

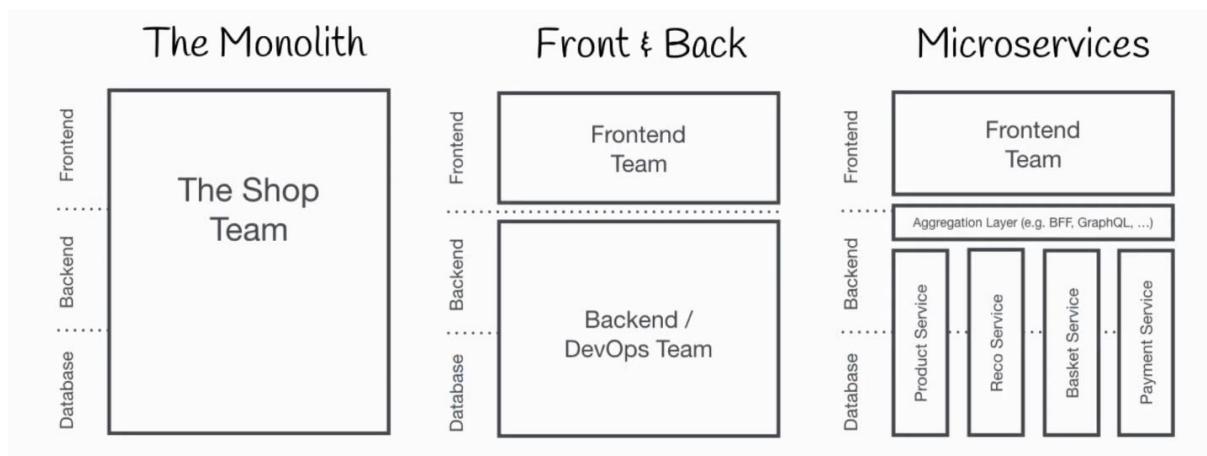
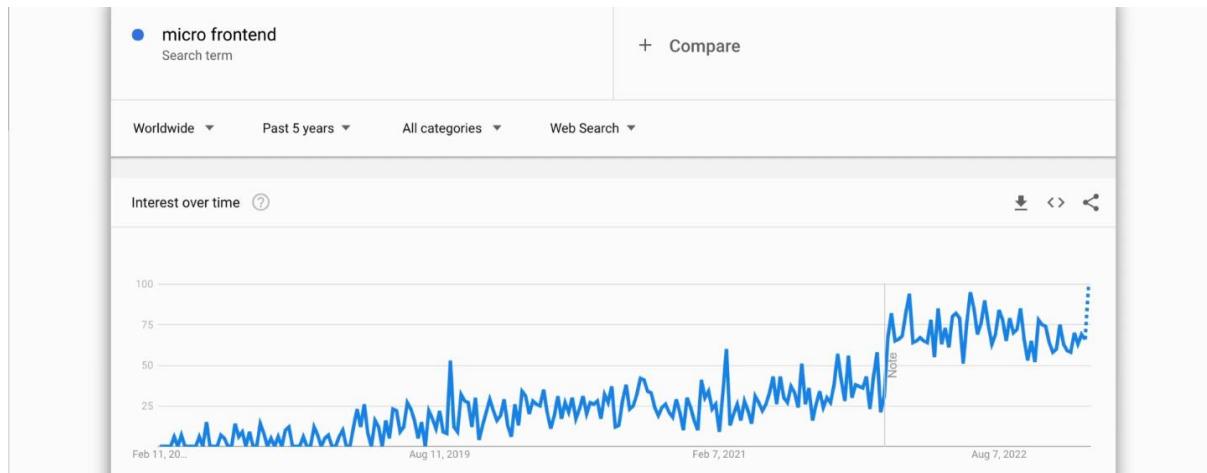
# Micro-Frontends Architecture with Nx and Angular

Filip Voska

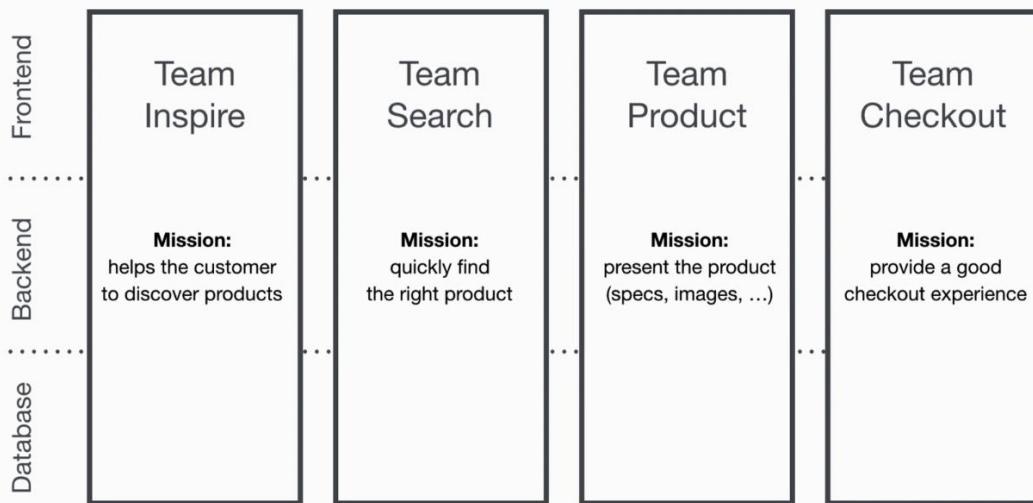
JAVASCRIPT TEAM LEAD  
@INFINUM



1. Give an overview of the MFE architecture when using an Nx monorepo
2. Demonstrate how it works in practice and share some tips & tricks
3. Advise appropriate instances when to build an MFE architecture



