ANGULAR 8

Angular is a Js Framework which allows you to create “Single-Page-Applications” ( SPA’s)

Angular changes the DOM and run it and it’s a single page. One single HTML page, which changes.

#### CLI DEEP DIVE AND TROUBLESHOOTING

In the next lecture, we’re going to build our first little app!

If the CLI prompts you to “answer some questions” ( some version do that ) you can simple hit enter for all questions this will accep thte default settings which are fine for this course.

The CLI generates a different welcome screens than youre going to see in my video though. No worries youll still be able to follow along without issues! Just make sure to code alonw so that your code equals mine Angular itself didn’t change a bit

If you want a dive deeper into the CLI and learn more about its usage have a look at this: <https://github.com/angular/angular-cli/wiki>

You encountered issues during the installation of the CLI or set up of a new project?

A lot of problems are solved by making sure youre using the lasts version of Node js and npm and the CLI itself

Updating NOdeJS:

Go to nodejs.or and download the latest version- uninstall ( all ) installed version on your machine first

Updating npm:

Run npm install –g npm

Updating the CLI

Npm uninstall –g angular-cli@angular/cli

Npm cache clean

Npm install –g@angular/cli

Here are some common issues and solutions:

-Creation of new project takes forever ( longer than 3 minutes )

- that happens on window from time to time > Try running the command line as administrator

-You get an EADDR error ( Address already in use )

-You might already have another ng serve process running make sure to quit that or use “ng serve –port ANOTHERPORT to serve your project on a new port

-My changes are not reflected in the browser ( app is not compiling )

Check if the window running “ng serve” displays an error. If that’s not the case make sure youre using the lastest CLI version and try restarting your cli

# ANGULAR CLI

Run these on the command line

-npm install –g@angular/cli

-ng new my-dream-app

-cd my-dream-app

-ng serve

Download the latest version of Node js before you run the above command lines.

It will create a folder with the app name and use default setting by hitting NO for angular routing and CSS

Open the IDE and the folder will be “my-first-angular-app”

Angular is, of course not a tool to allow us to write static HTML files. We wouldn’t need a framework for that. It allows us to mix static HTML code and actually what we have here is one of these componenets Angular works with; the app component

We also see title = 'app'. In “app.component.ts”

Now, what's that?

If you go back to the app.component.html file, we also saw title here right; between the curly braces.

So an assumption would be that the title in the Typescript file is related to that.

So let's maybe change this to 'my app' and now if we save this it recompiles and if we go back, we see

'Hi, this my app!'. Now this might not be perfect English, but we can definitely see that something changed.

This is so-called data binding in action;

a concept we'll also dive into deeply in this course. This is how we can output dynamic

content.

This could of course be content that is calculated dynamically or retrieved from a server in our

HTML code.

Now interestingly, if we right-click on the loaded page and inspect the page source we don't actually see

that code there.

We just see a bunch of script imports at the bottom. That is our build code and the Angular framework

code, the head tag here

and then this strange app-root part. Now, app-root is also something we see in the app.component.ts

file here in the selector.

So it looks like this is basically like our own HTML tag we're creating

and that's indeed what's happening here.

The page we're viewing here, to which this source belongs,

actually is this index.html file in the src folder. Here we also see app-root. The script imports

are missing because they are injected dynamically.

Now, what Angular does in the the end is

always load this page.

Then we have these dynamically-injected script imports and these script imports will dynamically replace

app-root with our own component.

And of course we can have more than one component in Angular apps.

Again, these are all things we'll dive into in this course.

Now that's nice, but

let's do something more fancy.

Let's change title dynamically.

So back in the app component, I'll actually get rid of the entire code in here and I'll add an input instead;

a normal HTML input (type="text"). Below that I'll add a paragraph where I want to output, let's say,

a name.

Now, name is not something we've defined yet, we'll do so in a second.

Let's go to app.component.ts and

change title to name and I'll say Max here (because that is my name) and if I save that and go back,

we see the input and we see the name.

Now I want to be able to enter something in the input and automatically change the name. We can do

this with a tool provided by Angular; a so-called directive which is called ngModel.

Now, you'll learn the exact syntax throughout the course.

For now, let's simply add [(ngModel)],

written like that.

Make sure to get the casing correct.

There is no dash in between or anything like that.

So ngModel in square brackets and parentheses on the input and set it equal to name.

So, to the same name you're outputting here.

Now this is a so-called directive and what it does is it basically tells Angular to listen to anything

you enter here and store it in this name property, in this name model, but also on the other hand, output

the value of the name model in this input.

This is what we're doing here. Now,

if we save this we don't see anything on the page and if we open the developer tools, which you can simply

do from the menu or with the shortcut. You reach it under View ->

Developer -> Developer Tools (in Chrome) and I strongly recommend using Chrome for this course since it has

the best developer tools.

So, then we see here in the console-part there is an error.

Can't bind to 'ngModel' since it isn't a known property of 'input'.

So somehow Angular doesn't understand ngModel.

Now that's strange, because as I said it's built-in right? Angular is actually split up into multiple modules;

sub-packages you could say.

We need to add them if you want to use a certain feature from them.

And in this course you will learn about the different packages and which features they contain. To add

such a feature, we go to another file that we haven't had a look at yet;

the app.module.ts file. This is basically where we tell Angular which pieces belong to our app and there we have

to add something to imports to import another package from Angular.

So we need to import it at the top of the file first because Typescript always needs to know where things

are.

So, import { FormsModule } from '@angular/forms';

This is one package from the Angular framework and from that package we can import the Forms Module; written

like this: import { FormsModule } from '@angular/forms';

So make sure to add this import.

This is not an Angular feature; it's a Typescript feature.

As I said Typescript needs to know where things are.

But now with that imported we can add it to this imports array down here (which is not related to the

imports up there).

This is simply a feature understood by Angular since it's part of an Angular module.

And now it tells Angular that we want to import some form features.

