Forms and Validation

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Outline

- Approaches
- Template-driven forms
  - How to use
  - Validation
- Reactive forms
  - How to use
  - Validation

Forms in Angular

Template-driven

- ngModel in the HTML-template
- Angular creates object tree for form
- FormsModule

Reactive

- We create the object tree in our component (TS-file)
- More control, more power
- ReactiveFormsModule

Data-driven

- Angular generates a form for a data model
- Handed over to the community ("formly")

Template-driven Forms

Template-driven Forms

```
export class FlightSearchComponent {

    from: string;
    to: string;

    constructor(flightService: FlightService) {
            from = 'Graz';
            to = 'Hamburg';
    }
}
```

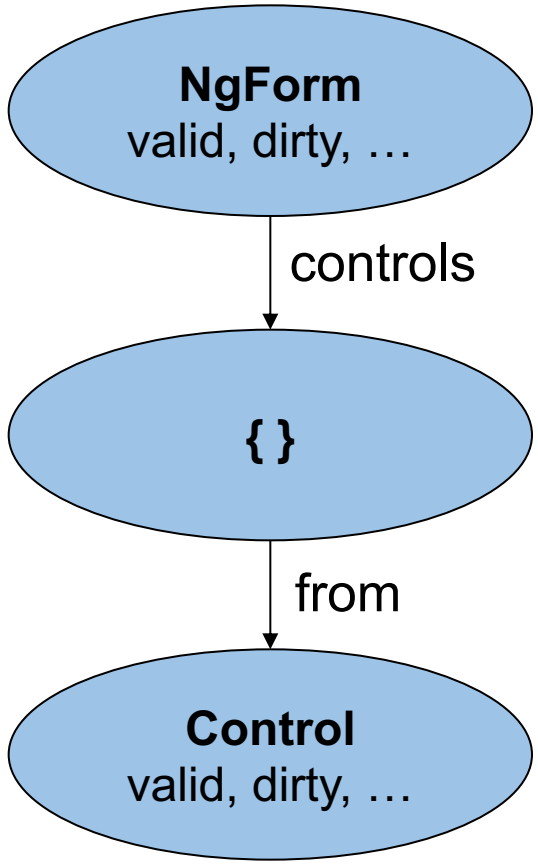
View

```
<form>

   <input type="text" name="from"
      [(ngModel)]="from" required minlength="3">

   […]

</form>
```



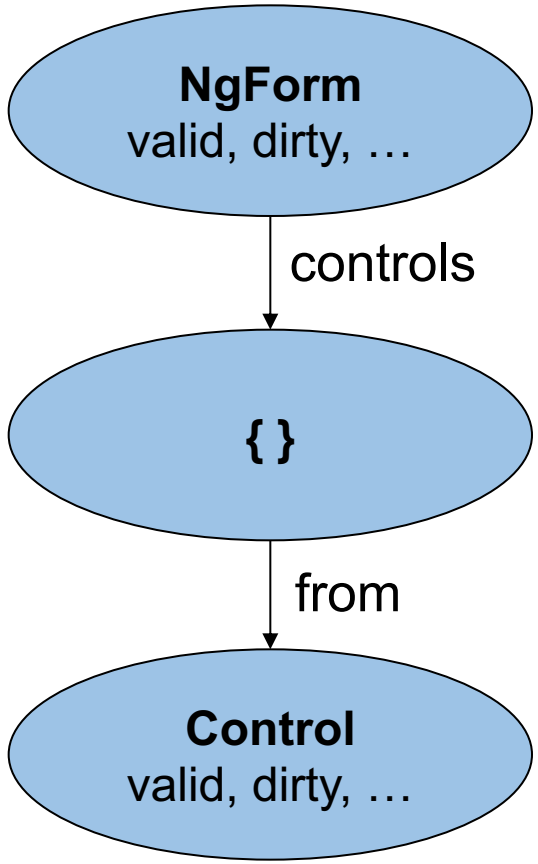
View

```
<form #f="ngForm">

    <input type="text" name="from"
        [(ngModel)]="from" required minlength="3">

    […]

</form>
```



