



# Angular workbook

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# Lab 1: Getting started 1/7

## Setting up your environment

### Training on Local system

You should install the following on your system:

- Node.js version LTS
- NPM (It will be installed at the same time as Node.js)
- Git
- IDE (e.g. Visual Studio Code)

Unzip the learning materials given by your trainer.

### Training on Strigo VM

Strigo Lab provides a Windows VM with the following functional environment:

- Node.js
- NPM (installed with Node.js)
- Git
- Visual Studio Code ("C:\Programs Files\Microsoft VS Code")

Note: Software can be installed easily if they are not pre-installed.



# Lab 1: Getting started 2/7

## Visual Studio Code Extensions

If you use VSCode as your IDE, install the following extensions in addition:

- Angular Language Service
- Auto Rename Tag (optional)
- Github Theme (optional)
- Material Icon Theme (optional)

## Version control system

- Open the browser and login to your favorite cloud-based version control system (Github, Gitlab, ...)
- Remotely, create a new empty repository named **zenika-ng-website** in which to save your code
- Locally, configure your Git name and email:

```
git config --global user.name "<YOUR_NAME>"
git config --global user.email <YOUR_EMAIL>
```



# Lab 1: Getting started 3/7

## Creating and running your Angular application

This app will be used along all labs.

**Install the Angular CLI globally and create your app with the shell commands**

```
npm i -g @angular/cli  
ng new zenika-ng-website
```

You will be displayed some options for your app.

- Choose "No" for 'zoneless' application
- Choose "CSS" as style preprocessor
- Choose "No" for SSR/SSG/Prerendering



# Lab 1: Getting started 4/7

If you can't install the Angular CLI globally, create your app with one of the following shell commands

```
npm init @angular zenika-ng-website
```

or:

```
npx @angular/cli new zenika-ng-website
```

In this case, to run an Angular CLI command, you will have to use NPM first **npm run ng <command>** instead of just **ng <command>**.

## Run the Angular dev server

```
ng serve # or: `npm start`
```

- Open the Chrome browser and visit: <http://localhost:4200>.

You should see the app with a placeholder content. 🚀



# Lab 1: Getting started 5/7

## Taking control of your application

Even if we haven't yet studied the main concepts, let's modify the application right away!

- Replace the content of `src/app/app.html` with:

```
<h1>Welcome to {{ title }}!</h1>
```

- Add some style in `src/app/app.css`:

```
h1 {  
  color: blue;  
}
```

- Replace the property `title` in `src/app/app.ts` with:

```
class App {  
  title = 'my first component';  
}
```

- Check that the application has been updated correctly in the browser. 🚀



# Lab 1: Getting started 6/7

## Now let's try running the application tests

```
ng test # or: `npm test`
```

Because we've modified the application, the tests in `app.spec.ts` fail.

- Fix the test on property `title`
- Fix the test on tag `h1`

## Finally let's build the application for production

```
ng build
```

- Open a shell window in `dist/zenika-ng-website/browser/` directory and run the command:

```
npx serve --single .
```

This command will download and run the NPM package named `serve`. Note that this package is not related to the `ng serve` command.

- Open the browser at the URL specified in the console





# Lab 1: Getting started 7/7

## Synchronize your repository

Push your local repository from the command line over *HTTPS* (not SSH).

Here's an example for Github:

```
git remote add origin https://github.com/[YOUR_USERNAME]/zenika-ng-website.git
git branch -M main
git push -u origin main
```



# Lab 2: Workspace 1/3

During the rest of the training, you will develop an e-commerce application.

The design team have been working hard, and the result is available in the **Exercises/resources/design** directory. You're going to integrate this design into your Angular application.

First, let's start a local server to see what to app looks like.