And this directive we're using (ngModel) is such a form feature.

So now if we save that, our app will rebuild and once it's done, we can go back and see our input

with Max inside of it.

And if I start typing there, you'll see that the text below it automatically updates.

This is some magic done by ngModel.

We'll dive much deeper into everything we learned here.

But this is now our first app; with some changes.

What does this course offer you? We're just **getting started** and we just built and edited our first Angular

application.

But of course we didn't fully understand what we did there.

So that's why in the next lecture we're going to dive into ***the basics*** of Angular. What are *components*?

What did we do there with this two-way data binding and how does that all work.

This section will answer it and we'll take a very detailed look at it. We'll also explain how all

these files you saw in your project are connected to each other.

Then we're going to look at ***components*** and data binding; two important key features and we actually

saw both already in our first application. Angular apps are built up from components and data binding

is simply how you output data in your DOM in the end and, as you will also learn, react to user events.

Angular has another key feature; **directives**. ngModel, which we used with two-way data binding, actually

is such a directive. You will learn more about the built-in directives in this section and, also very

important,

build your own directives; nice little helpers (instructions)

you can place in your templates, in your HTML code, which will then do something at runtime depending on

the commands you wrote in there. Well, after having a look at this, we're going to learn more about

**services** and dependency injection;

a core feature of Angular which makes it really easy for you to have your different pieces in your app

communicate with each other, to centralize code and to manage the state of your application.

Once we're finished with that it's time to have a look at routing because, thus far, we will only have

been on one page.

Well, we're always on one page since it's a single page application,

but to the user it really looked like one page. With routing, we introduce the management of different

URLs so that, to the user,

it looks like we're switching pages even though technically, we will still remain on that single page.

Sounds great!

It is

and routing shows you how it works.

Then it's time to have a look at Observables; something which will make more sense once you've been through

the routing section.

It is a concept allowing you to work with asynchronous code. Angular embraces it,

it's really powerful

and this section explains how it works.

Then we'll have a look at forms, because handling forms, handling user input is a key task of almost

any application

and this section takes a very close look at it. After we're done with forms

we're going to have a look at pipes; another nice feature which makes it easy for you to transform the

output

(what you display on the template at runtime). Well, we're nearing the end, but not before having a look

at HTTP.

What if you need to reach out to a web server?

What if you need to store some data in a database?

Angular can't connect to a database directly, but it can connect to a server which is able to and the Http Section

shows just that.

Thereafter, we'll have a look at authentication. What does authentication mean in an Angular application?

How does it work? While we're at it, we'll

implement it in an application. Then we're going to have a look at some optimizations we

can put into place and how we can manage different modules in our application;

something you will really understand once we are at this point. Then, we're going to deploy an application,

learn how we can get our Angular application from our local machine to a place in the Internet where

we can view it.

And if that's not enough for you, we're also going to have a look at animations and testing Angular applications.

Besides that, throughout the whole course, we're going to build a real project putting all these things you'll

learn in the individual sections into practice and, therefore, see how they are used in a real project.

So with that, I feel very confident you're going to be an Angular Master after finishing this course

and I can't wait to start this journey together with you.

HOW TO GET MOST OUT OF IT

-watch the vides and read the transcript

-do the assignments

-do the course project

-use the Q&A section

What is TypeScript

IT offers more features than vaniall JS like classes interfaces and very important which gives it the name types: strong typing

So you define in Typescript if a certain variable is a number a string or something else.

You don’t do this in vaniall js. There you have a dynamic typing

You can have a string variable and then you can assign a number that’s totally fine. That wont work in Typescript. It will give you an error and therefore it allows you to write much more robust code which gets check at the time you write it and not just at the time you run it. Typescript doesn’t run in the browser so it is compiled to JS. At the end of the course you can go through the Typescript.

BASIC PROJECT SETUP

So this is the page as we see it right now in the project we created at the end of the last section,

an empty page here, Angular, The Complete Guide, we reach it at localhost:4200, this is where our development server hosted by the CLI or spun up by the CLI will host our Angular application.

Now the content we see here can be changed by going to the ***app.component.html*** of file in our app folder

and in here, we can output some text let's say I'm the app component here in a h3 tag, a normal

HTML tag therefore. If we save this, we will see it here and it automatically has the bootstrap text style and so on because we added bootstrap at the end of the last section too.

But whilst it might seem kind of obvious that we see it here, it is also kind of strange, how does our browser or how does the server hosting our app know that it should render the content of app.component.html here?

You could argue it's the only component we have right now and we will take a closer look at component

Soon but that is not the reason and actually, this is not the file served by the server, instead the index.html file here is served by the server and remember that I told you that Angular is a framework which allows you to create single page application, this is the single page which is served, the index.html file.

Now if you have a look at this file, we see this is a normal HTML file, we define the title we could see on the tab in the browser here and the body of this file is very interesting. Here we get this app-root (index.html file) thing with loading.... in between. Now clearly we don't see loading... here( on the local hos), so somehow this index.html file seems to have changed and it did, app-root here here of course is not a default HTML element, instead this is one of our own components. We will soon dive into how we create our own components but the CLI created one for us, the root component of our application, the component which will tie together our whole application in the end and all the files in the app folder here which have component in their name, so these files are related to this component.