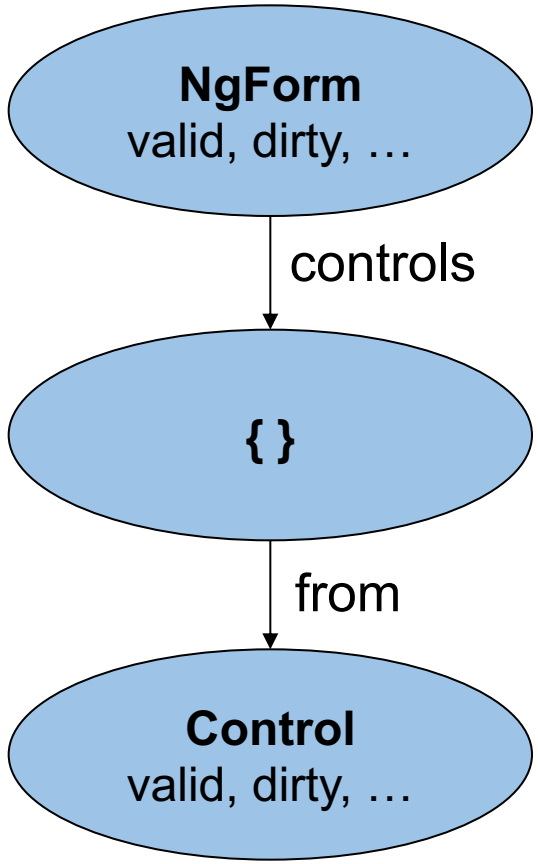
View

```
<form #f="ngForm">

    <input type="text" name="from"
        [(ngModel)]="from" required minlength="3">

    <div *ngIf="!f.controls['from'].valid">
        …Error…
    </div>

</form>
```



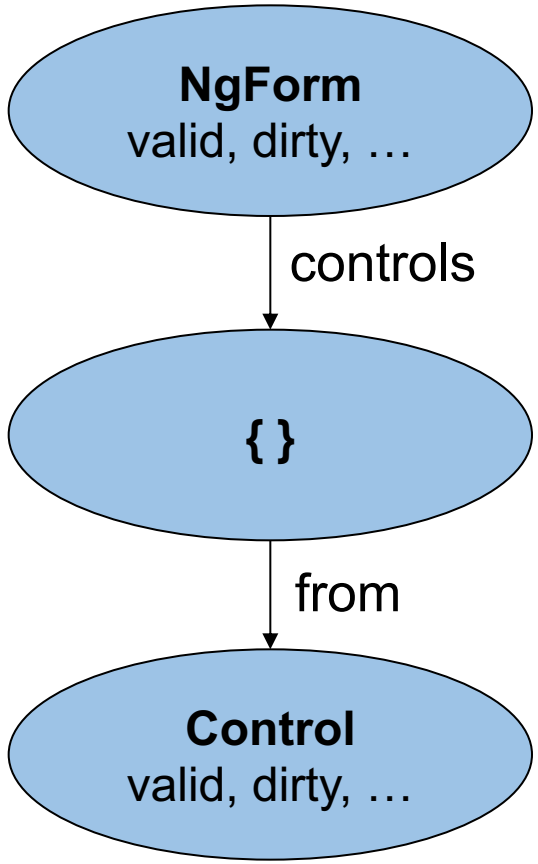
View

```
<form #f="ngForm">

    <input type="text" name="from"
        [(ngModel)]="from" required minlength="3">

    <div *ngIf="!f?.controls['from']?.valid">
        …Error…
    </div>

</form>
```



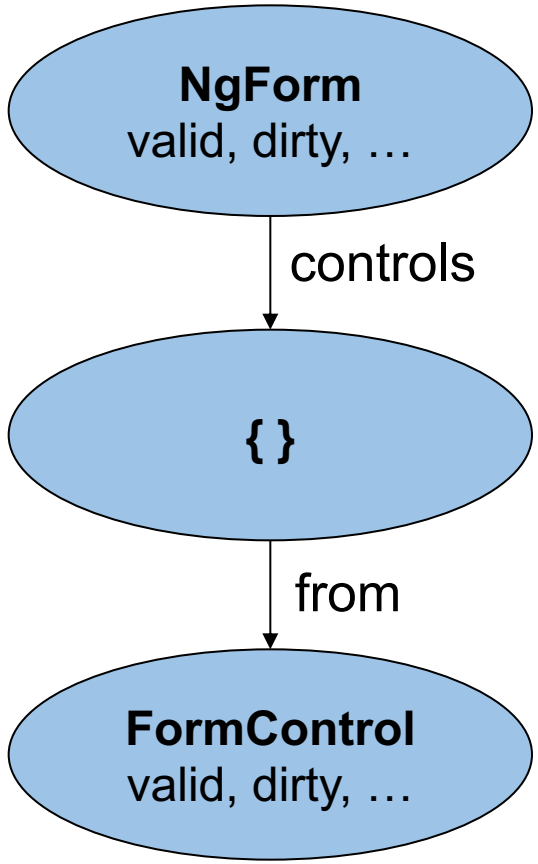
View

```
<form #f="ngForm">

   <input type="text" name="from"
      [(ngModel)]="from" required minlength="3">

   <div *ngIf="!f?.controls['from']?.valid">
      …Error…
   </div>

   <div
      *ngIf="f?.controls['from']?.hasError('required')">
      …Error…
   </div>
</form>
```