- Open a new shell window in the directory **design** and run the command:

```
npx serve .
```

- Open the browser at the URL specified in the console. You should see the 4 products available in the catalog.
- Next, copy/paste the content of **design/assets** into **public/assets**
- Finally, open the file **design/index.html** in your code editor
  - It contains **brief informations** about the layout of the design
  - Follow the **detailed instructions** provided in this lab to integrate the design into your Angular application



# Lab 2: Workspace 2/3

## Adding Bootstrap CSS

- Install Bootstrap with NPM:

```
npm i bootstrap
```

- In the `angular.json` file, add `bootstrap.min.css` to the `"styles"` array in both `"build"` and `"test"` sections:

```
{
  "projects": {
    "zenika-ng-website": {
      "architect": {
        "build": {
          "options": {
            "styles": [
              "node_modules/bootstrap/dist/css/bootstrap.min.css",
              "src/styles.css"
            ]
          }
        },
        "test": {
          "options": {
            "styles": [
              "node_modules/bootstrap/dist/css/bootstrap.min.css",
              "src/styles.css"
            ]
          }
        }
      }
    }
  }
}
```



# Lab 2: Workspace 3/3

## Adding the HTML code

- Copy/paste the inner content of the `body` tag to `src/app/app.html`

```
<body>  
  <!-- ONLY WHAT'S INSIDE -->  
</body>
```

- Serve your app using `ng serve` to see if the result is equivalent to that of the designers



# Lab 3: Components 1/3

In this lab, you'll start creating Angular components to break down the giant **App** component template into smaller parts

## Creating the "menu" component

- Create a menu component with the following shell command and move the corresponding code into it

```
ng generate component menu
```

- Once done, add the component `<app-menu />` to `src/app/app.html`



# Lab 3: Components 2/3

## Creating the "product-card" component

- Create a product-card component with the following shell command and move the corresponding code into it

```
ng g c --flat true product/product-card
```

- Add a file **product-types.ts** in the same directory (**src/app/product/**) and define the product interface

```
export interface Product {  
  id: string;  
  title: string;  
  description: string;  
  photo: string;  
  price: number;  
  stock: number;  
}
```

- The component should accept:
  - an input: **product** = **input.required<Product>()**;
  - an output: **addToBasket** = **output<Product>()**;
- Use the properties of the **product** object in the template to display the **title**, **description**, ...

```
... <a class="card-link">{{ product.title }}</a> ...
```

- The output should emit the product when the user clicks on the button "Ajoutez au panier"



# Lab 3: Components 3/3

## Storing all products in the App component

Currently, the products are hard-coded in the template `src/app/app.html`. Let's give the **App** component class, data ownership.

- In `src/app/app.ts`, define a `products: Product[] = []`; property
- Fill the array with the content of the file `Exercises/design/products.json`
- In `src/app/app.html`, use the component `<app-product-card />` instead of each hard-coded product (later in the training, we'll use a "for" loop to achieve this)

```
<app-product-card [product]="products[0]" />
```

- Define a `total = 0`; property that should be updated each time the user clicks on the button "Ajoutez au panier"



# Lab 4: Unit testing 1/3

In this lab, you will implement the tests for the app you developed in the "Lab 3: Components".

The **Menu** component don't need to be tested, since it have no logic.

You're going to focus on the **ProductCard** and **App** components.

- Before running the tests, replace the content of **app.spec.ts** with the following:

```
import { ComponentFixture, TestBed } from '@angular/core/testing';
import { App } from './app';

describe('App', () => {
  let component: App;
  let fixture: ComponentFixture<App>;

  beforeEach(async () => {
    await TestBed.configureTestingModule({
      imports: [App],
    }).compileComponents();

    fixture = TestBed.createComponent(App);
    component = fixture.componentInstance;
    fixture.detectChanges();
  });

  it('should create', () => {
    expect(component).toBeTruthy();
  });
});
```

- Run the tests using Angular CLI:

```
ng test
```

Some tests fail. Let's fix them!





# Lab 4: Unit testing 2/3

## product-card.spec.ts

- First, let's focus on this test, disabling all the others:

```
// Add temporarily the prefix "f" ("focus") to the `describe` function
fdescribe('ProductCard', () => {
  /* ... */
});
```

- In the **beforeEach** section, define the required **product** property:

```
fixture.componentRef.setInput('product', {
  title: 'TITLE',
  description: 'DESC',
  // ...
});
```

Now, the test setup should pass (but we're not testing anything useful at the moment).