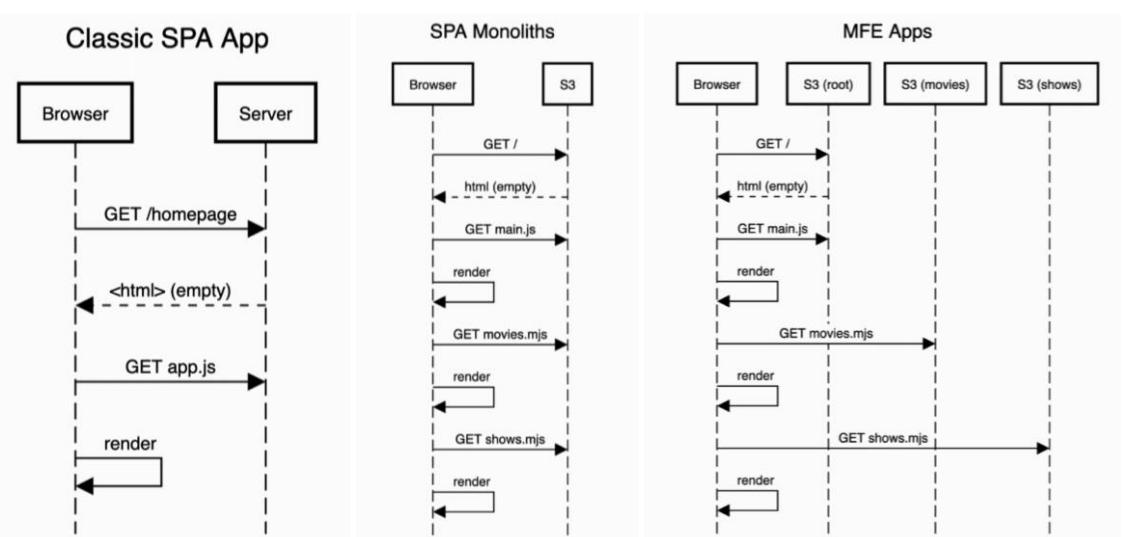
# End-to-End Teams with Micro Frontends

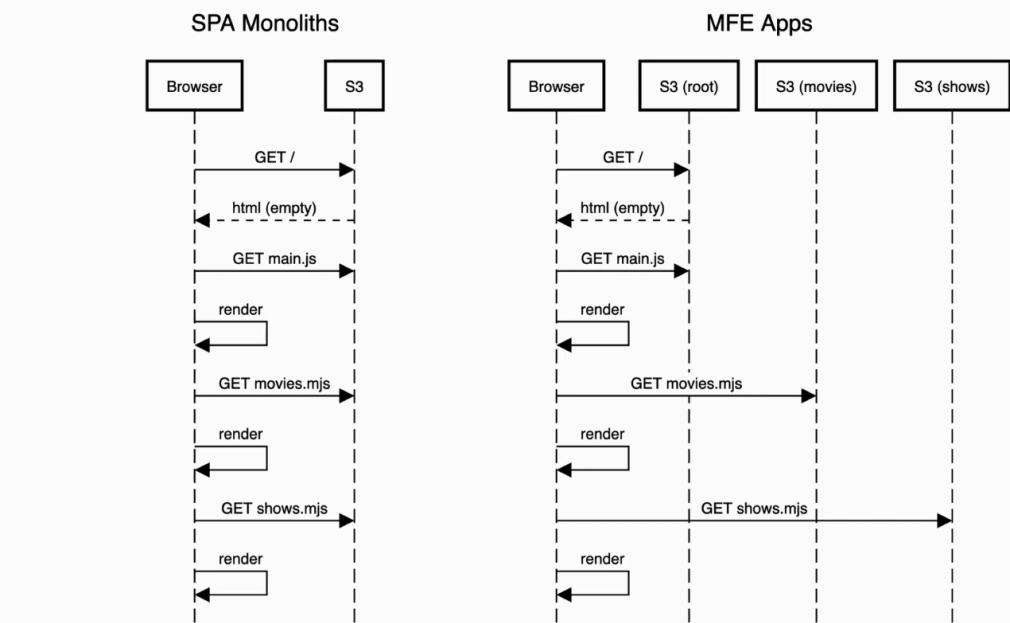


## 02 Goals

### Goals

- **Be framework-agnostic**
- **Independent teams**
- **Share code and state**
- **Share coding standards**
- **Be more resilient**
- **Follow DDD**
- **Set clear boundaries**
- **Faster build times**
- **Independent deployments**





## 04 What can we do with Nx?

### 1. Pick your monorepo style

```
npx create-nx-workspace
> NX Let's create a new workspace [https://nx.dev/getting-started/intro]
? Choose what to create ... Nx makes it fast, but lets you run things your way.
Package-based monorepo: ...
Integrated monorepo: Nx configures your favorite frameworks and lets you focus on shipping features.
Standalone React app: Nx configures Vite (or Webpack), ESLint, and Cypress.
Standalone Angular app: Nx configures Jest, ESLint and Cypress.
Standalone Node Server app: Nx configures a framework (ex. Express), esbuild, ESLint and Jest.
```

