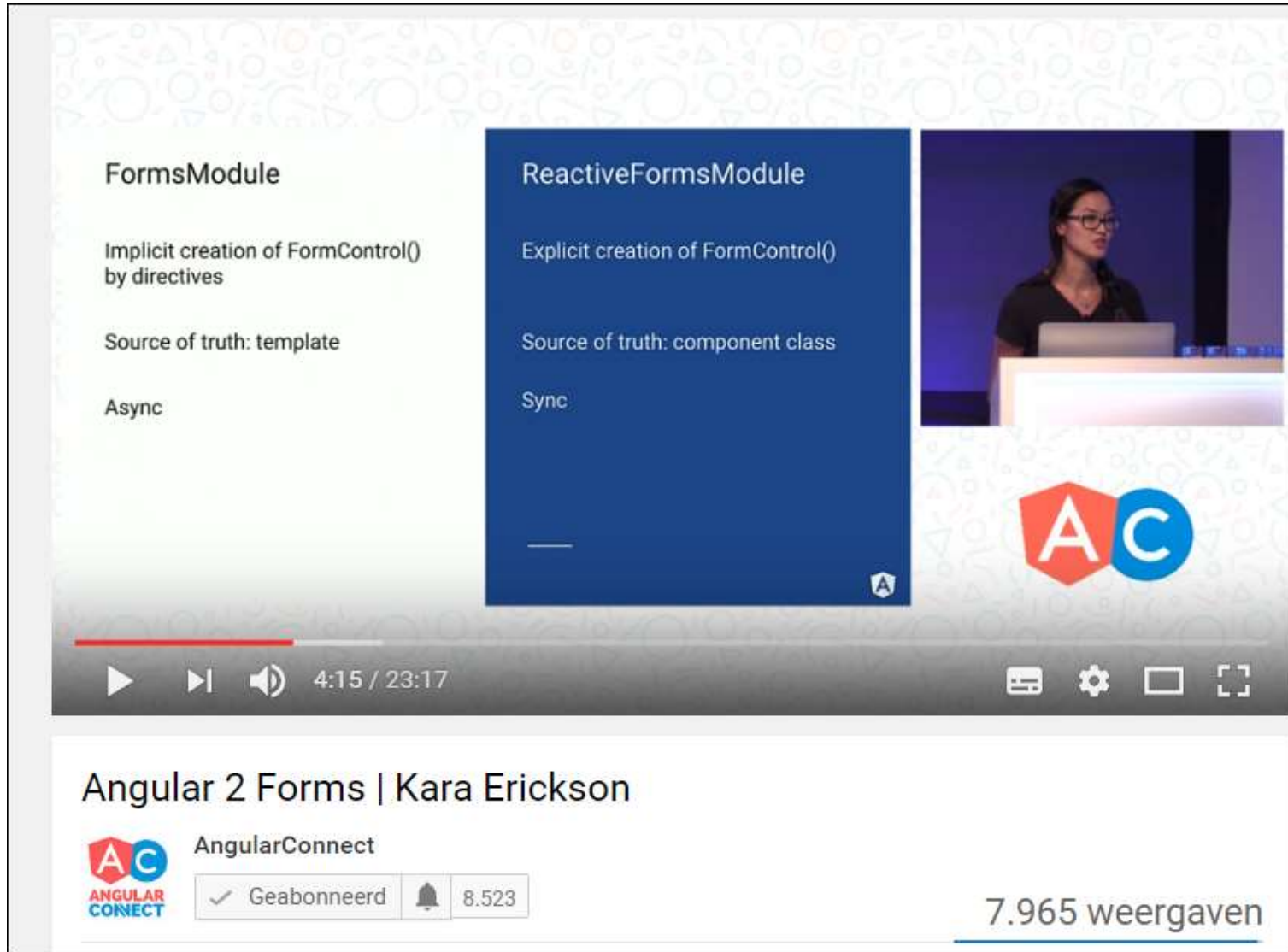
# More on Reactive Forms



The screenshot shows the top section of a website. At the top left is a circular profile picture of a man. To its right is a bio: "I'm Todd, a Developer Advocate @Telerik. Co-Founder of @UltimateAngular Creator of the Angular 2 migration guide. JavaScript, Angular, React, conference speaker. Developer Expert at Google." Below the bio is a blue "Follow @toddmotto" button and a white box showing "29.5K followers". Below this is a dark navigation bar with links: "Posts", "About", "Speaking", "Styleguide", "ngMigrate", and "Online training" (which has a red icon). Below the navigation bar is a light gray content area. The main heading is "Angular 2 form fundamentals: reactive forms" in a large, elegant serif font. Below the heading is a horizontal line with the text "POSTED ON OCT 19, 2016 - [Edit this page on GitHub](#)". Below this is a paragraph of text: "Angular 2 presents two different methods for creating forms, template-driven (what we were used to in Angular 1.x), or reactive. We're going to explore the absolute fundamentals of the reactive Angular 2 forms, covering `ngForm` , `ngModel` , `ngModelGroup` , submit events, validation and error messages."