### Tests

- It should display the product photo as image url
- It should display the product description
- It should display the product title
- It should display the product price
- It should emit addToBasket event with the given product when the button is clicked
  - Spy on the **emit** method of the **addToBasket** output to check that it is called



# Lab 4: Unit testing 3/3

## app.spec.ts

- Now remove the "f" ("focus") prefix you previously added to the **describe** function.

This component depends on 2 other components:

- **Menu**
- **ProductCard**

Choose one of the two approaches you learned about in the slides:

- First approach - **with implicit dependency import**
- Second approach - **allowing unknown HTML elements**

## Tests

- It should display the products
- It should update the total when "addToBasket" class method is called (Class testing)
- It should update the total when a product emits the "addToBasket" event (DOM testing)



# Lab 5: Control flow

In this lab, you'll use the `@for`, `@if` and `@else` to improve the application's logic.

## App component

- Update `addToBasket` method to decrease the product stock when user clicks *"Ajouter au panier"*
- Add a getter `get hasProductsInStock(): boolean` that returns `true` when at least one product has a stock greater than 0
- Use `@for` to iterate over the `products` arrays to display each `<app-product-card />` component
- Use `@if` to display only the products with a `stock` greater than 0
- Use `@if (hasProductsInStock) {} @else {}` to display the message *"Désolé, notre stock est vide !"* when there's no product left in the catalog

## Tests

### app.spec.ts

- It should decrease the stock of the product added to the basket
- It should not display products whose stock is empty
- It should display a message when stock is completely empty



# Lab 6: Directives

In this lab, you'll use the `ngClass` directive to improve the application's logic.

## ProductCard component

- Use `ngClass` directive to add the CSS class `.text-bg-warning` on the element `<div class="card h-100 text-center">` but only when the product `stock` is equal to 1 (last chance to buy it!).

## Tests

### `product.spec.ts`

- It should not add the "text-bg-warning" className when stock is greater than 1
- It should add the "text-bg-warning" className when stock is equal to 1



# Lab 7: Signals

In this Lab, you'll convert **App** component properties into signals.

## App component

- Use a `signal<Product[]>` signal for the **products** property
- Use a `computed<boolean>` signal for the **hasProductsInStock** property
- Use a `signal<number>` signal for the **total** property
- Fix the `addToBasket()` method to properly update the **products** and **total** signals
- Update the component template to properly consume the different signals

## Tests

### `app.spec.ts`

- Fix the tests to properly consume the different signals



# Lab 8: Services 1/5

In this lab, you'll move the data ownership from the **App** component to **services**.

You need to create 2 services using Angular CLI:

- `src/app/catalog/catalog-resource.ts`: to manage the products
- `src/app/basket/basket-resource.ts`: to manage the basket items

## CatalogResource

The service should have:

- A `_products = signal<Product[]>( ... )` private property (move here the 4 products defined in `app.ts`)
- A `products = _products.asReadonly()` public property
- A `hasProductsInStock = computed<boolean>( ... )` computed signal that returns `true` if at least one product stock is greater than 0
- A `decreaseStock(productId: string)` method to decrease the corresponding product stock if it is greater than 0

## Usage

- **App**: refactor the component to use the **CatalogResource** service



# Lab 8: Services 2/5

## BasketResource

- Define a new interface:

```
// src/app/basket/basket-types.ts
export interface BasketItem {
  id: string;
  title: string;
  price: number;
}
```

The service should have:

- A `_items = signal<BasketItem[]>( ... )` private property
- A `items = _items.asReadonly()` public property
- A `total = computed<number>( ... )` computed signal that returns the basket total
- A `addItem(item: BasketItem): void` method that add an item to the basket

### Usage

- **App**: refactor the component to use the **BasketResource** service
- **Menu**: use the **BasketResource** to display the number of items in the basket.  
To achieve this, add a `numberOfItems = computed<number>( ... )` property to the menu component.



