Web Components/Angular Elements/Microfrontends

Custom Elements, Shadow DOM, NgElement, createCustomElement, App Shell, Architecture

Full stack developers have been successfully using microservices server-side for a few years and now they would like to apply that architecture client-side, an approach known as microfrontends. In some ways microfrontends are similar to microservices: a clear need to break up a monolith application, allow different parts of a large app to evolve and be deployed at their own pace, perhaps using distinct foundational technologies. In other ways, they are different: microservices can run separately in data centers on a (e.g. Kubernetes) container cluster, whereas we wish a set of microfrontends to run isolated in a web browser and yet appear to end-users to be a single integrated interactive application, with some shared capabilities.

In this specialist course we first review W3C Web Components - a set of standards that allow components to be produced and consumed by different web frameworks (or different versions of the same framework). Then we look at Angular Elements, which allows the construction of web components using Angular. Then we explore microfrontends - what are they, how to best build them using Angular Elements, how to host them (app shell) & how to design large-scale web applications using them.

Target Audience

Experienced Angular developers working on large Angular projects who wish to compose them out of microfrontends.

Prerequisites

Full stack developers with good all-round experience of Angular 7.2.

Awareness of role of containers and microservices for server-side development highly relevant.

Contents of One-Day Training Course

Overview

What are we trying to achieve?
Dividing an app into dynamic components
* Standards - W3C Web Components
* Implementation - Angular Elements
* Design approach - Microfrontends

W3C Custom Elements

Create your own HTML elements
Attribute, properties, events
New `CustomElementRegistry`
How we can use them for microfrontends

W3C Shadow DOM

Shadow tree and light tree
Angular ViewEncapsulation.ShadowDOM (note: `Native` is deprecated)

Support Features: Slots, HTML Templates/Custom Events

Relevant additional HTML/DOM features that modern browsers support

Composability in Angular

Angular dynamic components
Lazy loading & extensibility
Specialist use of `NgModules`

Angular Elements Intro

`NgElement, ngBootstrap()`
`createCustomElement()`
Content projection (new in Elements v7)

Advanced Angular Elements

Build process
Managing element lifecycle / evolution
Loading a library containing elements
Review of Angular Elements' source tree
Importance of Render3/Ivy [Angular 8]

Microfrontend Architecture

What microservices brings to server app
How best to apply idea client-side
Microfrontend = large (somewhat contained) slice of interactive app
Critical to make group of them appear as as a single integrated app

Building Microfrontends

Structuring microfrontends
Source layout
Expected classes and interfaces
Design patterns

App Shell

Microfrontends have to live within a shell
Custom app shell hosts microfrontends
What capabilities it could offer: notification – recently used-quick links-app discovery

Microfrontends and ..

Routing
Internationali[z|s]ation
Security / Styling
Sharing widgets

Browser Containers

Interesting idea: containers in the browser
containers = namespaces + cgroups
How best to bring idea to browser [polyfill]
Hosting microfrontend in browser container

Project

Bringing together everything covered in this course, we conclude with a review of a substantial project that uses mico-frontends, based on Angular Elements