I will go into more detail about these files in one of the next lectures, for now let's take a closer

look at the app.component.ts file, the TypeScript file here. Here you can see that we have this @component decorator, this seems to be important but more importantly right now, you'll see that there, we have this selector property which assigns a string as a value and this string holds

app-root. Now this clearly is the same text as in our index.html file and this actually is the information Angular needed to be able to replace this part here in this index.html file with the template of this component, the component having this selector and the template on this component simply is the content here in this app.component.html file. Now whilst I will dive deeper into how to create components and how to configure them, this is what basically happens at the startup, though the missing information is how is Angular triggered, how is it kicked off to actually run over our body here of this index.html file? And the answer is in the final index.html file, getting served in the browser and we can verify this by inspecting the source code here, we got a couple of script imports at the end. These are injected by the CLI automatically, so that is why we don't see it here in the raw index.html file, here we don't have any script imports but whenever this ng serve process rebuilds our project, it will create bundles, Javascript script bundles and automatically add the right imports in the index.html file, a little convenience functionality for us. So in the final file, these script imports here are present and these script imports will contain our own code too. So these script files are therefore executed and they're actually the first code to be executed and that is just something you have to keep in mind, is the code we write in our main.ts file, that is why it's called main, this is the first code which gets executed. Let's have a closer look at it then. Here you see that we get a couple of imports, then we check if we are in production mode or not

to basically turn off some warning messages I can tell you that but most importantly here, this line, this now bootstraps starts our Angular application by passing an app module to this method and app module refers to this file here. Now if we have a look at this file, here we actually see that somehow we kind of like with the component have this strange @ thing here, I will dive into this in a couple of lectures too but most importantly for now, here we get this bootstrap array which basically lists all the components which should be known to Angular at the point of time it analyzes our index.html file and here the circle closes

because here, we reference our app component. So Angular gets started, this main.ts file gets started, there we bootstrap an Angular application and we pass this module as an argument. In this module, we tell Angular hey there is this app component which you know when you try to start yourself and Angular

now analyzes the app component, reads the set up we pass here and therefore knows this selector, app-root and now Angular is able to handle app-root in the index.html file and it knows all right this is the selector I know, you told me that I should know it because it was listed in this bootstrap array in the app module, this component. So now I know that here I should insert the app component and the app component happens to have some HTML code, a template attached to it which is this h3 tag and this is how the Angular application starts here, this is why we see what we see. Now that was a load of information regarding the app startup but it's key to understand how this starts, with this information we can now proceed and dive deeper into how components actually work, what they are, how we can create our own ones and what this app module here does in detail.

So let's move on.

#### COMPONENTS ARE IMPORTANT



In the last lecture, we had a close look at what happens at the point of time we visit localhost:4200

here in the browser. We understood that the index.html file is served, that it will contain a bunch of scripts here which get executed which then basically start the Angular app, the Angular app gets the important information, that it should know, the app component that it should analyze it with that information the Angular code is able to parse this here, this app-root component here understand it and insert our Angular application at this point and that is why we don't see loading... which would still be in the source code of this page as you can see but instead why we see this because Angular overwrites this at runtime because that is what it does, what its job is.

So now that we had a close look at this startup process, let's have a closer look at this component and

or @components in general. Components are a key feature in Angular, you build your whole application by composing it from a couple of components which you create on your own. Now we do start with this app component, the root component you should say which holds our entire application basically in the end. So this root component, this app component will be the component where we later nest or add our other components too, so to this template, this HTML file of the app component, this is where we will later add our other components. Typically, we might have a web page like this, with a header, with home and users, then a main area and a side bar maybe. Now if we have a look, this would be a fitting component, the header and maybe also the items on the header could be their own component, could be, you don't have to, you will learn throughout the course how I approach the splitting up of an application into separate components. We also have of course our main area and the side bar here as components and that is the core idea behind Angular, build components, each component has its own template, its own HTML code, maybe its own styling and more importantly also, its own business logic and this is the great benefit. It allows you to split up your complex application, your complex webpage into reusable parts, you may use a component more than once and that allows you to easily replicate that business logic, replicate that styling or in general, make a finely controlled piece in your application without having to crunch everything into one single script file, one single HTML file, instead it's very easy to update, very easy to exchange and again re-usable. So let's have a closer look at how we actually create a component and what this @component thing does in the next lecture.

#### CREATING NEW COMPONENT

Components are important right, that is why we start with one, with the app component. It on the one hand is a normal Angular component but on the other hand, it's also kind of special because it serves as our root component, it's in the end listed here in the app module in this bootstrap array which tells Angular, hey this is a special component, you should bootstrap the whole application with that component being the root component. So all other components we create will not be added to the index.html file, there selectors will not be added here, there selectors will be added to the app.component.html file because this is now the root component of our app where we add the other parts. Enough talking about adding components, let's add one. Let's say we want to output some information about a server. We're building a back-end for our server management application and we want to output some server information. So I will store this in a new folder which is a subfolder of the app folder because generally in a Angular CLI project, all your app related content will go into this app folder. I will name it server because it will hold my ServerComponent and this is a good practice, having the folder name equal your component name and each component typically should have its own folder, though it's not a hard rule but generally, it makes sense. So here in the server folder, I will add my ServerComponent. Now a good naming convention is to have server, so the name of your component first, then a dot and then component, we will later learn that there are other building blocks in an Angular application too, so by using filenames like this, it's very easy to see what's inside the file. And very important, don't forget to add .ts, so for TypeScript because this is what we will write this component in. So now we get an empty file for our new component, how do we create a component now? First of all, a component simply is just a class, a TypeScript class, so that Angular is able to instantiate it to create objects based on the blueprint we set up here you could say. So let's export this class so that we can use it outside of the file too because as I mentioned before, we're going to use our component in the app component for example to add it there. So we will add a class here and this class should now be named ServerComponent. Again the naming convention here, have the name of the component first, server and then also the description, component because later we will also learn about other parts which might then be named differently in the Angular app. This is our class and right now, it's a normal TypeScript class, nothing special about it, we can't use it like this, Angular doesn't have all the information it requires. So we should add something to it which tells Angular that this is not only a normal TypeScript class but instead something special, a component. We do this by adding a special decorator, decorators are a TypeScript feature which allow you to enhance your classes for example, enhance elements you use in your code, it's not restricted to classes but here we will use a class decorator. It's the component decorator and decorators are always attached by adding an @ sign in front of them. Now this component decorator is not something TypeScript knows from the start, so we have to import it. We have to add an import and this import now needs to give us access to component, so we need to import component between curly braces because from the file where we're going to import this, we could import other parts too, so we have to specifically pick the component by using this syntax and then it's from and now the package where we import component from is @angular/core. Now Angular ships with a couple of packages where it basically groups its functionalities and the core