# Lab 8: Services 3/5

## Use of injection token

- Create an injection token `APP_TITLE` in `src/app/app.token.ts`
- Provide the token using a `ValueProvider` with the value *"Bienvenue sur Zenika Ecommerce"*
- Inject the token in the `App` component to display the app title

## Tests

Since we've modified the application extensively, tests fail!

- For now, let's disable the tests in `app.spec.ts` by adding an `x` before the main `describe()`:

```
xdescribe("App", () => { /* ... */ });
```

### catalog-resource.spec.ts

- It should decrease the product stock
- It should not decrease the product stock when stock is empty

### basket-resource.spec.ts

- It should update the items when a product is added
- It should update the total when a product is added





# Lab 8: Services 4/5

## menu.spec.ts

The component now depends on the newly created **BasketResource**. Note that, as this service is "provided in root", it is automatically provided in **TestBed** and used in our tests.

```
@Injectable({ providedIn: "root" })
export class BasketResource {}
```

But remember that the goal of unit testing is to test each unit in isolation. So, we need to use *Stubs* instead of real implementations.

- Create a minimalist class called **BasketResourceStub** that will replace the **BasketResource**

```
// Note: do not use `{ providedIn: "root" }` metadata
// because the stub will be provided manually in our tests.
@Injectable()
export class BasketResourceStub implements Partial<BasketResource> {
  items = signal<BasketItem[]>([]);
  total = signal(0);
  addItem(item: BasketItem): void {
    this.items.update((items) => [...items, item]);
  }
}
```

- Provide the stub in **menu.spec.ts**

Add test:

- It should display the number of items



# Lab 8: Services 5/5

## app.spec.ts

Some tests currently performed in this component do not need to be fixed, but simply removed, as they are no longer relevant.

- Remove the tests related to the computation of the **basket total** and **catalog stock update** (the **App** component is no longer responsible for these computations):
  - ~~It should update the total when a product emits the "addToBasket" event~~
  - ~~It should update the total when "addToBasket" class method is called~~
  - ~~It should decrease the stock of the product added to the basket~~
- Remove the **x** from **xdescribe()** that you added previously to re-enable the tests
- Create a minimalist class **CatalogResourceStub** that will replace the **CatalogResource** (such as you did above for the **BasketResource**)
- Provide the 2 stubs in **app.spec.ts**
- Provide a value for **APP\_TITLE** injection token
- Fix the remaining tests

Add new, more relevant tests:

- It should call "CatalogResource.decreaseStock" and "BasketResource.addItem" methods when a product is added to the basket
  - For that use **TestBed.inject** function (to get the services instances) and **spyOn** Jasmine function (to spy on these methods)
- It should display the app title



# Lab 9: Pipes 1/5

In this lab, you'll use pipes to format the application content.

## ProductCard component

Let's start by using pipes provided by the Angular framework:

- Use the **uppercase** pipe to display the product title in uppercase
- Use the **currency** pipe to display the product price with the currency

At the moment, notice that the price is in \$ and formatted for the **en-US** locale (example: "\$21"). But we need to display it in € for the **fr** locale (example: "21 €").

Let's fix this!



# Lab 9: Pipes 2/5

- First, register the "fr" locale in your application

```
// src/app/app.config.ts
import { registerLocaleData } from "@angular/common";
import localeFr from "@angular/common/locales/fr";

registerLocaleData(localeFr);
```

- Next, provide **LOCALE\_ID** and **DEFAULT\_CURRENCY\_CODE** in the app config

```
// src/app/app.config.ts
import { DEFAULT_CURRENCY_CODE, LOCALE_ID } from "@angular/core";

export const appConfig: ApplicationConfig = {
  providers: [
    { provide: LOCALE_ID, useValue: "fr" },
    { provide: DEFAULT_CURRENCY_CODE, useValue: "EUR" },
  ],
};
```

The product price should now be displayed correctly.

## App component

- Use the **currency** pipe to display the basket total



# Lab 9: Pipes 3/5

## SortProductsPipe

Now, let's create a custom pipe of our own!

