Angular 2+

Workshop. Forms.

Contents

[Task 01. Template-Driven Form 2](#_Toc11417915)

[Task 02. ReactiveComponent Class 6](#_Toc11417916)

[Task 03. formGroup, formControlName directives 7](#_Toc11417917)

[Task 04. setValue(), patchValue() 10](#_Toc11417918)

[Task 05. FormBuilder 11](#_Toc11417919)

[Task 06. Setting Built-in Validators 12](#_Toc11417920)

[Task 07. Adjusting Validation Rules in Runtime 14](#_Toc11417921)

[Task 08. Custom Validator 17](#_Toc11417922)

[Task 09 Handle Validators Run Moment 19](#_Toc11417923)

[Task 10. Custom Validator w/ Parameters 21](#_Toc11417924)

[Task 11. Custom Validator Directive 22](#_Toc11417925)

[Task 12. Custom Validator Directive w/ Parameters 24](#_Toc11417926)

[Task 13. Async Custom Validator 25](#_Toc11417927)

[Task 14. Async Custom Validator Directive 27](#_Toc11417928)

[Task 15. Cross-Field Validation 29](#_Toc11417929)

[Task 16. Adjusting Validation Rules 34](#_Toc11417930)

[Task 16. Displaying Validation Messages 36](#_Toc11417931)

[Task 17. Reactive Transformations 38](#_Toc11417932)

[Task 18. Define the input element(s) to duplicate 39](#_Toc11417933)

[Task 19. Define a FormGroup 40](#_Toc11417934)

[Task 20. Refactor to Make Copies 41](#_Toc11417935)

[Task 21. Create a FormArray 42](#_Toc11417936)

[Task 22. Loop through the FormArray 43](#_Toc11417937)

[Task 23. Duplicate the Input Elements 44](#_Toc11417938)

# Task 01. Template-Driven Form

1. Create file **app/models/user.model.ts.** Run the following command from a command line:

> **ng g cl models/user --type model**

1. Replace the content of the file with the following content:

export class UserModel {

constructor(public firstName = '',

public lastName = '',

public email = '',

public sendProducts = false,

public addressType = 'home',

public street1?: string,

public street2?: string,

public country = '',

public city?: string,

public zip?: string) { }

}

1. Make changes to **SignupFormComponent.** Use the following snippet of code:

import { Component, OnInit } from '@angular/core';

import { NgForm } from '@angular/forms';

import { UserModel } from './../../models/user.model';

1. Add properties:

countries: Array<string> = ['Ukraine', 'Armenia', 'Belarus', 'Hungary', 'Kazakhstan', 'Poland', 'Russia'];

user: UserModel = new UserModel();

1. Add method:

onSave(signupForm: NgForm) {

// Form model

console.log(signupForm.form);

// Form value

console.log(`Saved: ${JSON.stringify(signupForm.value)}`);

}

1. Make changes to **SignupFormComponent** **template**. Use the following snippet of HTML:

// 1

<form class="form-horizontal"

**#signupForm="ngForm"**

**(ngSubmit)="onSave(signupForm)"**>

// 2

<div class="form-group"

**[ngClass]="{'has-error': (firstNameVar.touched || firstNameVar.dirty) && firstNameVar.invalid }"**>

<input class="form-control"

id="firstNameId"

type="text"

placeholder="First Name (required)"

required

minlength="3"

**[(ngModel)]= "user.firstName"**

**name="firstName"**

**#firstNameVar="ngModel"** />

**<span class="help-block" \*ngIf="(firstNameVar.touched || firstNameVar.dirty) && firstNameVar.errors">**

**<span \*ngIf="firstNameVar.hasError('required')">**

**Please enter your first name.**

**</span>**

**<span \*ngIf="firstNameVar.hasError('minlength')">**

**The first name must be longer than 3 characters.**

**</span>**

**</span>**

// 3

<div class="form-group"

**[ngClass]="{'has-error': (lastNameVar.touched || lastNameVar.dirty) && lastNameVar.invalid }"**>

<input class="form-control"

id="lastNameId"

type="text"

placeholder="Last Name (required)"

required

maxlength="50"

**[(ngModel)]="user.lastName"**

**name="lastName"**

**#lastNameVar="ngModel"** />

**<span class="help-block" \*ngIf="(lastNameVar.touched || lastNameVar.dirty) && lastNameVar.errors">**

**<span \*ngIf="lastNameVar.hasError('required')">**

**Please enter your last name.**

**</span>**

**</span>**

// 4

<div class="form-group"

**[ngClass]="{'has-error': (emailVar.touched || emailVar.dirty) && emailVar.invalid }"**>

<input class="form-control"

id="emailId"

type="email"

placeholder="Email (required)"

required

pattern="[a-z0-9.\_%+-]+@[a-z0-9.-]+"

**[(ngModel)]="user.email"**

**name="email"**

**#emailVar="ngModel"** />

**<span class="help-block" \*ngIf="(emailVar.touched || emailVar.dirty) && emailVar.errors">**

**<span \*ngIf="emailVar.hasError('required')">**

**Please enter your email address.**

**</span>**

**<span \*ngIf="emailVar.hasError('pattern')">**

**Please enter a valid email address.**

**</span>**

**</span>**

// 5

<input id="sendProductsId"

type="checkbox"

**[(ngModel)]="user.sendProducts"**

**name="sendProducts"** >

// 6

<div \*ngIf="user.sendProducts">

<div class="form-group" >

<label class="col-md-2 control-label">Address Type</label>

// 7

<input type="radio" id="addressType1Id" value="home"