package as the name implies gives us access to some of the core functionalities of Angular. So with that, we imported component, now this @component decorator is known to TypeScript, so when it parses this file and compiles it to Javascript, it is able to understand it, now we need to pass a Javascript object to this component decorator to configure it because without any configuration, it's still not that valuable to Angular. But here, we can set up some important information which will be stored as metadata for this class in the background then which will tell Angular what to do with this class and one important information piece is the selector. So basically, the HTML tag by which you're able to use this component later in your other components templates, we will see this in action soon. The selector should be a string

and here you may set up any name you want but you should make sure that it is a unique selector, that you don't accidentally overwrite a default HTML element or something like this. So typically, you prefix it with app- and then a fitting name, like server because it's a ServerComponent. This is my own selector by which I can now later use this component in my other components HTML files. So with that set up, the other important piece we need to have is the template and here let's reference another external file, I'll come back to another alternative to this soon and this external file of course needs to be created. So in the same folder, I will create a server.component and now .html file, this will hold the template, the HTML code of my component here. So here, I can now basically add any content I want,

like for example the Server Component to start simple and back to the TypeScript file, I can now point to this HTML file. We need a relative path for this, in the end this will all get bundled by webpack, so we need to tell it where to find the HTML file. Well and relative to the TypeScript file, the path simply is ./server.component.html, like this, this is pointing to this file. With this we created our first component,

now to use it we need to dive into app module and understand what this does because we need to change something here to use our own component.

Let's do this in the next lecture.

#### UNDERSTANDING THE ROL OF APPMODULE AND COMPONENT DECLARATION

In the last lecture we created our own component, the server component here. It's almost ready to be used but to use it, we need to change something about our app module, what is an app module? Angular uses components to build web pages and uses modules to basically bundle different pieces, for example components of your app into packages. Now this is kind of an advanced feature but later in the course, I will have a whole section about modules. For the majority of this course, we will only use the app module which is absolutely fine for a lot of projects, only in bigger projects you might think about splitting up your app into multiple modules. But what does this app module do, what is a module then? Well it's as I said bundle of functionalities of our app and it basically gives Angular the information which features does my app have and use. As you can see, it also is just an empty TypeScript class, like our component and as the component, we transform it into something else by adding a decorator, here it's the @NgModule decorator which is also imported from @angular/core. Now in there, we see four properties we set up on the object we passed to @NgModule, declarations, imports providers and bootstrap. We had a look at bootstrap, this was responsible for telling Angular hey which component should you be aware of at the point of time the whole application starts, so which component would you basically recognize in the index.html file and that was the app component. Now I already mentioned that we won't add any more component selectors to the index.html file, that's just not how it works, therefore we won't touch the bootstrap array. Still, we added a new component to Angular and this new component now has to be registered here in the module so that Angular knows that this component exists because and this is important, by default Angular will not scan all your files here. So if you don't tell it that the server component exists, it doesn't know it, just creating the file is not enough. That is why we have to register it here in the @NgModule to tell Angular hey part of this module and therefore right here of our whole app since we only have this module is the server component. We do register new components in this declarations array, we already registered the app component here because even though it's also used in bootstrap, it also is a part of our app, now we also need to add the server component here. Adding it like this is not enough though because now Angular would kind of know that this is part of the app but TypeScript wouldn't know where to find this type, where to find this server component. So when we try to bundle our code, we would get an error which you can actually see if you save this, triggering the recompilation, you see that we get an error in the terminal down there, that it can't find server component because and this is not Angular, this is TypeScript, it doesn't know where this file is, where to find this class. So we need to add an import at the top manually pointing to this. So we add server components here as an import from ./server and then here in the server component and you omit the .ts, you don't add .ts to your import, it's just server.component, so the file name without the extension, the extension is added by webpack which bundles our project automatically. So with this and it's just so important,

this is not Angular, this is a TypeScript feature, now TypeScript knows where to find this, therefore everything can be bundled, so therefore now Angular when it runs knows that we have a server component and that it is part of our app and with this, we can now finally use our component. We will do this in the next lecture but maybe you're also wondering what imports and providers does here in the app module. I'll come back to providers later in the services section, imports simply allows us to add some other modules to this module because I told you, you can split up your app into multiple modules and then you can import these modules to basically make this module a bit leaner and outsource some stuff into another module. Now I told you that we are only going to use one module, so what are we importing here? Some modules built into Angular because Angular itself is split up into modules, so the browser module for example gives us all the base functionality we need to start our app and forms and HTTP module, that is something I'll come back to in the forms or HTTP section of the course. So with this, the basics about this module should be clear, again we'll dive deeper into this later in the course. We also registered our own component, let's now use it in the next lecture.

With our component registered, let's use it. So we have our selector here, app-server. Now I told you we are not going to add it to the index.html file, there it wouldn't work instead let's go to the app.component.html file, the only other HTML we have right now where we could add it and here I'll add a horizontal line and below this, I'll add my app-server element here and the shortcut I used here is just a little plugin called emmet, available for many IDEs and editors which gives you a quicker way of writing HTML. So here, app-server is our own selector, our own element kind of we created. If we now save this, it should successfully recompile and if we have a look at our running application, you see the server component here, our own component being added here. So that is how you can use your components then with their selector after adding them to app module and then displaying them on the page.

CREATING COMPONENTS WITH THE CLI AND NESTING COMPONENTS

In the last lectures, we learned a lot including the creation of a new component by hand.