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Own Valididators

Directives

- Add behaviour to a component or any other HTML tag
- Built in examples
  - Attribute directives: ngModel, ngClass, ngStyle
  - Structural directives: *ngIf, *ngFor, *ngSwitch
- Custom attribute directives
  - E.g. validation directive
- No template (contrary to components)

Validation directive

```
<input [(ngModel)]="from" name="from" city>
```

Validation directive

```
@Directive({
    selector: 'input[city]'
})
export class OrtValidatorDirective implements Validator {

    validate(c: AbstractControl): ValidationErrors {
        let value = c.value;

        […]

        if (…) return { city: true }; // error

        return {}; // no error
    }
}
```

Validation directive

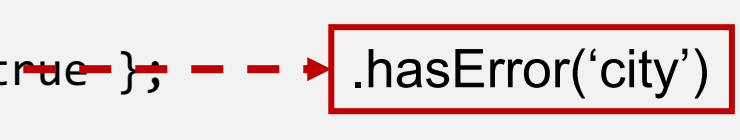
```
@Directive({
    selector: 'input[city]',
    providers: [{ provide: NG_VALIDATORS,
                  useExisting: OrtValidatorDirective, multi: true}]
})
export class OrtValidatorDirective implements Validator {

    validate(c: AbstractControl): ValidationErrors {
        let value = c.value;

        […]

        if (…) return {city: true};

        return {}; // no error
    }
}
```



Using attributes

```
<input [(ngModel)]="from" name="from"
                [city]="['Graz', 'Hamburg', 'Zürich']">
```

Using attributes

```
@Directive({
    selector: 'input[city]',
    providers: [{ provide: NG_VALIDATORS,
                  useExisting: OrtValidatorDirective,
                  multi: true }]
})
export class OrtValidatorDirective implements Validator {

    @Input() city: string[];

    validate(c: AbstractControl): ValidationErrors {
        […]
    }
}
```

Using attributes

```
@Directive({
    selector: 'input[city]',
    providers: [{ provide: NG_VALIDATORS,
                  useExisting: OrtValidatorDirective,
                  multi: true }]
})
export class OrtValidatorDirective implements Validator {

    @Input() city: string;
    @Input() strategy: string;

    validate(c: AbstractControl): ValidationErrors {
        […]
    }
}
```

Using attributes

```
<input [(ngModel)]="from" name="from"
       [city]="['Graz', 'Hamburg', 'Zürich']" [strategy]="'strict'">
```

Using attributes

```
<input [(ngModel)]="from" name="from"
       city="Graz, Hamburg, Zürich" strategy="strict">
```

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Multifield Validators

```
@Directive({
    selector: 'form[roundTrip]',
    providers: [ … ]
})
export class RoundTripValidatorDirective implements Validator {

    validate(control: AbstractControl): ValidationErrors {
        […]
    }
}
```

Multifield Validators

```
export class RoundTripValidatorDirective implements Validator {

    validate(control: AbstractControl): ValidationErrors {
        let group = control as FormGroup;

        let from = group.controls['from'];
        let to = group.controls['to'];

        if (!from || !to) return { };

        […]
}
```

Multifield Validators

```
export class RoundTripValidatorDirective implements Validator {

    validate(control: AbstractControl): ValidationErrors {
        let group = control as FormGroup;

        let from = group.controls['from'];
        let to = group.controls['to'];

        if (!from || !to) return { };

        if (from.value === to.value) return { roundTrip: true };

        return { };
    }
}
```

Asynchrone Validierungs-Directives

```
@Directive({
    selector: 'input[asyncCity]',
    providers: [ … ]
})
export class AsyncCityValidatorDirective implements AsyncValidator {

    validate(control: AbstractControl): Observable<ValidationErrors> {
        […]
    }

}
```