**[(ngModel)]="user.addressType"**

**name="addressType"**>Home

<input type="radio" id="addressType2Id" value="work"

**[(ngModel)]="user.addressType"**

**name="addressType"**>Work

<input type="radio" id="addressType3Id" value="other"

**[(ngModel)]="user.addressType"**

**name="addressType"**>Other

// 8

<select class="form-control"

id="countryId"

**[(ngModel)]="user.country"**

**name="country"**>

<option value="">Select a Country...</option>

**<option \*ngFor="let country of countries"**

**[value]="country">{{country}}</option>**

</select>

// 9

<input type="text"

class="form-control"

id="cityId"

placeholder="City"

**[(ngModel)]="user.city"**

**name="city"**>

<input type="number"

class="form-control"

id="zipId"

placeholder="Zip Code"

**[(ngModel)]="user.zip"**

**name="zip"**>

<input type="text"

class="form-control"

id="street1Id"

placeholder="Street address"

**[(ngModel)]="user.street1"**

**name="street1"**>

<input type="text"

class="form-control"

id="street2Id"

placeholder="Street address (second line)"

**[(ngModel)]="user.street2"**

**name="street2"**>

// 10

<button class="btn btn-primary"

type="submit"

**[disabled]="!signupForm.valid"**>

Save

</button>

1. Add the following snippet of code at the end of template

<br>Dirty: {{ signupForm.dirty }}

<br>Touched: {{ signupForm.touched }}

<br>Valid: {{ signupForm.valid }}

<br>Value: {{ signupForm.value | json }}

1. Make changes to the file **signup-form.component.css.** Use the following snippet of code:

input.ng-valid.ng-touched{

background: lightgreen;

}

# Task 02. ReactiveComponent Class

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

import { FormGroup, FormControl } from '@angular/forms';

import { UserModel } from './../../models/user.model';

countries: Array<string> = ['Ukraine', 'Armenia', 'Belarus', 'Hungary', 'Kazakhstan', 'Poland', 'Russia'];

// data model

user: UserModel = new UserModel();

// form model

userForm: FormGroup;

private createForm() {

this.userForm = new FormGroup({

firstName: new FormControl(),

lastName: new FormControl(),

email: new FormControl(),

sendProducts: new FormControl(true)

});

}

ngOnInit() {

this.createForm();

}

onSave() {

// Form model

console.log(this.userForm);

// Form value w/o disabled controls

console.log(`Saved: ${JSON.stringify(this.userForm.value)}`);

// Form value w/ disabled controls

console.log(`Saved: ${JSON.stringify(this.userForm.getRawValue())}`);

}

1. Make changes to **SignupReactiveFormComponent Template.** Use the following snippet of html:

<select class="form-control"

id="countryId">

<option value="">Select a Country...</option>

<option \*ngFor="let country of countries"

value="{{country}}">{{country}}

</option>

</select>

# Task 03. formGroup, formControlName directives

1. Make changes to **SignupReactiveFormComponent** **template**. Use the following snippet of HTML:

<form class="form-horizontal"

(ngSubmit)="onSave()"

[formGroup]="userForm">

<button class="btn btn-primary"

type="submit"

[disabled]="!userForm.valid">

Save

</button>

<br>Dirty: {{ userForm.dirty }}

<br>Touched: {{ userForm.touched }}

<br>Valid: {{ userForm.valid }}

<br>Value: {{ userForm.value | json }}

<br>Form Status: {{userForm.status }}

<input class="form-control"

id="firstNameId"

type="text"

placeholder="First Name (required)"

required

minlength="3"

formControlName="firstName"/>

<input class="form-control"

id="lastNameId"

type="text"

placeholder="Last Name (required)"

required

maxlength="50"

formControlName="lastName"/>

<input class="form-control"

id="emailId"

type="email"

placeholder="Email (required)"

required

pattern="[a-z0-9.\_%+-]+@[a-z0-9.-]+"

formControlName="email" />

<label>

<input id="sendProductsId"

type="checkbox"

formControlName="sendProducts" />

Send me your products

</label>

1. Comment template from

<div>

<div class="form-group" >

<label class="col-md-2 control-label">Address Type</label>

to the closed tag

1. Add attribute [ngClass] for div with class “form-group”

For firstName

[ngClass]="{'has-error': (userForm.get('firstName').touched || userForm.get('firstName').dirty) && !userForm.get('firstName').valid }"

For lastName

[ngClass]="{'has-error': (userForm.get('lastName').touched || userForm.get('lastName').dirty) && !userForm.get('lastName').valid }"

For email

[ngClass]="{'has-error': (userForm.get('email').touched || userForm.get('email').dirty) && !userForm.get('email').valid }"

1. Add span block after each input – block for displaying validation error messages

For firstName

<span class="help-block" \*ngIf="(userForm.get('firstName').touched || userForm.get('firstName').dirty) && userForm.get('firstName').errors">

<span \*ngIf="userForm.get('firstName').hasError('required')">

Please enter your first name.

</span>

<span \*ngIf="userForm.get('firstName').hasError('minlength')">

The first name must be longer than 3 characters.

</span>

</span>

For lastName

<span class="help-block" \*ngIf="(userForm.get('lastName').touched || userForm.get('lastName').dirty) && userForm.get('lastName').errors">

<span \*ngIf="userForm.get('lastName').hasError('required')">

Please enter your last name.

</span>

</span>

For email

<span class="help-block" \*ngIf="(userForm.get('email').touched || userForm.get('email').dirty) && userForm.get('email').errors">

<span \*ngIf="userForm.get('email').hasError('required')">

Please enter your email address.