Now there also is an alternative to creating it manually. When using the CLI, you can open a new terminal window or command line, leave the ng serve window running, that's important, don't close it and in this new window we can use some CLI command to also create a new component. Let's say we want to have our single server components here in another component, so nested into another component, a servers, multiple servers component. We can create this manually by adding a servers folder with our component or we use the CLI withng and there we have a generate command, which allows us to generate some elements, some elements supported by Angular. One such element is a component, so we can create a new component with ng generate component and

then passing the name, servers like this. You can also use a shortcut and instead of ng generate component, you could say ng g c which does the same. So if you hit enter, what this will do is it will give you a new folder in your app folder with the name of your component, servers and in there, you basically find the same files as you had for the app component, HTML, CSS, TS and this spec file which basically is used for testing. Now I will remove this, we will later have a section about the testing and we'll have a look at the styling later too, for now let's say it is in this servers component that we want to output our single server. Well we already have this selector, app server, so in this template of the servers component, we can overwrite the default text with app server and maybe simply replicate this so that we have two components because remember, components are reusable. We can use the same component as often as we want by simply using its selector as often as we want. So now we have two servers here and with this in our servers component, you need to make sure that you also update the app module. Now the CLI should do this automatically which is why you already find the import and the declaration in this file but make sure you really do have it here. With this, we can go to our servers.component.ts file to check the selector which is app-servers and then we can go to our app.component.html file and update the selector to use this new component instead of the old one.

With this if we now save this and go back to our application, it looks almost the same as before, we see

our single server component twice but if we inspect the code here in the developer tools of Chrome for example, you'll see that we have this outer app servers component, this newly created component and in between, we have two single app server components. So with that, we learned a couple of important things about how to create components manually or with the CLI, how we can nest them into each other, that we can use components selectors in any other template of any other component and how we can replicate components by simply using them multiple times, using their selectors multiple times.

Let's dive into how we can actually style them, what we can do regarding the style and the template

of components.

WORKING WITH COMPONENT TEMPLATES

Thus far, we always used an external template file and we haven't done anything regarding the styling

of components, time to change both. Now instead of using an external template file, you can also use an inline template which means you define the HTML code in the TypeScript code, sounds strange?

Well it's possible. We can do this by simply going to our servers components here for example and right

now, we point to this HTML file here, now we can change templateUrl to template, one of the two has to be present, either linked to an external template or just the template to define it in this file but each component needs to have a template, this is the one property you have to have at all times. So with that, now I change it to template, now we can write our template code here. So here we could now replicate app-server, like this, maybe twice, we have to make sure that we don't wrap this line because this is not supported in a default TypeScript string and if I now save this, we see the same result as before.

So it looks like nothing changed and that is good in this case because we try to make it look like this

but actually, we did change the way we set up our template here, now we're defining the HTML code in this same file. And actually if you want to write multi-line strings here, which you probably want if you add more HTML code to it, you can switch from a normal string with single quotation marks to using back ticks to use Javascript template expressions, to be able to write multi-line strings in between there now.

So now between the opening and closing back tick, you may actually wrap the line and now write your HTML code, like this. What should you use, should you use this approach here of using template or an external file? It depends, if you have not that much code, not that much HTML code, using an inline template like this might be fine, then you have all the logic in the TypeScript code and that is absolutely OK but as soon as you have let's say more than three lines of code in the HTML part here in the template,

using an external file is a good idea to make it easier to follow and easier to understand. It is important though to keep in mind that you can use this approach, that you can inline your templates and very important, that you need to have at least a template in a component. You can omit the selector, you will later in the routing section learn a different way of loading components without using their selector and you don't have to add styles but templates have to be present. So that was templates, now let's have a look at the styles in the next lecture.

WORKING WITH COMPONENT STYLES

We understood that templates are important and that we can either use them inline here or point to an external file, what about styles? We also have this styleUrls property here and we have these CSS files.

What can we do with those? Let's go back to our app component for this. Here we got a h3 tag and a horizontal line and if we have a look at our application, it's not that pretty, right? The I'm in the app component text here or all the text actually is sitting right on the edge here, not super pretty. Now since we use bootstrap, of course we can use some bootstrap classes to enhance this. So we could add a div with a container class around it, then add a row and this is just using the CSS framework, bootstrap, so these are some CSS classes provided by this framework, nothing Angular specific and then we could add a column here, xs-12 to have one column on all device widths. Now if we add this, we added some styling, some normal CSS styling, nothing Angular specific and our app looks a little bit nicer now.

This is great but we can also use some tools given to us by Angular. Let's say this, I'm in the app component heading here, we want to change that style, maybe we want to give this some blue color.

We can do it just by going to the app.component.css file which defines the styling for this component

and now we can use or write normal CSS code, so overwrite the style of the h3 tag and set its color to some blue, so maybe to this dark blue here. If we now save this and we have a look at our application, you see it's dark blue now. This is how you can use this style file, this CSS file referenced in the app component here to define the styles for a component. Now just like we were able to choose between external file and inline code for template, we can do the same for the styling. You notice that styleUrls is an array here whereas templateUrl wasn't. It is this because we could reference multiple external stylesheets here, so you could add pointers to other stylesheets but besides that, I'm going to comment this out, you can also set up another property which is just styles. This also takes an array but now it takes an array of strings where you define the style in this string, so now in this file. Here I'm going to use back ticks again to be able to write a multi-line expression here and then we could set up h3 here

and to really show you that this is different, I will set the color to now let's not say dark blue but to dodger blue. And if I now save this and we go back to the application, you see the blue updated because now the inline style is taking over, I commented out the other one. Just like with the template, you have to decide which one to use, you can't combine styleUrls and styles but both important here has to be an array, that's the difference to template, you must only have one template, you may have multiple style files or style definitions and you can choose between inline and external file. The rules are basically the same as for the template. If you have more code in there, using an external file is a good idea, if it's a short style definition like this, why don't you just put it into the TypeScript file? This is how you can work with templates and styles.

FULLY UNDERSTANDING COMPONENT SELECTOR

So that actually works like a CSS selector and therefore, you are not limited to selecting by element.