We want to be able to sort the displayed products by **price** or **stock**.

- Generate the pipe `src/app/sort-products/sort-products-pipe.ts` using Angular CLI
  - Implement the **transform** method that returns the sorted array of products
  - Add an optional parameter to the pipe to specify on which property (**price** or **stock**) to sort the products
- Once your finished, use your pipe to sort the products in the **App** component template

Finally, let's add a selector to choose between **price** and **stock** sorting. You'll find a component ready for use here: **Exercises/resources/select-product-key**.

- Copy/paste the component **Exercises/resources/select-product-key** into your app at `src/app/select-product-key`



# Lab 9: Pipes 4/5

Use the component:

- Add **productKey** in **app.ts** component

```
import { Component } from "@angular/core";
import { ProductKey } from "../select-product-key/product-key-types";

@Component({
  /* ... */
})
export class App {
  productKey = signal<ProductKey>(undefined);
}
```

- Use **<app-select-product-key>** in **app.html**

```
<app-select-product-key [(productKey)]="productKey" />
```



# Lab 9: Pipes 5/5

## Tests

### `app.spec.ts`

- It should display the products sorted by price
- It should display the products sorted by stock
- It should display the basket total with currency

### `sort-products-pipe.spec.ts`

- It should not sort products when key is undefined
- It should sort products by price
- It should sort products by title

### `product.spec.ts`

- It should display product title in uppercase
- It should display product price with currency





# Lab 10: Http 1/3

In this lab, you'll communicate with a REST API server that will manage the products and the basket.

- To run the server, open a new shell window in the **Exercises/resources/server** directory and run the following commands:

```
npm install
npm start
```

The server is listening on: **http://localhost:8080/api/**

Here are the available endpoints:

- **GET /products** to fetch all products
  - Response: **Product[]**
- **GET /products/:productId** to fetch one product
  - Response: **Product**
- **GET /basket** to fetch the basket
  - Response: **BasketItem[]**
- **POST /basket** to add a new item to the basket
  - Request body: **{ productId: string; }**
  - Response: **BasketItem**

## ApplicationConfig

- Add the HTTP provider: **provideHttpClient(withFetch())**





# Lab 10: Http 2/3

## CatalogResource

- Inject the `HttpClient` service
- Remove the hard coded products from the `_products` property
- Add a `fetchProducts(): Observable<Product[]>` method that gets the products from the server and stores them in the `_products` signal.  
To achieve this side-effect, use the RxJS `tap` operator in the `.pipe()` transformation chain:

```
import { Observable, tap } from 'rxjs';
import { Injectable } from '@angular/core';
import { Product } from '../product/product-types';

@Injectable({
  providedIn: 'root',
})
export class CatalogResource {
  fetchProducts(): Observable<Product[]> {
    return this.httpClient
      .get<Product[]>('http://localhost:8080/api/products')
      .pipe(tap((products) => this._products.set(products)));
  }
}
```

## Updating the App component

- Subscribe to `CatalogResource.fetchProducts()` method in the class constructor, to trigger data fetching



# Lab 10: Http 3/3

## BasketResource

- Inject the `HttpClient` service
- Add a `fetchBasket(): Observable<BasketItem[]>` method (such as we did with `fetchProducts()` for the `CatalogResource`)
- Add a `addItem(productId: string): Observable<BasketItem>` method posts the item to be added and update the `_basket` property accordingly

## Updating the App component

- Subscribe to `BasketResource.fetchBasket()` method in the class constructor, to trigger data fetching
- Update the `addToBasket()` method so that it subscribes correctly to `BasketResource.addItem()` method

## Tests

At this point, a lot of tests fail! This is because the structure of the application has changed radically. Refactoring the tests would take too much time in the context of this training.

With the trainer, take a look at the new test implementation in the following directory:

- `Exercises/solutions/projects/10_http`



# Lab 11: Routing 1/7

In this lab, you'll create a multi-page application (SPA) using the Angular router.