</span>

<span \*ngIf="userForm.get('email').hasError('pattern')">

Please enter a valid email address.

</span>

<span \*ngIf="userForm.get('email').hasError('email')">

Please enter a valid email address.

</span>

</span>

# Task 04. setValue(), patchValue()

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

user: UserModel = new UserModel(

'Vitaliy',

'Zhyrytskyy',

'v.zhiritskiy@gmail.com',

false

);

// 2

private setFormValues() {

this.userForm.setValue({

firstName: this.user.firstName,

lastName: this.user.lastName,

email: this.user.email,

sendProducts: this.user.sendProducts

});

}

// 3

private patchFormValues() {

this.userForm.patchValue({

firstName: this.user.firstName,

lastName: this.user.lastName

});

}

// 4

ngOnInit() {

this.createForm();

this.setFormValues();

// this.patchFormValues();

}

1. Look at the result. Comment method **this.setFormValues();** in ngOnInit() and uncomment method  **this.patchFormValues();** Look at the result.

# Task 05. FormBuilder

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

import { FormBuilder, FormGroup, FormControl } from '@angular/forms';

constructor(

private fb: FormBuilder

) { }

private buildForm() {

this.userForm = this.fb.group({

firstName: '',

lastName: {value: 'Zhyrytskyy', disabled: true},

email: [''],

sendProducts: true

});

}

ngOnInit() {

this.createForm();

this.buildForm();

this.setFormValues();

this.patchFormValues();

}

# Task 06. Setting Built-in Validators

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

import { FormBuilder, FormGroup, FormControl, Validators } from '@angular/forms';

// 2

private buildForm() {

this.userForm = this.fb.group({

firstName: '',

firstName: ['', [Validators.required, Validators.minLength(3)]],

lastName: {value: 'Zhyrytskyy', disabled: true},

email: [''],

sendProducts: true

});

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<input class="form-control"

id="firstNameId"

type="text"

placeholder="First Name (required)"

required

minlength="3"

formControlName="firstName"/>

1. Check the validation for the field First Name
2. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

private buildForm() {

this.userForm = this.fb.group({

firstName: ['', [Validators.required, Validators.minLength(3)]],

lastName: {value: 'Zhyrytskyy', disabled: true},

lastName: [

{ value: 'Zhyrytskyy', disabled: false },

[Validators.required, Validators.maxLength(50)]

],

email: [''],

email: [

'',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'), Validators.email]

],

sendProducts: true

});

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<input class="form-control"

id="lastNameId"

type="text"

placeholder="Last Name (required)"

required

maxlength="50"

formControlName="lastName"/>

<input class="form-control"

id="emailId"

type="email"

placeholder="Email (required)"

required

pattern="[a-z0-9.\_%+-]+@[a-z0-9.-]+"

formControlName="email" />

1. Check the validation of the fields: FirtsName, LastName, Email

# Task 07. Adjusting Validation Rules in Runtime

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

placeholder = {

email: 'Email (required)',

phone: 'Phone'

};

// 2

private buildForm() {

this.userForm = this.fb.group({

firstName: ['', [Validators.required, Validators.minLength(3)]],

lastName: [

{ value: 'Zhyrytskyy', disabled: false },

[Validators.required, Validators.maxLength(50)]

],

email: [

'',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+')]

],

phone: '',

notification: 'email',

sendProducts: true

});

}

1. Make changes for the Email input in **SignupReactiveFormComponent templete.** Add the following snippet of HTML **after the field email**

<input class="form-control"

id="emailId"

type="email"

placeholder="Email (required)"

placeholder={{placeholder.email}}

formControlName="email" />

1. Make changes to **SignupReactiveFormComponent templete.** Add the following snippet of HTML **after the field email**

<div class="form-group"

[ngClass]="{'has-error': (userForm.get('phone').touched ||   
 userForm.get('phone').dirty) && userForm.get('phone').invalid }">

<label class="col-md-2 control-label"

for="phoneId">Phone</label>

<div class="col-md-8">

<input class="form-control"

id="phoneId"

type="tel"

placeholder={{placeholder.phone}}

formControlName="phone" />

<span class="help-block" \*ngIf="(userForm.get('phone').touched  
 || userForm.get('phone').dirty) && userForm.get('phone').errors">

<span \*ngIf="userForm.get('phone').hasError('required')">

Please enter your phone number.

</span>

</span>

</div>

</div>

<div class="form-group">

<label class="col-md-2 control-label">Send Notifications</label>

<div class="col-md-8">

<label class="radio-inline">

<input type="radio"

value="email"

formControlName="notification">Email

</label>

<label class="radio-inline">

<input type="radio"

value="text"

formControlName="notification">Text

</label>

</div>

</div>

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

onSetNotification(notifyVia: string) {

const phoneControl = this.userForm.get('phone');

const emailControl = this.userForm.get('email');

if (notifyVia === 'text') {

phoneControl.setValidators(Validators.required);

emailControl.clearValidators();

this.placeholder.email = 'Email';

this.placeholder.phone = 'Phone (required)';

}

else {

emailControl.setValidators( [

Validators.required,

Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'),

Validators.email

]);

phoneControl.clearValidators();

this.placeholder.email = 'Email (required)';

this.placeholder.phone = 'Phone';

}

phoneControl.updateValueAndValidity();

emailControl.updateValueAndValidity();

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<label class="radio-online">

<input type="radio"

value="email"

formControlName="notification"

(click)="onSetNotification('email')">Email

</label>

<label class="radio-online">

<input type="radio"

value="text"

formControlName="notification"