### 2. Pick your framework

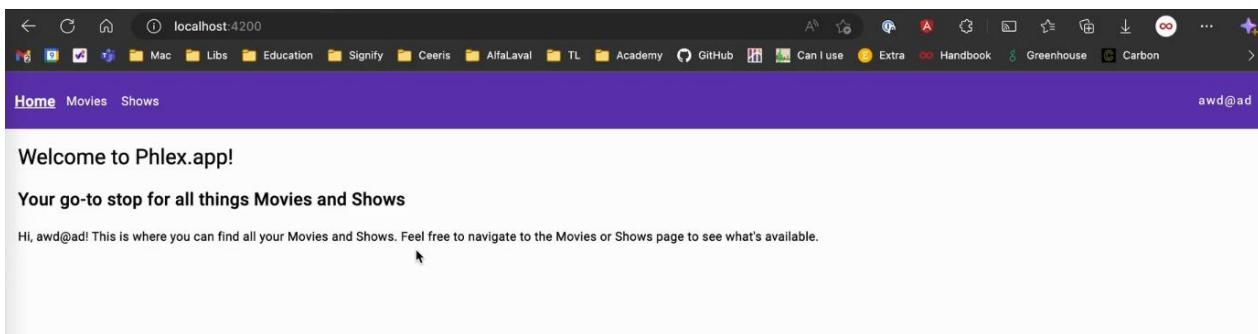
```
✓ Choose what to create · integrated
? What to create in the new workspace ... Nx makes it fast, but lets you run things your way.
apps [an empty monorepo with no plugins with a layout that works best for building apps]
ts [an empty monorepo with the JS/TS plugin preinstalled]
react [a monorepo with a single React application]
angular [a monorepo with a single Angular application]
next.js [a monorepo with a single Next.js application]
nest [a monorepo with a single Nest application]
react-native [a monorepo with a single React Native application]
node [a standalone repo with a single Node Server e.g. Express]
```

### 3. Use generators

```
infinum-talks-mfe-demo on ✘ main via  v18.13.0 >
nx g @nrwl/angular:remote music --host=phlex --dry-run
> NX  Generating @nrwl/angular:remote
  ✓ Which stylesheet format would you like to use? - scss
[NX] Angular devkit called `writeWorkspace`, this may have created 'workspace.json' or 'angular.json'
[NX] Double check workspace configuration before proceeding
Skipping music since apps/music/project.json already exists.
CREATE apps/music/tsconfig.app.json
CREATE apps/music/tsconfig.spec.json
CREATE apps/music/src/favicon.ico
CREATE apps/music/src/index.html
CREATE apps/music/src/main.ts
CREATE apps/music/src/styles.scss
CREATE apps/music/src/assets/.gitkeep
CREATE apps/music/src/app/app.module.ts
CREATE apps/music/src/app/app.component.ts
CREATE apps/music/project.json
CREATE apps/music/src/app/app.routes.ts
CREATE apps/music/tsconfig.editor.json
CREATE apps/music/tsconfig.json
CREATE apps/music/.eslintrc.json
CREATE apps/music/jest.config.ts
CREATE apps/music/src/test-setup.ts
CREATE apps/music-e2e/cypress.config.ts
CREATE apps/music-e2e/src/e2e/app.cy.ts
CREATE apps/music-e2e/src/fixtures/example.json
CREATE apps/music-e2e/src/support/app.po.ts
CREATE apps/music-e2e/src/support/commands.ts
CREATE apps/music-e2e/src/support/e2e.ts
CREATE apps/music-e2e/tsconfig.json
CREATE apps/music-e2e/project.json
CREATE apps/music-e2e/.eslintrc.json
UPDATE apps/phlex/src/assets/module-federation.manifest.json
UPDATE apps/phlex/src/remotes.d.ts
UPDATE apps/phlex/src/app/app.routes.ts
CREATE apps/music/src/app/remote-entry/entry.component.ts
```

OO INFINUM

## 05 Demo time!



```
1 "name": "infinum-talks-mfe-demo",
2 "version": "0.0.0",
3 "license": "MIT",
4
5 "scripts": {
6   "start": "nx serve phlex --dev-remotes=movies,shows",
7   "build": "nx build phlex"
8 },
9 "private": true,
10
11 "dependencies": {
12   "@angular/animations": "~15.1.0",
13   "@angular/cdk": "~15.1.3",
14   "@angular/common": "~15.1.0",
15   "@angular/compiler": "~15.1.0",
16   "@angular/core": "~15.1.0",
17   "@angular/forms": "~15.1.0",
18   "@angular/material": "~15.1.3",
19   "@angular/platform-browser": "~15.1.0",
20   "@angular/platform-browser-dynamic": "~15.1.0",
21   "@angular/router": "~15.1.0",
22   "@nrwl/angular": "15.6.3",
23   "rxjs": "~7.5.0",
24   "tslib": "2.3.0",
25   "zone.js": "~0.11.4"
26 },
27
28 "devDependencies": {
29   "@angular-devkit/build-angular": "~15.1.0",
30   "@angular-eslint/eslint-plugin": "~15.0.0",
31   "@angular-eslint/eslint-plugin-template": "~15.0.0",
32   "@angular-eslint/template-parser": "~15.0.0",
33   "@angular/cli": "~15.1.0",
34   "@angular/compiler-cli": "~15.1.0",
35 }
```

We are serving the main application as **phlex** and we will also serve 2 remote apps called **movies** and **shows**