Asynchrone Validierungs-Directives

Token: NG_ASYNC_VALIDATORS

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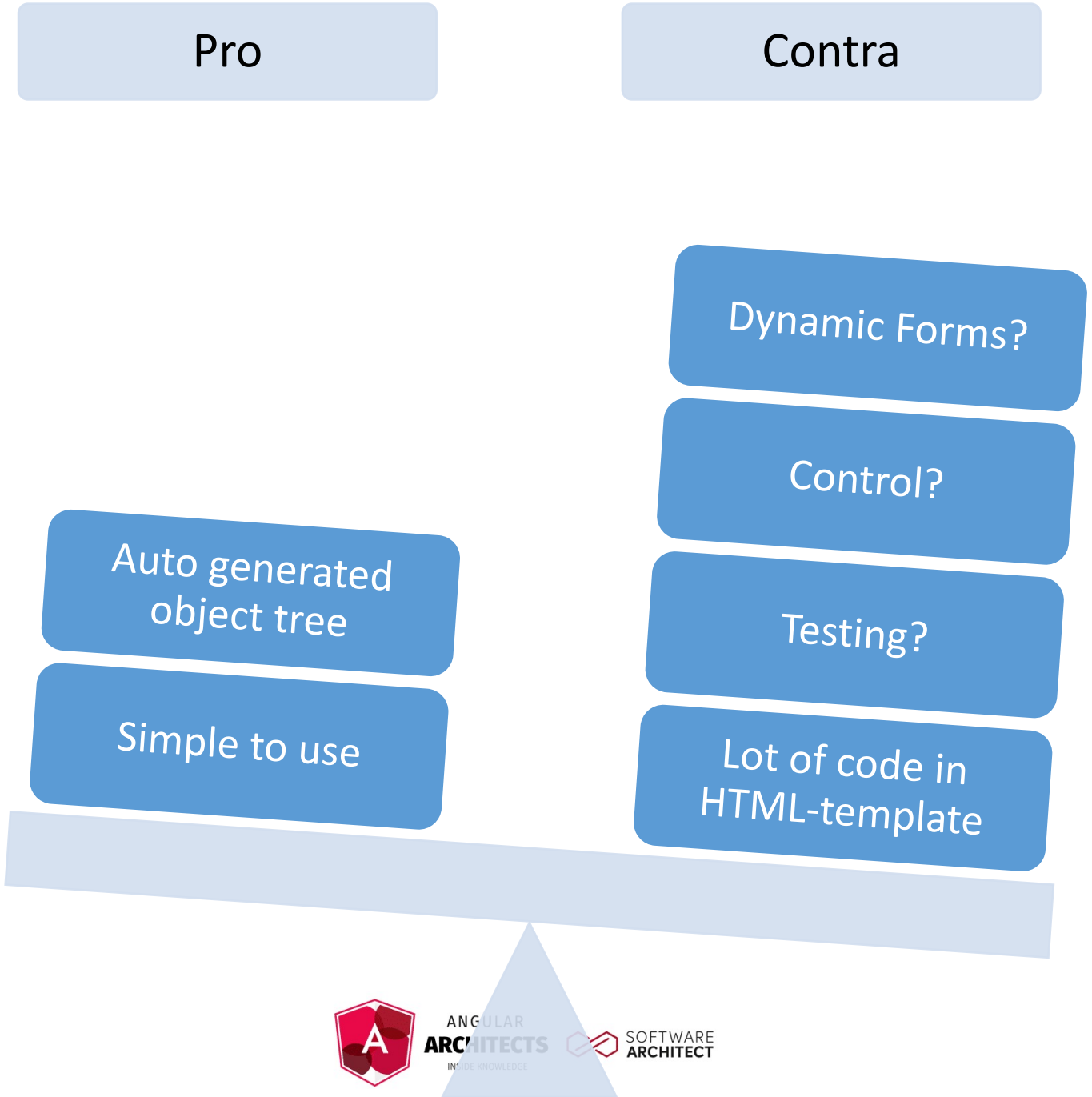

Reactive Forms

ReactiveFormsModule

```
@NgModule({
   imports: [
      ReactiveFormsModule,
      CommonModule,
      SharedModule,
      [...]
   ],
   [...]
})
export class FlightBookingModule { }
```

Reactive Forms

```
export class FlightSearchComponent {

    form: FormGroup;

    […]
}
```

Reactive Forms

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(…) {
        let fromControl = new FormControl('Graz');
        let toControl = new FormControl('Hamburg');
        this.form = new FormGroup({ from: fromControl, to: toControl});

        […]

    }
}
```

Reactive Forms

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(…) {
        let fromControl = new FormControl('Graz');
        let toControl = new FormControl('Hamburg');
        this.form = new FormGroup({ from: fromControl, to: toControl});

        fromControl.validator = Validators.required;
        […]
    }
}
```