(click)="onSetNotification('text')">Text

</label>

# Task 08. Custom Validator

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

private buildForm() {

this.userForm = this.fb.group({

firstName: ['', [Validators.required, Validators.minLength(3)]],

lastName: [

{ value: 'Zhyrytskyy', disabled: false },

[Validators.required, Validators.maxLength(50)]

],

email: [

'',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+')], Validators.email

],

phone: '',

notification: 'email',

serviceLevel: '',

sendProducts: true

});

}

1. Make changes to **SignupReactiveFormComponent template.** Add the following snippet of HTML after the block div for the element «Send Notifications»:

<div class="form-group"

[ngClass]="{'has-error': (userForm.get('serviceLevel').touched || userForm.get('serviceLevel').dirty) && !userForm.get('serviceLevel').valid }">

<label class="col-md-2 control-label"

for="serviceLevelId">Service Level</label>

<div class="col-md-8">

<input class="form-control"

id="serviceLevelId"

type="number"

formControlName="serviceLevel" />

<span class="help-block" \*ngIf="(userForm.get('serviceLevel').touched || userForm.get('serviceLevel').dirty) && userForm.get('serviceLevel').errors">

<span \*ngIf="userForm.get('serviceLevel').hasError('serviceLevel')">

Please enter correct number from 1 to 5.

</span>

</span>

</div>

</div>

1. Create file **app/validators/custom.validators.ts.** Use the following snippet of code:

import { AbstractControl, ValidationErrors } from '@angular/forms';

export class CustomValidators {

static serviceLevel(c: AbstractControl): ValidationErrors | null {

if (c.value !== undefined && (Number.isNaN(c.value) || c.value < 1 || c.value > 5)) {

return {

serviceLevel: true

};

}

return null;

}

}

1. Create file **app/validators/index.ts.** Use the following snippet of code:

export \* from './custom.validators';

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

import { CustomValidators } from './../../validators';

// 2

phone: '',

notification: 'email',

serviceLevel: '',

serviceLevel: ['', CustomValidators.serviceLevel],

sendProducts: true

# Task 09 Handle Validators Run Moment

1. Make changes to the file **app/validators/custom.validators.ts.** Use the following snippet of code:

static serviceLevel(c: AbstractControl): ValidationErrors | null {

console.log('Validator: serviceLevel is called');

if (c.value !== undefined && (Number.isNaN(c.value) || c.value < 1 || c.value > 5)) {

return {

serviceLevel: true

};

}

return null;

}

1. Look at the console. You can see that validator runs very often.
2. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

private createForm() {

this.userForm = new FormGroup({

firstName: new FormControl(),

firstName: new FormControl('', {

validators: [Validators.required, Validators.minLength(3)],

updateOn: 'blur'

}),

lastName: new FormControl(),

email: new FormControl(),

phone: new FormControl(),

notification: new FormControl('email'),

serviceLevel: new FormControl('', {

validators: [CustomValidators.serviceLevel],

updateOn: 'blur'

}),

sendProducts: new FormControl(true)

});

}

// 2

ngOnInit() {

// this.buildForm();

this.createForm();

}

1. Look at the console. You can see that validator runs more rarely.
2. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

private buildForm() {

this.userForm = this.fb.group({

// firstName: ['', [Validators.required, Validators.minLength(3)]],

// It works!

firstName: new FormControl('', {validators: [Validators.required, Validators.minLength(3)], updateOn: 'blur'}),

// It works since v7

// firstName: this.fb.control('', { validators: [Validators.required, Validators.minLength(3)], updateOn: 'blur' }),

lastName: [

{ value: 'Zhyrytskyy', disabled: false },

[Validators.required, Validators.maxLength(50)]

],

email: [

'',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'), Validators.email]

],

phone: '',

notification: 'email',

serviceLevel: ['', CustomValidators.serviceLevel],

sendProducts: true

});

}

// 2

ngOnInit() {

// this.buildForm();

// this.createForm();

}

1. Look at the console. How often does validator run?

# Task 10. Custom Validator w/ Parameters

1. Make changes to the file **custom.validators.ts.** Use the following snippet of code:

// 1

import { AbstractControl, ValidationErrors, ValidatorFn } from '@angular/forms';

// 2

static serviceLevelRange(min: number, max: number): ValidatorFn {

return (c: AbstractControl): ValidationErrors | null => {

if (c.value !== undefined && (Number.isNaN(c.value) || c.value < min || c.value > max)) {

return {

serviceLevel: true

};

}

return null;

}

}

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1. add properties

rMin = 1;

rMax = 3;

// 2

serviceLevel: ['', CustomValidators.serviceLevel],

serviceLevel: ['', CustomValidators.serviceLevelRange(this.rMin, this.rMax)],

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

Please enter correct number from 1 to 5.

Please enter correct number from {{rMin}} to {{rMax}}.