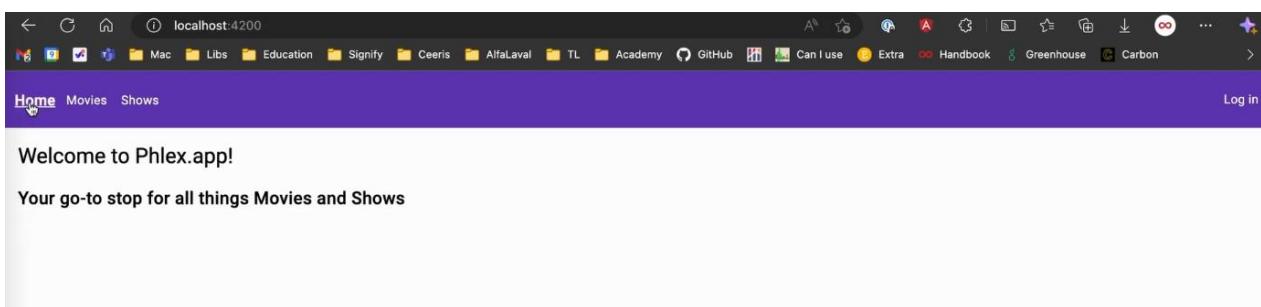
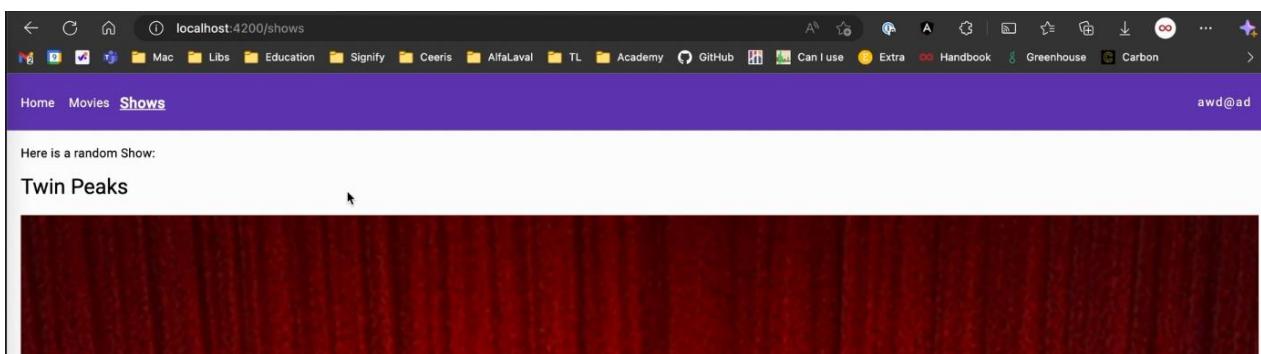
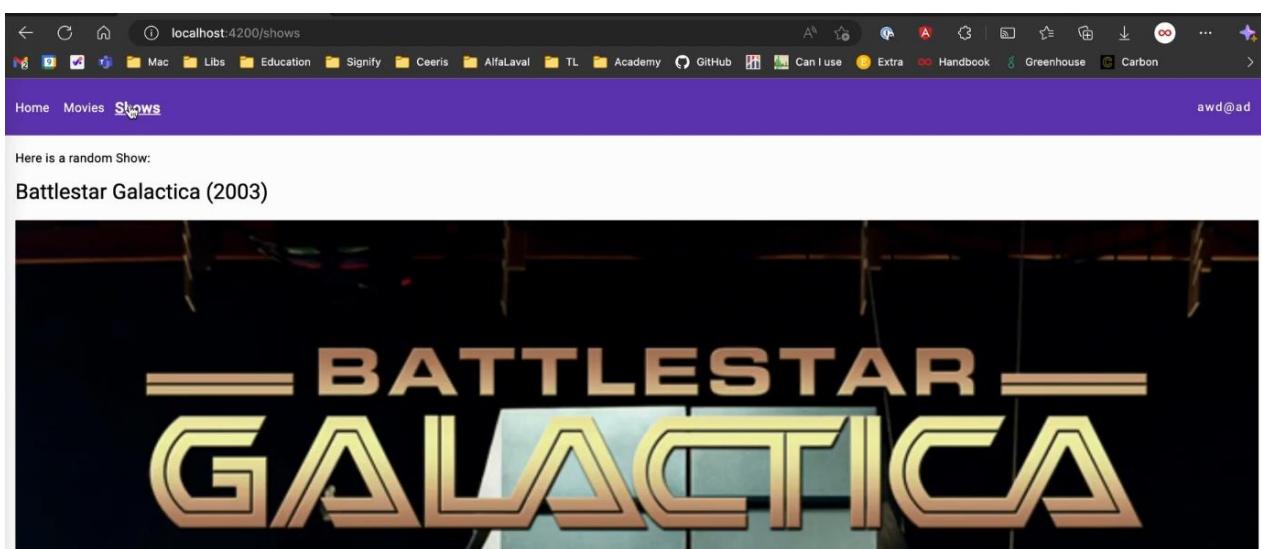
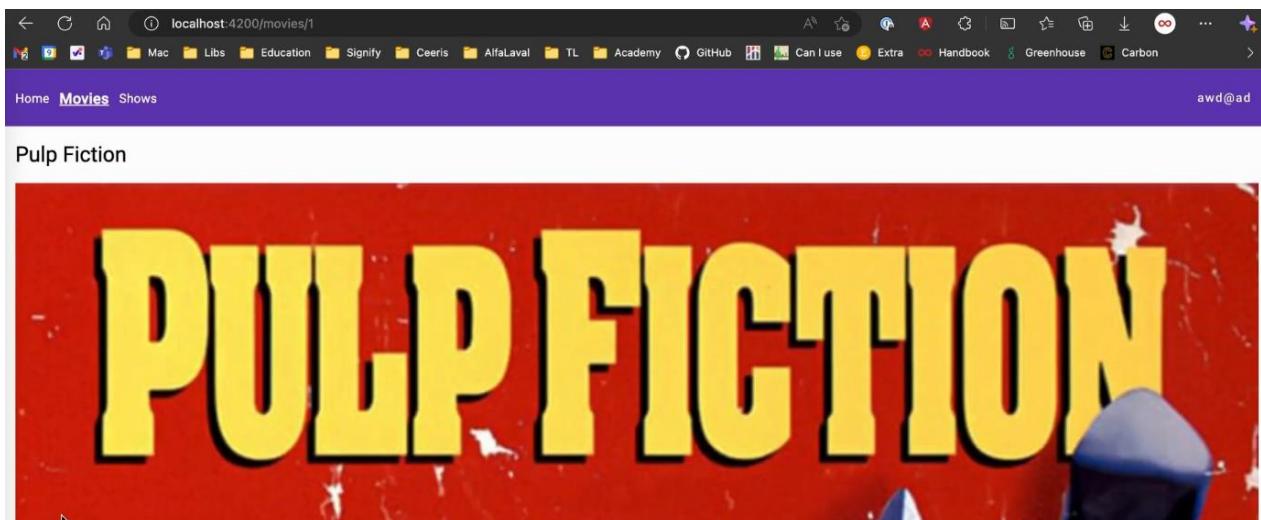
localhost:4200/movies