You could put this into square brackets to use the attribute selector,so in CSS, you can select elements by attribute by enclosing that attribute in squared brackets and now if you save this, you would see that our app actually is broken because if we have a look at the error message, app servers is an unknown element because now, our code in Angular doesn't recognize app servers anymore because we change the selector to be an attribute. So to make this work again, we would have to comment this out or remove it and maybe add a div or any other element, a normal HTML element which has an app servers attribute now.

Now with this custom attribute added now, now the app works again because now, Angular selects the element by attribute and not by the element itself because we changed the selector. Another alternative is to select by and I'm just going to comment this out so that the code is still there for reference, to select by class, so with a dot at the beginning, .app-servers, again just like in CSS. So here, we can now select by class, so let's add a new div here which has a CSS class of app-servers, which we of course could now also

Style but besides that, it's also recognized by Angular as a selector which is why we still see the app. Now these are all options you have, as a side note, selecting by ID won't work, that's not supported by Angular and all those pseudo-selectors like hover and so on also don't work and you typically use the elements style here, app servers for components, we will soon learn about directives, another feature where this is different but for components, you typically create your own elements and therefore you don't use that style and you don't use the attribute style, instead you use app servers like an element but it is important to understand that you are not limited to this and there might be use cases where you want to use a different selector.

Assignment

-Create two components Warning component Success component

-output them beneath each other in the AppComponent

-Output a warning or success message in the componenets

-Style these components

Solution

-Go to the app folder, right click and create a folder

-Give the name the folder “warning-alert”

-create a file inside the new folder created with name “warning-alert.component.ts”

-inside the component file, create a decorator

-the decorator will be named as @Component

-inside the decorate create a selector and a template

-use back ticks for the template and create a p tag with text in it.

-make sure export class “WarningAlertComponent

Now another way to create a component through CLI

-Go to your folder app folder in the command prompt

-Type ng generate component or ng g c success-alert

-now to go the app component and wrote those two components underneath each other

-type <app-success-alert></app-success-alert>

-type <app-warning-alert></app-warning-alert>

-You will get a warning/error message

-in the app.module add the warningAlertComponent which you created in the warning-alert.component.ts with export and class

-in the app module.ts import the warningAlertComponent from the folder path

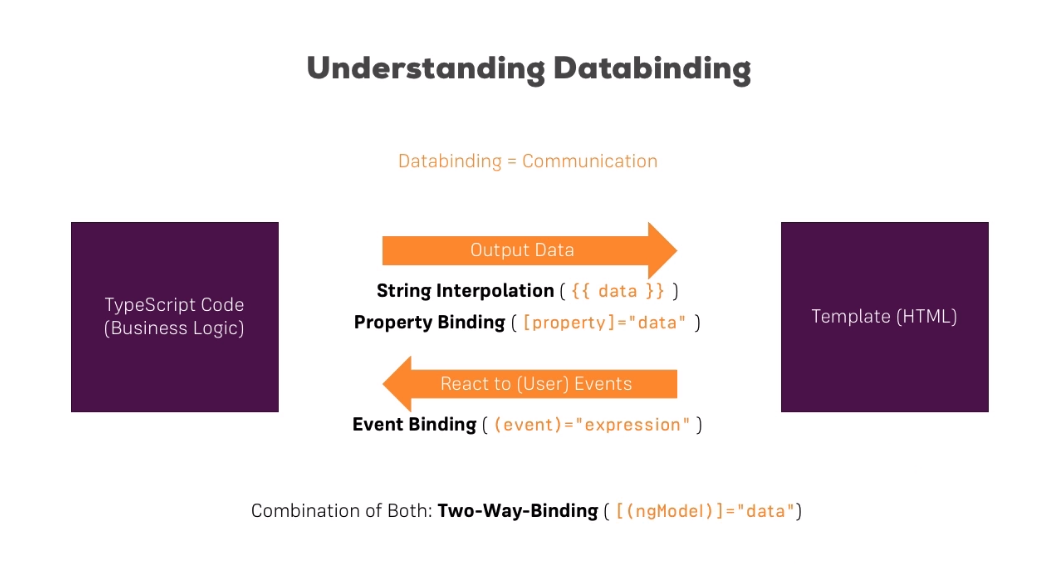
-you don’t have add the ts at the end, by default IDE does add this import for you, if you don’t see this add it manually

#### WHAT IS DATABINDING

In our little basic first application we're working on, where we added a couple of components, we covered a lot of key aspects of a basic Angular app, how it starts and how to use components, the base building block of any Angular app. But thus far, we only output static content, the server component here, that's not super interesting, we did even more than that in the first section of this course. So let's change this to output some data which is kind of dynamic at least, which is not hardcoded into the template, time for some data binding. What is data binding? You could basically translate data binding with communication. Communication between your TypeScript code of your component, your business logic and the template, so what the user sees because you might have some result in your TypeScript code because you fetched something from a server or finished some calculation which you want to display to the user and the only thing the user sees is the template. So we need some kind of communication between both pieces to be able to really do something in our app, that is where data binding comes into play because it is responsible for this communication. We get different ways of communication now, for example we want to output data from our TypeScript code in the HTML code in the template. We can use string interpolation for this,

you saw this in the first section of course, it's the syntax with the double curly braces and then some property name or some expression in between or property binding. We will have a closer look at all these forms of course in the next lectures, so we will learn what this then is and how it works. The syntax basically uses these strange square brackets around HTML attributes but again, I will come back to this.

Sometimes though, the other direction is interesting too, if the user clicks a button, you can kind of think of the user clicking the button on the template because again, the template is the thing with which the user interacts, which he sees and where he is also able to click buttons. So if we click a button, we maybe want to trigger something in our TypeScript code, so now we need the other direction and we can get this other direction, we can react to user events with event binding. So we can bind to for example a click event to execute some code whenever it occurs and we also have one additional form of data binding where we combine both directions, two-way data binding, where we are able to react events and output something at the same time. Might not be super clear how this works but that is what you will now have a detailed look at all four forms in the next lectures.