# Task 11. Custom Validator Directive

1. Create file **ValidarorsModule.** Run the following command from the command line:

**ng g m validators -m app.module**

1. Make changes to file **custom.validators.ts.** Use the following snippet of code:

// 1

export function checkServiceLevel(

c: AbstractControl,

min: number = 1,

max: number = 5

): ValidationErrors | null {

if (

c.value !== undefined &&

(Number.isNaN(c.value) || c.value < min || c.value > max)

) {

return {

serviceLevel: true

};

}

return null;

}

// 2

static serviceLevel(c: AbstractControl): ValidationErrors | null {

console.log('Validator: serviceLevel is called');

if (

c.value !== undefined &&

(Number.isNaN(c.value) || c.value < 1 || c.value > 5)

) {

return {

serviceLevel: true

};

}

return null;

return checkServiceLevel(c);

}

// 3

static serviceLevelRange(min: number, max: number): ValidatorFn {

return (c: AbstractControl): ValidationErrors | null => {

if (c.value !== undefined && (Number.isNaN(c.value) || c.value < min || c.value > max)) {

return {

'serviceLevel': true

};

}

return null;

return checkServiceLevel(c, min, max);

};

}

1. Create **ServiceLevelDirective**. Run the following command from the command line:

**ng g d validators/service-level --skip-tests true --export true -m validators.module**

1. Replace the content of **ServiceLevelDirective**. Use the following snippet of code:

import { Directive } from '@angular/core';

import { Validator, AbstractControl, ValidationErrors, NG\_VALIDATORS } from '@angular/forms';

import { checkServiceLevel } from './custom.validators';

@Directive({

selector: '[appServiceLevelValidator]',

providers: [{

provide: NG\_VALIDATORS,

useExisting: ServiceLevelDirective,

multi: true

}]

})

export class ServiceLevelDirective implements Validator {

validate(c: AbstractControl): ValidationErrors | null {

return checkServiceLevel(c, 1, 3);

}

}

1. Make changes to file **app/validators/index.ts.** Use the following snippet of code:

export \* from './custom.validators';

export \* from './service-level.directive';

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

serviceLevel: ['', CustomValidators.serviceLevelRange(this.rMin, this.rMax)],

serviceLevel: [''],

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<input class="form-control"

id="serviceLevelId"

type="number"

formControlName="serviceLevel"

appServiceLevelValidator />

# Task 12. Custom Validator Directive w/ Parameters

1. Make changes to **ServiceLevelDirective.** Use the following snippet of code:

// 1

import { Directive, Input } from '@angular/core';

// 2

export class ServiceLevelDirective implements Validator {

@Input() rMin = 1;

@Input() rMax = 3;

validate(c: AbstractControl): ValidationErrors | null {

return checkServiceLevel(c, 1this.rMin, 3this.rMax);

}

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<input class="form-control"

id="serviceLevelId"

type="number"

formControlName="serviceLevel"

appServiceLevelValidator rMin="{{rMin}}" rMax="{{rMax}}" />

# Task 13. Async Custom Validator

1. Make changes to **custom.validators.ts.** Use the following snippet of code:

// 1

// rxjs

import { Observable } from 'rxjs';

// 2

static asyncEmailPromiseValidator(

c: AbstractControl

):

| Promise<ValidationErrors | null> | Observable<ValidationErrors | null> {

const email = c.value;

return new Promise(resolve => {

setTimeout(() => {

if (email === 'existsemail@example.com') {

resolve({

asyncEmailInvalid: true

});

} else {

resolve(null);

}

}, 2000);

});

}

1. Make changes to **SignupReactiveFormComponent** Use the following snippet of code:

// 1 buildForm()

email: [

'',

[

Validators.required,

Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'),

Validators.email

],

[CustomValidators.asyncEmailPromiseValidator]

],

// 2 onSetNotification

emailControl.clearValidators();

emailControl.clearAsyncValidators();

// 3 onSetNotification

emailControl.setValidators([

Validators.required,

Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'),

Validators.email

]);

emailControl.setAsyncValidators(

CustomValidators.asyncEmailPromiseValidator

);

1. Make changes to **SignupReactiveFormComponent Template** Use the following snippet of HTML:

<span class="help-block" \*ngIf="(userForm.get('email').touched || userForm.get('email').dirty) && userForm.get('email').errors">

<span \*ngIf="userForm.get('email').hasError('required')">

Please enter your email address.

</span>

<span \*ngIf="userForm.get('email').hasError('pattern')">

Please enter a valid email address.

</span>

<span \*ngIf="userForm.get('email').hasError('email')">

Please enter a valid email address.

</span>

<span \*ngIf="userForm.get('email').hasError('asyncEmailInvalid')">

This email already exists. Please enter other email address.

</span>

</span>

# Task 14. Async Custom Validator Directive

1. Create **AsyncEmailValidatorDirective.** Run the following command from the command line:

**ng g d validators/async-email-validator --skip-tests true --export true -m validators.module**

1. Replace the content of **AsyncEmailValidatorDirective**. Use the following snippet of code:

import { Directive } from '@angular/core';

import { NG\_ASYNC\_VALIDATORS, Validator, AbstractControl } from '@angular/forms';

import { Observable } from 'rxjs';

import { debounceTime, distinctUntilChanged, first} from 'rxjs/operators';

import { CustomValidators } from './custom.validators';

@Directive({

selector: '[appAsyncEmailValidator][formControlName], [appAsyncEmailValidator][ngModel]',

providers: [

{

provide: NG\_ASYNC\_VALIDATORS,

useExisting: AsyncEmailValidatorDirective,

multi: true

}

]

})

export class AsyncEmailValidatorDirective implements Validator {

validate(c: AbstractControl): Promise<{ [key: string]: any}>|Observable < {[key: string]: any}> {

return CustomValidators.asyncEmailPromiseValidator(c);

// return this.validateEmailObservable(c.value)

// .pipe(

// debounceTime(1000),

// distinctUntilChanged(),

// // The observable returned must be finite, meaning it must complete at some point.   
// // To convert an infinite observable into a finite one, pipe the observable through a

// // filtering operator such as first, last, take, or takeUntil

// first()

// );

}

private validateEmailObservable(email: string) {

return new Observable(observer => {

if (email === 'existsemail@example.com') {

observer.next({asyncEmailInvalid: true});