Hi, awd@ad! Here are some movie recommendations for you

Movies Shows

awd@ad

Pulp Fiction	The Matrix
PULP FICTION View Details	THE MATRIX View Details



localhost:4200/login

Home Movies Shows Log in

Email\*

Password\*

Enter "fail" as password to make the login request fail

Log in

localhost:4200/login

Home Movies Shows Log in

Email\*

awdawd@asd

Password\*

.....

Enter "fail" as password to make the login request fail

Log in

localhost:4200

Home Movies Shows awdawd@asd

Welcome to Phlex.app!

Your go-to stop for all things Movies and Shows

Hi, awdawd@asd! This is where you can find all your Movies and Shows. Feel free to navigate to the Movies or Shows page to see what's available.

localhost:4200/movies

Home Movies Shows awdawd@asd Log out

Hi, awdawd@asd! Here are some movie recommendations for you

Pulp Fiction

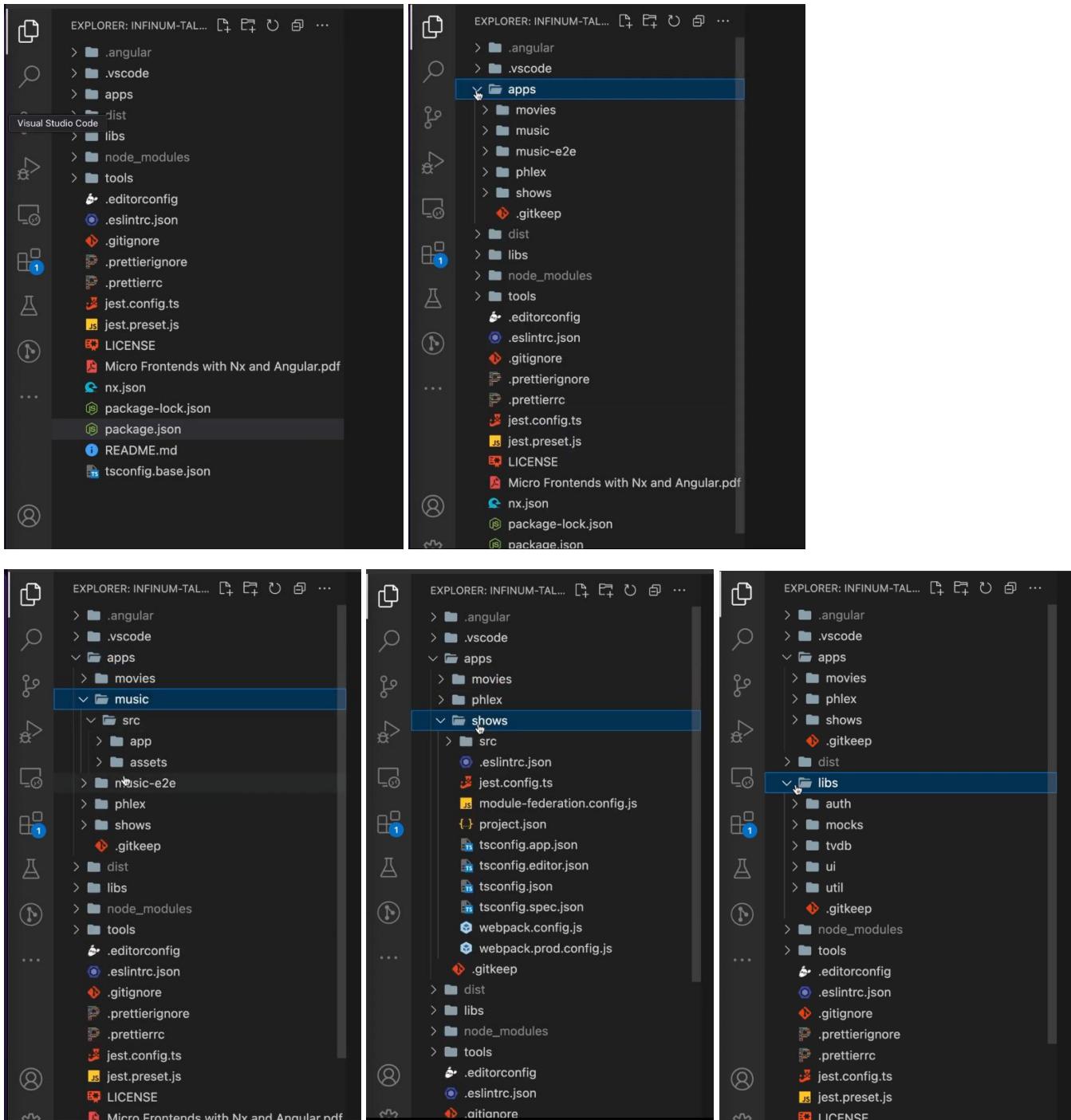


The Matrix



[View Details](#)