## app.routes.ts

- Create the following components and declare a route for each one of them:
  - Component: **Catalog** --> Route: 'catalog'
  - Component: **Basket** --> Route: 'basket'
- Add a route **\*\*** that redirects to '/catalog'

## Catalog component

- Move the main content you have developed in the **App** component to this one, including:
  - the template
  - the class logic
  - the tests (optional)

## App component

- In **src/app/app.ts**, add **RouterOutlet** to the component **imports**
- In **src/app/app.html**, put a **<router-outlet />** directive, instead of the main content you just moved. The template should now look like this:

```
<app-menu />

<main class="py-4 container">
  <router-outlet />
</main>
```



# Lab 11: Routing 2/7

## RouterLink

Add **routerLink** directives in the following templates (don't forget to add the **RouterLink** in the related components **imports**):

- In **catalog.html**:
  - to visit the page *"Voir mon panier"*
- In **menu.html**:
  - to return the home page when clicking on *"Zenika Ecommerce"*
  - to visit the page *"Voir mon panier"*
- In **product-card.html**:
  - to visit the product details page at `['/product', product.id]`  
(below, you will create the **ProductDetails** component in the bonus section)

# Lab 11: Routing 3/7

## Basket component

- Use the following markup for the component template:

```
<h2 class="h4">Mon panier</h2>

<div class="card">
  <div class="card-header">2 articles</div>

  <ul class="list-group list-group-flush">
    <!-- Use `@for` to loop over the basket items -->
    <li class="list-group-item d-flex justify-content-between">
      Coding the snow <span class="text-primary">19 €</span>
    </li>

    <li class="list-group-item d-flex justify-content-between">
      Coding the world <span class="text-primary">18 €</span>
    </li>
    <!-- End of: Use `@for` to loop over the basket items -->

    <li class="list-group-item d-flex justify-content-between fw-bold">
      Total <span class="text-primary">37 €</span>
    </li>
  </ul>
</div>
```

- Use the **BasketResource** service to implement the component logic
- Subscribe to **BasketResource.fetchBasket()** method in the class constructor, to trigger data fetching  
Note that you'll remove this part once you've implemented the basket guard (see below \*)
- To check that everything is working properly, you should be able to:
  - Visit the <http://localhost:4200/catalog> page, click on "Voir mon panier" and view the basket items
  - Reload the <http://localhost:4200/basket> page and view the basket items



# Lab 11: Routing 4/7

## BasketGuard

When visiting the page `http://localhost:4200/basket`:

- If there are items in the basket, the **Basket** component should be displayed
- If the basket is empty, an alternate **BasketEmpty** component should be displayed

Let's do this!

- Generate a **CanMatch** guard in `src/app/basket/basket-guard.ts`

```
import { inject } from "@angular/core";
import { CanMatchFn } from "@angular/router";
import { BasketResource } from "../basket-resource";

export const basketGuard: CanMatchFn = () => {
  const basketResource = inject(BasketResource);
  return /* to be continued... */;
};
```

- Add the guard to the appropriate route
- Generate a new component **BasketEmpty** component
  - It simply displays *"Votre panier est vide."*
- Add the route **'basket'** to display the component
  - Yes, it's the same route as for the **Basket** component
- At this point, you can safely remove the **BasketResource.fetchBasket()** subscription from the **Basket** component constructor, because data fetching is now triggered by the guard itself anyway (see above \*)





# Lab 11: Routing 5/7

## Bonus: ProductDetails component

- Create the component and add a lazy-loaded route '`product/:id`'
- Retrieve the `:id` from the `ActivatedRoute` snapshot
- Fetch the product from the server using the `HttpClient` service:
  - `http://localhost:8080/api/product/:id`
- Store the fetched product in a class property:
  - `product = signal<Product | undefined>(undefined);`
- For the component template, copy/paste the following:
  - `Exercises/resources/product-details/product-details.html`



# Lab 11: Routing 6/7

## Bonus: Application performances

Have you noticed that when loading the catalog, the message *"Désolé, notre stock est vide !"* appears briefly and is then replaced by the products once fetched?

You can improve this by not displaying anything as long as the **products** are undefined.