} else {

observer.next(null);

}

});

}

}

1. Make changes to file **validators/index.ts**. Use the following snippet of code:

export \* from './async-email-validator.directive';

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

email: [

'',

[

Validators.required,

Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'),

Validators.email

],

// [CustomValidators.asyncEmailPromiseValidator]

],

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<input class="form-control"

id="emailId"

type="email"

placeholder="Email (required)"

formControlName="email"

appAsyncEmailValidator />

1. Enter the value **existsemail@example.com** to the field and ensure that validation runs.
2. Make changes to file **validators/async-email-validator.directive.ts** and ensure that validation runs.

validate(c: AbstractControl): Promise<{ [key: string]: any}>|Observable < {[key: string]: any}> {

// return CustomValidators.asyncEmailPromiseValidator(c);

// return this.validateEmailObservable(c.value)

// .pipe(

// debounceTime(1000),

// distinctUntilChanged(),

// first()

// );

}

# Task 15. Cross-Field Validation

1. Make changes to **SignupReactiveFormComponent template.** Add the following snippet of HTML after the block of email:

<div class="form-group"

[ngClass]="{'has-error': (userForm.get('confirmEmail').touched ||

userForm.get('confirmEmail').dirty) &&

userForm.get('confirmEmail').invalid }">

<label class="col-md-2 control-label"

for="confirmEmailId">Confirm Email</label>

<div class="col-md-8">

<input class="form-control"

id="confirmEmailId"

type="email"

placeholder={{placeholder.confirmEmail}}

formControlName="confirmEmail" />

<span class="help-block" \*ngIf="(userForm.get('confirmEmail').touched ||   
 userForm.get('confirmEmail').dirty) &&

userForm.get('confirmEmail').errors">

<span \*ngIf="userForm.get('confirmEmail').hasError('required')">

Please confirm your email address.

</span>

</span>

</div>

</div>

1. Make changes to **SignupReactiveFormComponent.** Ensure that the validation of the field confirmEmail runs.

// 1

placeholder = {

email: 'Email (required)',

confirmEmail: 'Confirm Email (required)',

phone: 'Phone'

};

// 2

email: ['',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'), , Validators.email],

// [CustomValidators.asyncEmailPromiseValidator]

],

confirmEmail: ['', Validators.required],

1. Make changes to **SignupReactiveFormComponent template.** Add the following snippet of HTML before the block of email and put into it blocks for email and confirmEmail:

<div formGroupName="emailGroup">

<!-- Put here email and confirmEmail blocks -->

</div>

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

email: [

'',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'), Validators.email],

// [CustomValidators.asyncEmailPromiseValidator]

],

confirmEmail: ['', Validators.required],

emailGroup: this.fb.group({

email: ['',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'), Validators.email],

// [CustomValidators.asyncEmailPromiseValidator]

],

confirmEmail: ['', Validators.required],

}),

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<div class="form-group"

[ngClass]="{'has-error': (userForm.get('emailGroup.email').touched ||

userForm.get('emailGroup.email').dirty) &&

userForm.get('emailGroup.email').invalid }">

<label class="col-md-2 control-label"

for="emailId">Email</label>

<div class="col-md-8">

<input class="form-control"

id="emailId"

type="email"

placeholder={{placeholder.email}}

formControlName="email"  
 appAsyncEmailValidator />

<span class="help-block" \*ngIf="(userForm.get('emailGroup.email').touched ||

userForm.get('emailGroup.email').dirty) &&

userForm.get('emailGroup.email').errors">

<span \*ngIf="userForm.get('emailGroup.email').hasError('required')">

Please enter your email address.

</span>

<span \*ngIf="userForm.get('emailGroup.email').hasError('pattern')">

Please enter a valid email address.

</span>

<span \*ngIf="userForm.get('emailGroup.email').hasError('email')">

Please enter a valid email address.

</span>

<span \*ngIf="userForm.get('emailGroup.email').hasError('asyncEmailInvalid')">

This email already exists. Please enter other email address.

</span>

</span>

</div>

</div>

<div class="form-group"

[ngClass]="{'has-error': (userForm.get('emailGroup.confirmEmail').touched ||

userForm.get('emailGroup.confirmEmail').dirty) &&

userForm.get('emailGroup.confirmEmail').invalid }">

<label class="col-md-2 control-label"

for="confirmEmailId">Confirm Email</label>

<div class="col-md-8">

<input class="form-control"

id="confirmEmailId"

type="email"

placeholder={{placeholder.confirmEmail}}

formControlName="confirmEmail" />

<span class="help-block" \*ngIf="(userForm.get('emailGroup.confirmEmail').touched ||

userForm.get('emailGroup.confirmEmail').dirty) &&

userForm.get('emailGroup.confirmEmail').errors">

<span \*ngIf="userForm.get('emailGroup.confirmEmail').hasError('required')">

Please confirm your email address.