[View Details](#)



EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

auth.service.ts

```
libs auth src lib auth.service.ts
3 import { STORAGE } from '@phlex/util';
4 import { BehaviorSubject, Observable, tap } from 'rxjs';
5 import { User } from './user';
6
7 const STORAGE_KEY = 'infinum-mfe-demo:user';
8
9 @Injectable({
10   providedIn: 'root',
11 })
12 export class AuthService {
13   private readonly http = inject(HttpClient);
14   private readonly storage = inject(STORAGE); You, 3 days ago via PR ... + add
15
16   private readonly _user$ = new BehaviorSubject<null | User>(
17     this.getInitialUser()
18   );
19   public readonly user$ = this._user$.asObservable();
20
21   public logIn(email: string, password: string): Observable<User> {
22     return this.http.post<User>('/api/login', { email, password }).pipe(
23       tap((user) => {
24         this.storage.setItem(STORAGE_KEY, JSON.stringify(user));
25         this._user$.next(user);
26       })
27     );
28   }
29
30   public logOut() {
31     this.storage.removeItem(STORAGE_KEY);
32     this._user$.next(null);
33   }
34
35   private getInitialUser(): User | null {
36     try {
```

EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

auth.service.ts

```
libs auth src lib auth.service.ts > ↗ AuthService > ↗ user$ You, 3 days ago | 1 author (You)
9 @Injectable({
10   providedIn: 'root',
11 })
12 export class AuthService {
13   private readonly http = inject(HttpClient);
14   private readonly storage = inject(STORAGE);
15
16   private readonly _user$ = new BehaviorSubject<null | User>(
17     this.getInitialUser()
18   );
19   public readonly user$ = this._user$.asObservable(); You, 3 days ago + add
20
21   public logIn(email: string, password: string): Observable<User> {
22     return this.http.post<User>('/api/login', { email, password }).pipe(
23       tap((user) => {
24         this.storage.setItem(STORAGE_KEY, JSON.stringify(user));
25         this._user$.next(user);
26       })
27     );
28   }
29
30   public logOut() {
31     this.storage.removeItem(STORAGE_KEY);
32     this._user$.next(null);
33   }
34
35   private getInitialUser(): User | null {
36     try {
```

EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

auth.service.ts X

libs > auth > src > lib > auth.service.ts > AuthService > user\$

```
You, 3 days ago | 1 author (You)
9 @Injectable({
10   providedIn: 'root',
11 })
12 export class AuthService {
13   private readonly http = inject(HttpClient);
14   private readonly storage = inject(STORAGE);
15
16   private readonly _user$ = new BehaviorSubject<null | User>(
17     this.getInitialUser()
18   );
19   public readonly user$ = this._user$.asObservable();
20
21   public logIn(email: string, password: string): Observable<User> {
22     return this.http.post<User>('/api/login', { email, password }).pipe(
23       tap((user) => {
24         this.storage.setItem(STORAGE_KEY, JSON.stringify(user));
25         this._user$.next(user);
26       })
27     );
28
29   public logOut() {
30     this.storage.removeItem(STORAGE_KEY);
31     this._user$.next(null);
32   }
33
34   private getInitialUser(): User | null {
35     try {
36       const userString = this.storage.getItem(STORAGE_KEY);
37       if (userString) {
38         return JSON.parse(userString);
39       }
40     } catch (error) {
41       console.error('Error getting initial user:', error);
42     }
43     return null;
44   }
45 }
```

EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

auth.service.ts X

libs > auth > src > lib > auth.service.ts > AuthService > user\$

```
You, 3 days ago | 1 author (You)
9 @Injectable({
10   providedIn: 'root',
11 })
12 export class AuthService {
13   private readonly http = inject(HttpClient);
14   private readonly storage = inject(STORAGE);
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16   private readonly _user$ = new BehaviorSubject<null | User>(
17     this.getInitialUser()
18   );
19   public readonly user$ = this._user$.asObservable();
20
21   public logIn(email: string, password: string): Observable<User> {
22     return this.http.post<User>('/api/login', { email, password }).pipe(
23       tap((user) => {
24         this.storage.setItem(STORAGE_KEY, JSON.stringify(user));
25         this._user$.next(user);
26       })
27     );
28
29   public logOut() {
30     this.storage.removeItem(STORAGE_KEY);
31     this._user$.next(null);
32   }
33
34   private getInitialUser(): User | null {
35     try {
36       const userString = this.storage.getItem(STORAGE_KEY);
37       if (userString) {
38         return JSON.parse(userString);
39       }
40     } catch (error) {
41       console.error('Error getting initial user:', error);
42     }
43     return null;
44   }
45 }
```

The screenshot shows the VS Code interface with the following details:

- Explorer View:** Shows the project structure. Root folders include ".angular", ".vscode", "apps" (containing "movies", "phlex", "shows", ".gitkeep"), "dist", "libs" (containing "auth", "mocks", "tvdb"), and "ui" (containing "src" and "lib"). A "card" folder under "ui/lib" contains files: "card.component.html", "card.component.scss", "card.component.spec.ts", "card.component.ts", "index.ts", "test-setup.ts", ".eslintrc.json", "jest.config.ts", and "node-packagae.json".
- Editor View:** Displays the "card.component.html" file content. The code uses Angular's MatCard component to display movie posters.

```

<mat-card>
  <mat-card-header>
    <mat-card-title>{{ title }}</mat-card-title>
  </mat-card-header>
  <img mat-card-image [src]="imageUrl" alt="Poster image for movie {{ title }}"/>
  <mat-card-actions>
    <ng-content></ng-content>
  </mat-card-actions>
</mat-card>

```

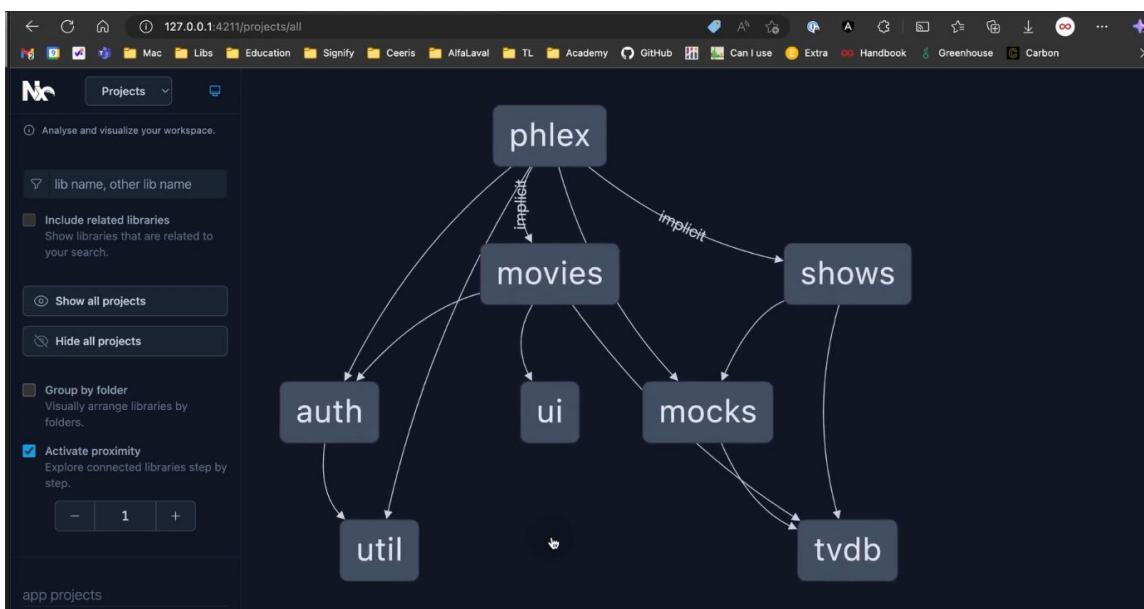
Next, let us see how we have set up the connection between all our apps and the libraries