- In the `/catalog/catalog-resource.ts` service, change the `_product` signature:

```
@Injectable({
  providedIn: 'root',
})
export class CatalogResource {
  private _products = signal<Product[] | undefined>(undefined);
  // Remember that previously, it was: `signal<Product[]>([])`
}
```

- Fix the errors raised by this change
- Finally, in the `/catalog/catalog.html` component template, use `@if {}` statement like this:

```
@if (products()) {
  <!-- The "for" loop that displays the products -->
}
```





# Lab 11: Routing 7/7

## Bonus: Directories organisation

- The following directories can be moved within the `src/app/catalog/` directory:
  - `/product/`
  - `/select-product-key/`
  - `/sort-products/`



# Lab 12: Forms 1/5

In this lab, you'll create an Angular form to checkout the basket.

- Generate a new component using Angular CLI:
  - `src/app/basket/checkout-form/checkout-form.ts`
- Add the `FormsModule` to the component `imports` metadata
- For the component template, copy/paste the design made with love by the UI/UX team:
  - `Exercises/resources/checkout-form/checkout-form.html`
- Insert the component selector at the end of the basket component template:
  - `<app-checkout-form />`



# Lab 12: Forms 2/5

## Handle form fields

- For each field, add the `ngModel` directive and create a template variable to access it
  - For example `<input name="name" ngModel #nameModel="ngModel" />`
- Fields validation:
  - All fields are required
  - Credit card field must match the pattern `^[0-9]{3}-[0-9]{3}$`
- Fields appearance:
  - Add CSS class `.is-invalid` when the field's state is "touched" and "invalid"
  - Add CSS class `.is-valid` when the field's state is "valid"
- Credit card field has 2 "invalid-feedback":
  - Use `@if` directive to display only the relevant error



# Lab 12: Forms 3/5

## Handle form submission

- In the component class, add a new method:
  - **checkout(checkoutDetails: CheckoutDetails): void**  
(leave the implementation empty for now...)
- In the component template, on the **<form>** element:
  - Create a template variable **#checkoutForm** to access the **ngForm** directive
  - Handle the **ngSubmit** event to call the **checkout** method you just created
  - And use the **checkoutForm.value** property as **checkout** method argument
- Still in the component template:
  - The submit button should be disabled as long as the form is invalid
  - Form fields and the submit button should be disabled when the form is being submitted (to achieve this 2 points, add a new property **checkoutInProgress: signal<boolean>** in the component class)



# Lab 12: Forms 4/5

## Basket related changes

- In `src/app/basket/basket-types.ts`, add new interfaces:

```
export interface CheckoutDetails {  
  name: string;  
  address: string;  
  creditCard: string;  
}  
  
export interface CheckoutOrder {  
  orderNumber: number;  
}
```

- In the `src/app/basket/basket-resource.ts` service, add a new method to checkout the basket:

```
export class BasketResource {  
  checkout(checkoutDetails: CheckoutDetails): Observable<CheckoutOrder> {  
    return this.httpClient  
      .post<CheckoutOrder>(  
        'http://localhost:8080/api/basket/checkout',  
        checkoutDetails  
      )  
      // Empty the basket items after checkout completes  
      .pipe(tap(() => this._items.set([])));  
  }  
}
```



# Lab 12: Forms 5/5

## Back to CheckoutForm component

You now have everything you need to implement the `checkout()` method you created earlier

Subscribe to the `BasketResource.checkout()` method and handle "next" and "error" events:

- On "next":
  - Display a "success" message with the `orderNumber`
  - Add a link to navigate to the home page using the `routerLink` directive
  - In this case, the form fields must remain disabled
- On "error":
  - Display a "danger" message
  - The user should be able to hide the "danger" message when clicking on the "close" button
  - In this case, the form fields should be enabled again to allow the user to retry submitting the form

## Bonus

Check the following directory to see the `ReactiveFormsModule` implementation:

- `Exercises/solutions/projects/12_forms/src/app/basket/checkout-reactive-form/`



**<app-end />**

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