Reactive Forms

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(…) {
        let fromControl = new FormControl('Graz');
        let toControl = new FormControl('Hamburg');
        this.form = new FormGroup({ from: fromControl, to: toControl});

        fromControl.validator =
                Validators.compose([Validators.required, Validators.minLength(3)]);
    }
}
```

Reactive Forms

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(…) {
        let fromControl = new FormControl('Graz');
        let toControl = new FormControl('Hamburg');
        this.form = new FormGroup({ from: fromControl, to: toControl});

        fromControl.validator =
                Validators.compose([Validators.required, Validators.minLength(3)]);

       fromControl.asyncValidator =
                Validators.composeAsync([…]);
    }
}
```

FormBuilder

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(fb: FormBuilder, …) {
        this.form = fb.group({
            from: ['Graz', Validators.required],
            to: ['Hamburg', Validators.required]
        });
        […]
    }

}
```

FormBuilder

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(fb: FormBuilder, …) {
        this.form = fb.group({
            from: ['Graz', [Validators.required, Validators.minLength(3)] ],
            to: ['Hamburg', Validators.required]
        });
        […]
    }

}
```

FormBuilder

```
export class FlightSearchComponent {

    form: FormGroup;

    constructor(fb: FormBuilder, …) {
        this.form = fb.group({
            from: ['Graz', [Validators.required, Validators.minLength(3)], [ /* asyncValidator */ ] ],
            to: ['Hamburg', Validators.required]
        });
        […]
    }

}
```

API

```
this.form.valueChanges.subscribe(change => {
    console.debug('the form has been changed', change);
});
```

```
this.form.controls['from'].valueChanges.subscribe(change => {
    console.debug('from input has been changed ', change);
});
```

```
let fromValue = this.form.controls['from'].value;
let toValue = this.form.controls['to'].value;
```

```
let formValue = this.form.value;
```

Reactive Forms

```
<form [formGroup]="form">

   <input id="from" formControlName="from" type="text">

   […]

</form>
```

Reactive Forms

```
<form [formGroup]="form">

   <input id="from" formControlName="from" type="text">
   <div *ngIf="!form.controls['from'].valid">…Error…</div>

   […]

</form>
```

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Validators for Reactive Forms

Reactive Validators === functions

A simple validator

```
function validate (c: AbstractControl): ValidationErrors  {
    if (c.value == 'Graz' || c.value == 'Hamburg') {
        return { };
    }
    return { city: true };
}
```

Apply validators

```
this.form = fb.group({
    from: [
        'Graz',
        [
            validate
        ],
        [
            /* asyncValidator */
        ]
    ],
    to: ['Hamburg', Validators.required]
});
```

Parametrizable validators

```
function validateWithParams(allowedCities: string[]) {

        […]

}
```

Parametrizable validators

```
function validateWithParams(allowedCities: string[]): ValidatorFn {

        […]

}
```

Parametrizable validators

```
function validateWithParams(allowedCities: string[]): ValidatorFn {

    return (c: AbstractControl): ValidationErrors => {
            […]
    };

}
```

Parametrizable validators

```
function validateWithParams(allowedCities: string[]): ValidatorFn {

    return (c: AbstractControl): object => {

        if (allowedCities.indexOf(c.value) > -1) {
            return { }
        }

        return { city: true };

    };
}
```

Apply validators

```
this.form = fb.group({
    from: [
        'Graz',
        [
            validateWithParams(['Graz', 'Hamburg'])
        ],
        [
            /* asyncValidator */
        ]
    ],
    to: ['Hamburg', Validators.required]
});
```

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Asynchrone Validatoren

```
export function cityValidatorAsync(flightService: FlightService) {

    return (control: AbstractControl): Observable<ValidationErrors> => {
        […]
        return observable;
    }
}
```

Apply validators

```
this.form = fb.group({
    from: [
        'Graz',
        [
            validateWithParams(['Graz', 'Hamburg'])
        ],
        [
            cityValidatorAsync(this.flightService)
        ]
    ],
    to: ['Hamburg', Validators.required]
});
```

Multifield validators

```
export function validateMultiField([…]): ValidationFn {

    return (control: AbstractControl): ValidationErrors {

        const formGroup = control as FormGroup;

        […]
    }

};
```

Apply validators

```
this.form = fb.group({ … });
this.form.validator = validators.compose([validateMultiField([…])])
```

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Homework for this evening

Check at least one of your teams Angular projects
and find out what type of forms are being used there

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