</span>

</span>

</div>

</div>

</div>

1. Make changes to file **custom.validators.ts.** Use the following snippet of code:

static emailMatcher(c: AbstractControl): ValidationErrors | null {

const emailControl = c.get('email');

const emailConfirmControl = c.get('confirmEmail');

if (emailControl.pristine || emailConfirmControl.pristine) {

return null;

}

if (emailControl.value === emailConfirmControl.value) {

return null;

}

return { emailMatch: true };

}

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

emailGroup: this.fb.group({

email: ['',

[Validators.required, Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+') , Validators.email],

//[CustomValidators.asyncEmailPromiseValidator]

],

confirmEmail: ['', Validators.required],

}, {validator: CustomValidators.emailMatcher}),

// 2 Replace method onSetNotification with new one

onSetNotification(notifyVia: string) {

const controls = new Map();

controls.set('phoneControl', this.userForm.get('phone'));

controls.set('emailGroup', this.userForm.get('emailGroup'));

controls.set('emailControl', this.userForm.get('emailGroup.email'));

controls.set(

'confirmEmailControl',

this.userForm.get('emailGroup.confirmEmail')

);

if (notifyVia === 'text') {

controls.get('phoneControl').setValidators(Validators.required);

controls.forEach(

(control, index) => {

if (index !== 'phoneControl') {

control.clearValidators();

control.clearAsyncValidators();

}

}

);

this.placeholder = {

phone: 'Phone (required)',

email: 'Email',

confirmEmail: 'Confirm Email'

};

} else {

const emailControl = controls.get('emailControl');

emailControl.setValidators([

Validators.required,

Validators.pattern('[a-z0-9.\_%+-]+@[a-z0-9.-]+'),

Validators.email

]);

emailControl.setAsyncValidators(CustomValidators.asyncEmailPromiseValidator);

controls.get('confirmEmailControl').setValidators([Validators.required]);

controls.get('emailGroup').setValidators([CustomValidators.emailMatcher]);

controls.get('phoneControl').clearValidators();

this.placeholder = {

phone: 'Phone',

email: 'Email (required)',

confirmEmail: 'Confirm Email (required)'

};

}

controls.forEach(control => control.updateValueAndValidity());

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<div formGroupName="emailGroup"

[ngClass]="{'has-error': userForm.get('emailGroup').errors}">

<span class="help-block" \*ngIf="(userForm.get('emailGroup.confirmEmail').touched ||

userForm.get('emailGroup.confirmEmail').dirty) &&

userForm.get('emailGroup.confirmEmail').errors">

<span \*ngIf="userForm.get('emailGroup.confirmEmail').hasError('required')">

Please confirm your email address.

</span>

</span>

<span class="help-block" \*ngIf="(userForm.get('emailGroup.confirmEmail').touched ||

userForm.get('emailGroup.confirmEmail').dirty) &&

(userForm.get('emailGroup.confirmEmail').errors ||

userForm.get('emailGroup').errors) ">

<span \*ngIf="userForm.get('emailGroup.confirmEmail').hasError('required')">

Please confirm your email address.

</span>

<span \*ngIf="userForm.get('emailGroup').hasError('emailMatch')">

The confirmation does not match the email address.

</span>

</span>

# Task 16. Adjusting Validation Rules

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

import { Component, OnInit, OnDestroy } from '@angular/core';

import { Subscription } from 'rxjs';

// 2

export class SignupReactiveFormComponent implements OnInit, OnDestroy

// 3

private sub: Subscription;

// 4

private watchValueChanges() {

this.sub = this.userForm.get('notification').valueChanges

.subscribe(value => console.log(value));

}

// 5

ngOnInit() {

this.buildForm();

this.watchValueChanges();

}

// 6

ngOnDestroy() {

this.sub.unsubscribe();

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HMTL:

<div class="form-group">

<label class="col-md-2 control-label">Send Notifications</label>

<div class="col-md-8">

<label class="radio-online">

<input type="radio"

value="email"

formControlName="notification"

(click)="onSetNotification('email')">Email

</label>

<label class="radio-online">

<input type="radio"

value="text"

formControlName="notification"

(click)="onSetNotification('text')">Text

</label>

</div>

</div>

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

private watchValueChanges() {

this.sub = this.userForm.get('notification').valueChanges

.subscribe(value => console.log(value));

.subscribe(value => this.setNotification(value));

}

// 2

private onSsetNotification(notifyVia: string) {

# Task 17. Displaying Validation Messages

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

import { FormGroup, FormControl, FormBuilder, Validators, AbstractControl } from '@angular/forms';

// 2

userForm: FormGroup;  
validationMessage: string;

// 3

private sub: Subscription;

private validationMessagesMap = {

email: {

required: 'Please enter your email address.',

pattern: 'Please enter a valid email address.',

email: 'Please enter a valid email address.',

asyncEmailInvalid:

'This email already exists. Please enter other email address.'

}

};

// 4

private setValidationMessage(c: AbstractControl, controlName: string) {

this.validationMessage = '';

if ((c.touched || c.dirty) && c.errors) {

this.validationMessage = Object.keys(c.errors)

.map(key => this.validationMessagesMap[controlName][key])

.join(' ');

}

}

// 5

private watchValueChanges() {

…

const emailControl = this.userForm.get('emailGroup.email');

const sub = emailControl.valueChanges.subscribe(value =>

this.setValidationMessage(emailControl, 'email')

);

this.sub.add(sub);

}

// 6

onBlur() {

const emailControl = this.userForm.get('emailGroup.email');

this.setValidationMessage(emailControl, 'email');

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<div class="form-group"

[ngClass]="{'has-error': (userForm.controls.emailGroup.controls.email.touched ||

userForm.get('emailGroup.email').dirty) &&

userForm.get('emailGroup.email').invalid }">

[ngClass]="{'has-error': validationMessage}">

<label class="col-md-2 control-label"

for="emailId">Email</label>

<div class="col-md-8">

<input class="form-control"

id="emailId"

type="email"

placeholder={{placeholder.email}}

formControlName="email"

asyncEmailValidator

(blur)="onBlur()" />

<span class="help-block" \*ngIf="(userForm.get('emailGroup.email').touched ||

userForm.get('emailGroup.email').dirty) &&

userForm.get('emailGroup.email').errors">

<span \*ngIf="userForm.get('emailGroup.email').hasError('required')">

Please enter your email address.