#### STRING INTERPOLATION

Let's start by having a closer look at string interpolation. Here in the server component, I don't want to output this here in the HTML code like this, I don't want to hardcode the output here. It would be realistic that our server component contains information about a specific server. So maybe here in the template file, we want to output server with ID and then some dynamic ID here is and then the status, like offline. So we have two dynamic fields here. Now what makes sense to kind of derive them in TypeScript code, in a real app that might be derived from a HTTP request to make some back-end or some calculation, for now it will hardcode it in here. So we might have a server ID and I will assign a value of let's say 10, so a number and I might also have a serverStatus which is a string offline, so two different types, a string and a number and though not necessary, you could also be very explicit by assigning the type with TypeScript's feature here of adding a colon after the property name and then the type, it will infer it automatically

though, so this is not required, I'm just doing this here for demo purposes. So now I want to output these two properties in my template and to get this connection, we need data binding because you learned it's all about the communication between your TypeScript code and the template. So string interpolation is a typical use case here, a typical solution for this task here, instead of the placeholder, I use my double curly braces, opening and closing, this is the string interpolation syntax and in-between these double curly braces, you can now write a TypeScript expression. So the easiest expression is to simply reference a property, like the server ID and this is a common use case, that you only output a property here or the value of the property. However, it's not the only use case, you could also for example here for server simply hardcode a string in there, any expression which can be resolved to a string in the end, that's the only condition for a string interpolation syntax here. So whatever you have between the curly braces, in the end it somehow has to return a string, so you could call a method here which returns a string in the end. The only other restriction is you can't write multi-line expressions here, you can't write block expressions in here, so you can't add an if or for control structure in here, you could use a ternary expression though. So this is what you can do, now let's also replace the last placeholder and here, I will again just reference a property, the server status. Now this is string interpolation in usage and you'll see that we have an expression which is a string itself and then two other oppressions which simply point to properties and again, you could also call a method here which returns a string. Now interesting, the server ID is not a string but a number and I just said that string interpolation has to resolve to a string in the end, has to get a string in the end, so let's see if this works. If we save this with ng serve still running,

let's also change app server back to app servers to make this work again, we see server with ID 10 is offline. We see it twice because we repeat this component and each component of course has the same content but we see that string interpolation is working and that it especially is also working here for our number.

So ID 10, that is not an issue, that is working fine because a number can be easily converted into a string.

So yes, you have to get a string in the end or something which can be converted to a string to really

be correct here. This is how you can use string interpolation and now to really complete the example, let's say the serverStatus here is somehow returned in a method, getServerStatus could be the method name,

this is how you define a method in TypeScript, so you might know this kind of method definition from other languages and here we simply return this serverStatus, so we return the property here. We could of course have accessed it directly as we already did but just to demonstrate that you can call a method,

here I am calling a method, getServerStatus of course leads to the same output because again, all this

method does is it returns us a string in the end or something which can be converted to a string, that

is string interpolation in action.

PROPERTY BINDING

In the last lecture, we had a look at string interpolation which is a great tool for out putting data

in a template, now I want to have a look at property binding. Now one important information by the way, there are a lot of times where you can either use property binding or string interpolation

and I will show what I mean in a second. Let's go to our ”servers component” where we manage all the servers and I want to allow the user to add new servers, at least soon I want to allow that.

So we will need a <button >where I say “add server” on it and I will just add some CSS classes, “btn” and “btn-primary” to make this part look nice, this is all using normal bootstrap CSS classes though, nothing to do with Angular and to reflect this change in my “servers component” here (template: ), I also want to comment out the inline template and point to the external template again, so “templateUrl” should point to my “servers.component.html” file, like this. So now with this, if I save this, we see that button here. Right now, it doesn't make any sense that I'm able to click this button because it doesn't do anything, we haven't learned to react to a button click yet.

So I will add a new property in my TypeScript code here which I'll name allowNewServer and set it

to false. ( under export class ) So now this is also another property holding a boolean value,

so true or false, in this case false because I don't want to allow the user to create a new server and

you could again imagine that this is somehow derived dynamically we will soon work with some dynamic data. So in the HTML file here (servers.component.html), I now want to disable the button

and as you probably know, there is a disabled attribute you can add, like this. If we now save this, the button is disabled, I can't click it. That's nice but that's hardcoded into HTML, now maybe this allowNewServer code here changes however, maybe it's not set to this all the time. So then, we wouldn't be able to react to this and I can actually demonstrate this by for now in the constructor which is simply a method executed at the point of time this component is created by Angular, by there calling setTimeout ( inside the constructor ), a normal Javascript function and here I define after which period of time or after how many milliseconds something should happen, so after 2000 milliseconds which are two seconds, I want to execute a function and here I'm using an ES6 arrow function.

This syntax might look strange, it's almost the same as function like this, with some difference when it comes to handling the this keyword. But in the end, here you passed the arguments and here you have the function body, more importantly in here, I can set allowNewServer and now this would not work in the other syntax because this would then be referring to something else, can set it to true.

So after two seconds, this will be switched to true and since we hardcoded this, of course this doesn't affect our button here at all, it stays disabled. So I want to bind it to allowNewServer. So now to make this disabled functionality dynamic, we can bind to it by enclosing it in square brackets. Square brackets indicate to Angular that we're using property binding, that we want to dynamically bind some property and disable the HTML attribute, in the end, in normal HTML, only sets a specific property on the underlying DOM element. You might note that each HTML element you use is parsed by the browser and kind of translated into an element on the document object model, this is totally unrelated to Angular and therefore we have an element in this DOM and this element has a couple of properties.