<https://toddmotto.com/angular-2-forms-reactive>

# Kara Erickson on Angular Forms



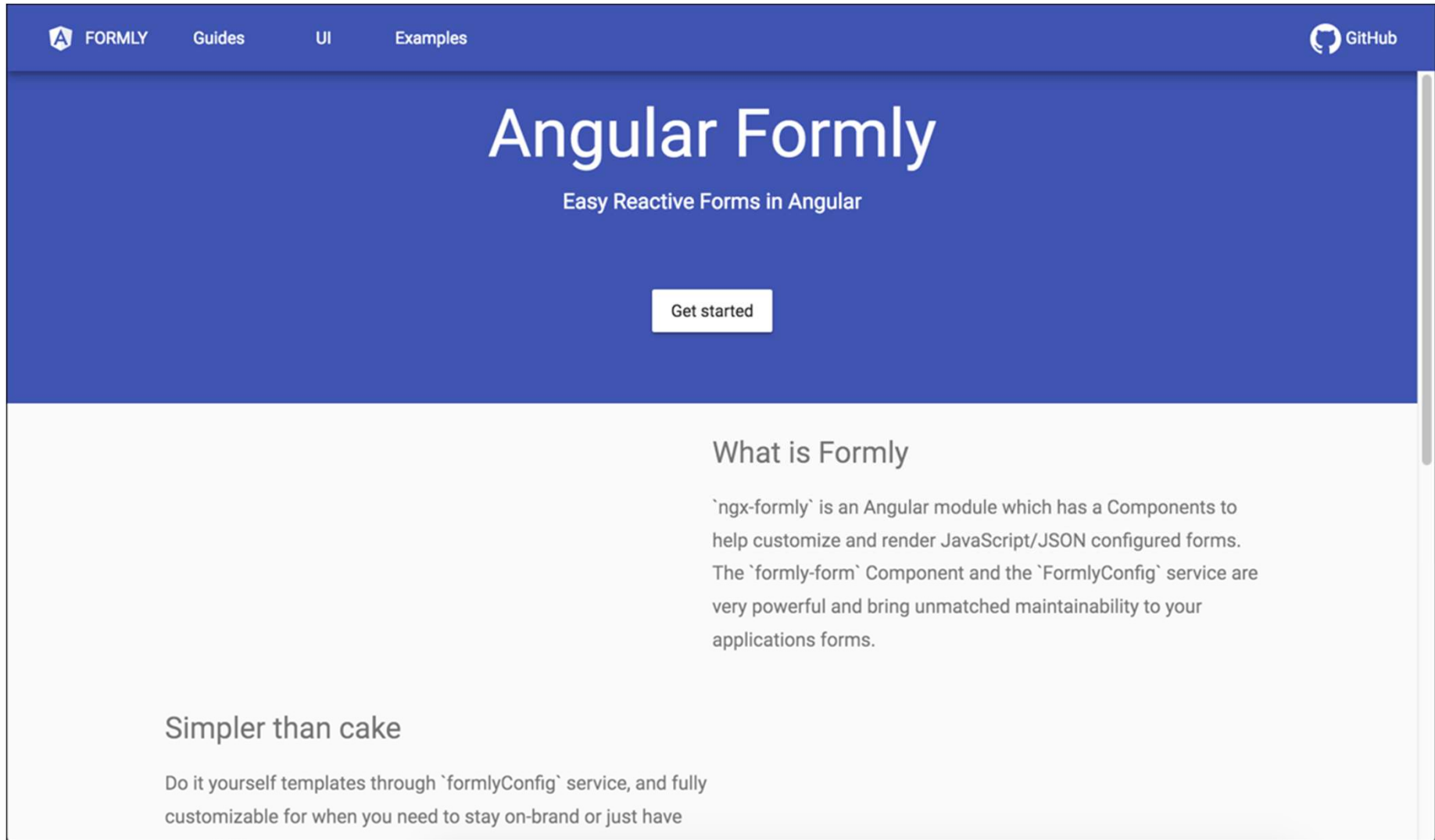
The video player displays a presentation slide comparing **FormsModule** and **ReactiveFormsModule**.

FormsModule	ReactiveFormsModule
Implicit creation of FormControl() by directives	Explicit creation of FormControl()
Source of truth: template	Source of truth: component class
Async	Sync

The video player interface includes a progress bar at 4:15 / 23:17, standard playback controls, and the AngularConnect logo. Below the video, the title "Angular 2 Forms | Kara Erickson" is shown, along with the AngularConnect channel name, a "Geabonneerd" (Subscribed) button, a notification bell, a subscriber count of 8.523, and a view count of 7.965 weergaven (7,965 views).

<https://www.youtube.com/watch?v=xYv9lsrV0s4>

Automated form and template generation, based on a form model:



<https://ngx-formly.github.io/ngx-formly/>

[github.com/PeterKassenaar/ngx-formly-demo](https://github.com/PeterKassenaar/ngx-formly-demo)

[github.com/PeterKassenaar/ng2-form-edit](https://github.com/PeterKassenaar/ng2-form-edit)