</span>

<span \*ngIf="userForm.get('emailGroup.email').hasError('pattern')">

Please enter a valid email address.

</span>

\*ngIf="userForm.get('emailGroup.email').hasError('email')">

Please enter a valid email address.

</span>

<span \*ngIf="userForm.get('emailGroup.email').hasError('asyncEmailInvalid')">

This email already exists. Please enter other email address.

</span>

</span>

<span class="help-block" \*ngIf="validationMessage">

{{ validationMessage }}

</span>

</div>

</div>

# Task 18. Reactive Transformations

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

import { Subscription } from 'rxjs';

import { debounceTime } from 'rxjs/operators';

1. Внесите изменения в метод **watchValueChanges**

private watchValueChanges() {

…

const sub = emailControl.valueChanges

.pipe(

debounceTime(1000)

)

.subscribe(value => this.setValidationMessage(emailControl, 'email')); this.sub.add(sub);

}

# Task 19. Define the input element(s) to duplicate

1. Make changes to method **buildForm.** Use the following snippet of code:

sendProducts: true,

addressType: 'home',

country: '',

city: '',

zip: '',

street1: '',

street2: ''

1. Uncomment HTML of **SignupReactiveFormComponent**, which starts from

<!--<div >

1. Replace the div element**.** Use the following snippet of code:

<div >  
<div \*ngIf="userForm.get('sendProducts').value">

1. Make changes to the markup of the fields **Home, Work, Other**

formControlName="addressType"

1. Make changes to the markup of the fields **Country, City, Zip Code, Street Address 1, Street Address 2**

// Country

formControlName="country"

// City

formControlName="city"

// Zip Code

formControlName="zip"

// Street Address 1

formControlName="street1"

// Street Address 2

formControlName="street2"

# Task 20. Define a FormGroup

1. Make changes to the method **buildForm.** Use the following snippet of code:

addressType: 'home',

country: '',

city: '',

zip: '',

street1: '',

street2: ''

addresses: this.fb.group({

addressType: 'home',

country: '',

city: '',

zip: '',

street1: '',

street2: ''

})

1. Wrap 4 div blocks, which are in the block   
   <div \*ngIf="userForm.get('sendProducts').value"> and contain the fields for address. Use the following snippet of HMTL:

<div formGroupName="addresses">...</div>

# Task 21. Refactor to Make Copies

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

private buildAddress(): FormGroup {

return this.fb.group({

addressType: 'home',

country: '',

city: '',

zip: '',

street1: '',

street2: ''

});

}

// 2

addresses: this.buildAddress()

addresses: this.fb.group({

addressType: 'home',

country: '',

city: '',

zip: '',

street1: '',

street2: ''

})

# Task 22. Create a FormArray

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

// 1

import { FormGroup, FormControl, FormArray, FormBuilder, Validators, AbstractControl } from '@angular/forms';

// 2

get addresses(): FormArray {

return this.userForm.get('addresses') as FormArray;

}

1. Make changes to the method **buildForm.** Use the following snippet of code:

addresses: this.buildAddress()

addresses: this.fb.array([this.buildAddress()])

1. Make changes to **SignupReactiveFormComponent template.** Create wrapper block for the block <div formGroupName="addresses">. Use the following snippet of HTML:

<div formArrayName="addresses">

</div>

1. Replace the expression of attribute **formGroupName**="addresses". Use the following snippet of HTML:

<div formGroupName="addresses">

<div formGroupName="0">

# Task 23. Loop through the FormArray

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

<div formArrayName="addresses">

<div formGroupName="0">

<div \*ngFor="let address of addresses.controls; let i = index" [formGroupName]="i" >

1. Replace the value of attribute **id** for the fields **Home, Work, Other.** Use the following snippet of HTML:

id="addressType1Id"

id="{{'addressType1Id' + i}}"

1. Replace the value of attribute **for** for the label elements **«Country, City, Zip Code», «Street Address 1», «Street Address 2».** Use the following snippet of HTML:

// Country, City, Zip Code

for="cityId"

attr.for="{{'countryId' + i}}"

// Street Address 1

for="street1Id"

attr.for="{{'street1Id' + i}}"

// Street Address 2

for="street2Id"

attr.for="{{'street2Id' + i}}"

1. Replace the value of the attribute **id** for the fields **Country, City, Zip Code, Street Address 1, Street Address 2.** Use the following snippet of HTML:

// Country

id="countryId"

id="{{'countryId' + i}}"

// City

id="cityId"

id="{{'cityId' + i}}"

// Zip Code

id="zipId"

id="{{'zipId' + i}}"

// Street Address 1

id="street1Id"

id="{{'street1Id' + i}}"

// Street Address 2

id="street2Id"

id="{{'street2Id' + i}}"

# Task 24. Duplicate the Input Elements

1. Make changes to **SignupReactiveFormComponent.** Use the following snippet of code:

onAddAddress(): void {

this.addresses.push(this.buildAddress());

}

1. Make changes to **SignupReactiveFormComponent template.** Use the following snippet of HTML:

// 1

<div formArrayName="addresses">

…

</div>

<div class="form-group">

<div class="col-md-4 col-md-offset-2">

<button class="btn btn-primary"

type="button"

(click)="onAddAddress()">

Add Another Address

</button>

</div>

</div>

// 2

<br>userForm.get('emailGroup').errors {{userForm.get('emailGroup').errors | json}}

<br>Street: {{addresses.get('0.street1')?.value}}