A lot of these can't even be set through attributes on the HTML element. Well one of the properties is the disabled property and you can set it through the disabled attribute but here we're not using the disabled attribute anymore, with the square brackets, we are directly binding to this native disabled property this HTML element has. So now, we can set this equal to and now between the quotation marks here, an expression which for this property resolves to a Boolean but for other properties, another type might be required because again, you can bind to a lot of properties, basically to all the HTML element properties. We'll soon learn that there are also other properties you can bind to.

So for now I can simply pass allowNewServer here, my property name because this will resolve to true or false, exactly the value the disabled property needs because it has to decide whether it should be disabled or not. So now with that, if we reverse this, so by adding an exclamation mark, we made sure that this is only disabled if this is false, so if allowNewServer is not true, otherwise you would do exactly the opposite. So now with the exclamation mark, if we go back to the app, you see it's disabled but after two seconds, let me reload this, it becomes enabled because now we're binding to this disabled property, this native element property, we're binding this to our own TypeScript property here and the convenient thing is and this is what Angular is all about, that this will update dynamically. So once allowNewServer changes, this is changed in the DOM, so now the button gets enabled. One of the main reasons why you use Angular, it makes it very easy for you to interact with your DOM, to change something there at runtime like we do here. That is property binding in place, now as I mentioned besides binding to HTML element properties like we do here, you can also bind to other properties, for example of directives, something we haven't learned about yet and your own component, something I will also show you later. So this is property binding. Before moving on the other two forms of data binding, let's find out where you could actually use string interpolation instead of property binding

PROPERTY BINDING VS STRING INTERPOLATION

<p> {{ allowNewServer }} </p> this is string interpolation

<p [interText]= “allowNewServer”> </p> this is property binding

In the last lecture, we learned about property binding, now if we had the use case that we also want to output the current value of allowNewServer, we could of course use string interpolation to simply output allowNewServer and a boolean can also be cast into a string. So now we see false here and after two seconds, you see this changed to true because we change it in the code(inside servers html). Nice.

Now this is one of the cases here where you can easily use property binding instead of string interpolation.

So you could simply bind to a property of this element, the “innerText “ property and set this equal to

“allowNewServer”. Now I can remove the string interpolation here inside of the text and whilst it might look empty now, well we set in our text so we get the same behavior as before because the innerText property of an element is just what's between the opening and closing tag, so in this case, we were able to easily replace string interpolation with property binding. So when should you use which of the two?

Well basically if you want to output something in your template, print some text to it, use string interpolation, if you want to change some property, be that of a HTML element or as you will later learn, of a directive or a component, typically use property binding, that is how you can differentiate it and you will get a feeling for this once you work your way through the course project and so on. So this is this, one important note I want to make is don't mix property binding and string interpolation. You might notice that here, we have disabled equals and then we have quotation marks and then directly, our property name. There are no curly braces between these quotation marks and there shouldn't be because that will break the app, this will not work. Between the quotation marks of property binding, you can and you must already write TypeScript code so to say, a TypeScript expression which will return the value this property expects, so for disabled some expression which returns true or false. So just like with string interpolation, you may also call a method there but you must not add curly braces in there. Whilst it might look we simply use a HTML attribute there. We aren't, this whole syntax here is a syntax recognized by Angular,

so this is why between the quotation marks, you can already and you have already, you have to write TypeScript code because again, this whole expression is evaluated by Angular, mixing in string interpolation will break it, string interpolation only works in a normal template, not within another expression of that template, not within a property binding or something like this. With that, enough about property binding and generally about outputting data in the template, let's see how we can react to events.

EVENT BINDING

In the last lectures, we learned a lot about how we can use property binding and string interpolation to output data in the template, let's now react to events.

For example we have a button here ( servers html ) and after two seconds, this button is enabled, so it would be nice we could do something once we clicked the button. Now I will soon show you how we can actually add a new server, how we can add a new replication of our server selector, of our server component here, for now what I want to do is I want to output something. I will remove this text here (the p tag from previous interpolation) and instead here, I want to output the value of a property. I'll create this property and again you may ignore ngOnInit for now, I will come back to this, I will name it serverCreationStatus and initially I will set it to “no server was created”, like this. Now this property can be output via string interpolation, serverCreationStatus and I just told you I don't want to continue outputting data, we want to listen to events. So I promised it, we'll do it. I will add another method below here and I will name this method onCreateServer, the on at the beginning to kind of make clear that this will be triggered from within my template, you don't have to name it on something but it kind of makes it easier to understand who will call this method. Well, the user will basically by doing something, some event will call it, that is what I want to symbolize with that. So in here, I will set the serverCreationStatus to server was created. So the missing piece of course is to call this method and now here is where event binding comes into play. We want to listen to this click event here and typically, you have the onClick attribute on the HTML element where you can now execute some Javascript code. We won't use that with Angular though, here we have the syntax Angular offers us, event binding which uses parentheses, like property binding used square brackets, for events parentheses are the signal that we're using event binding and here, we have to specify the name of the event between the parentheses, for example “click” and you can basically bind to all the events made available by the HTML attribute you're placing this on.

So if you have onClick, onMouseEnter, you could bind to click mouse enter without the on at the beginning. So we bind to the click event and now between the quotation marks, we put the code we want to execute once this event occurs. Now oftentimes, you will call a method here, so let's do this. Let's point to the method we want to execute which is onCreateServer with parentheses, so this method will now get executed whenever we click the button. As a side note, you don't have to execute a method here,

you could also put the code you want to execute right between the quotation marks. Oftentimes this is not very good because you want to execute more code if some event happens but if all you want to do is set some boolean property to true for example, well you can definitely do this inline the template, as a general rule though, you shouldn't put too much logic into your templates though. So now we're binding the click event and we execute onCreateServer method when it occurs, so let's see this in action. In our application, let's reload the page, the button gets enabled and now watch this part here, if I click the button, it changes to server was created because we are triggering our own method here. And this is how a simple event binding works, use parentheses, the event name in between and then between the quotation marks, the code you want to execute when this event occurs.