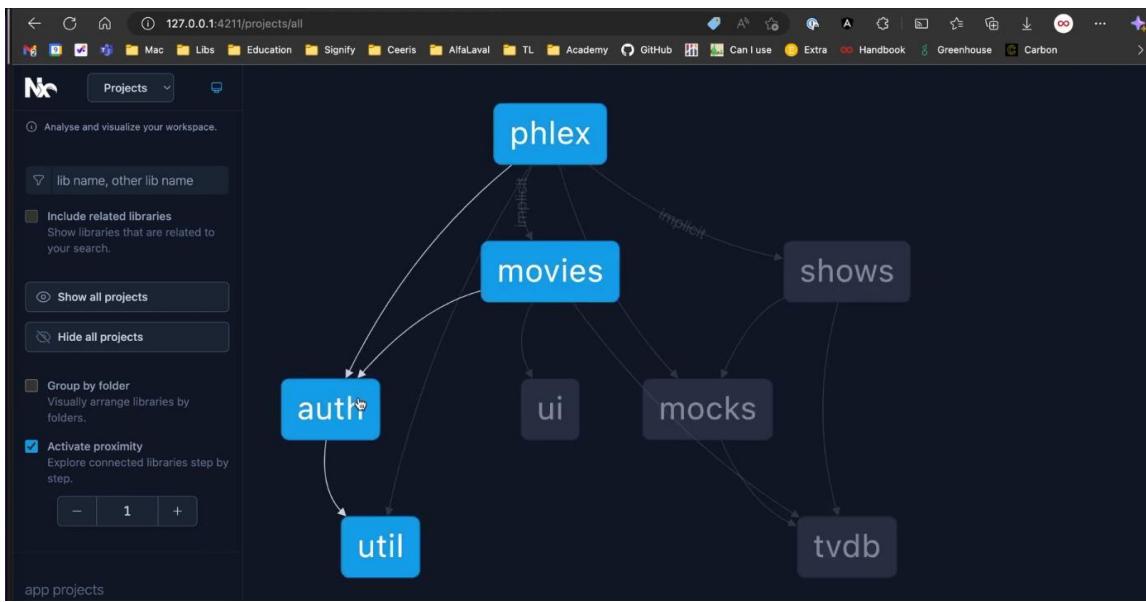
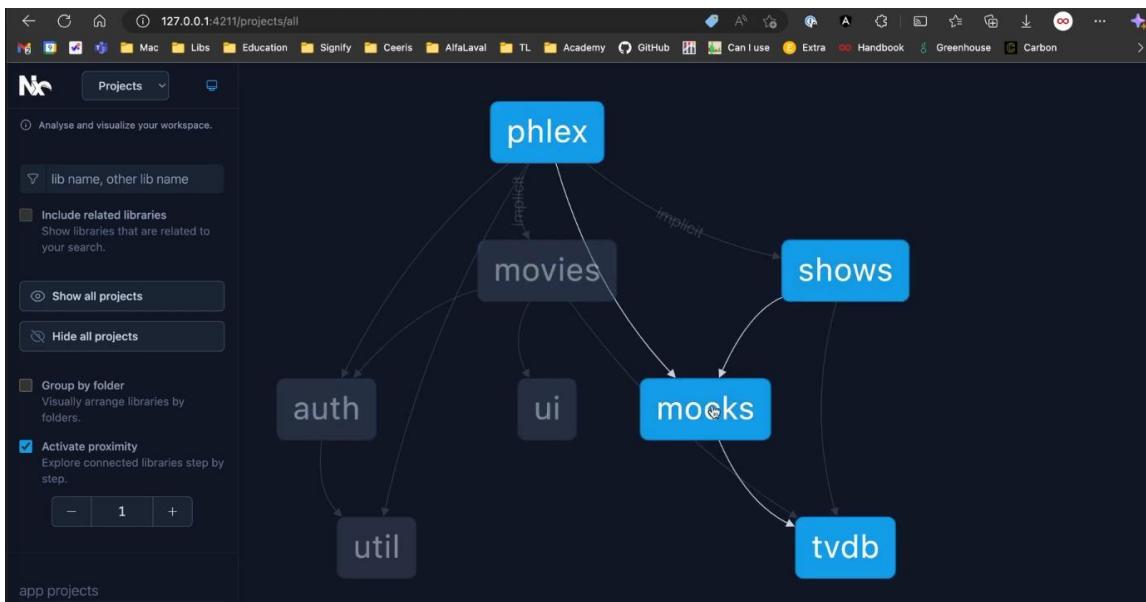
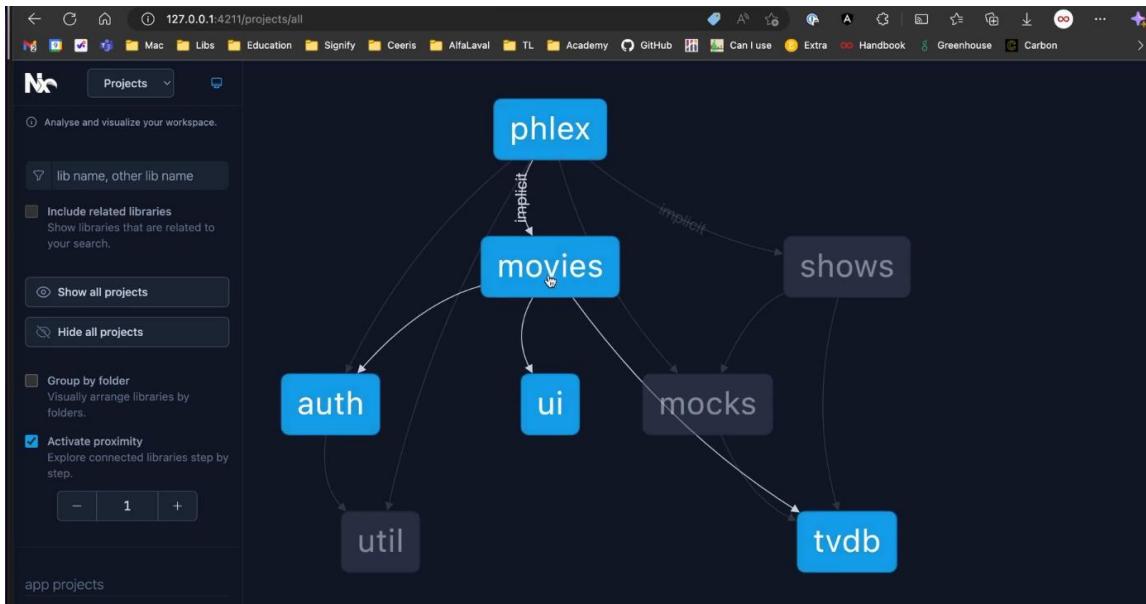
The terminal window shows the following output:

```

Last login: Thu Feb  9 18:49:15 on ttys000
infinum-talks-mfe-demo on ✘ main via ✽ v18.13.0
> nx graph:affected

```





EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

card.component.scss card.component.html

```
libs > ui > src > lib > card > card.component.html > mat-card > img
1   <mat-card>
2     <mat-card-header>
3       <mat-card-title>{{ title }}</mat-card-title>
4     </mat-card-header>
5
6     <img
7       mat-card-image
8       [src]="imageUrl"
9       alt="Poster image for movie {{ title }}" You, 2 days ago + add common
10    >
11
12     <mat-card-actions>
13       <ng-content></ng-content>
14     </mat-card-actions>
15   </mat-card>
16
```

node\_modules

localhost:4200

Home Movies Shows awdawd@asd

Welcome to Phlex.app!

Your go-to stop for all things

Movies and Shows

Hi, awdawd@asd! This is where you can find all your Movies and Shows. Feel free to navigate to the Movies or Shows page to see what's available.

Elements Console Network Application Sources Angular

Preserve log  Disable cache No throttling

Filter Invert Hide data URLs All Fetch/XHR JS CSS Img Media Font Doc WS Wasm Manifest Other

Has blocked cookies Blocked Requests 3rd-party requests

localhost:4200

Home Movies Shows awdawd@asd

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Elements Console Network Application Sources Angular

Preserve log  Disable cache No throttling

Filter Invert Hide data URLs All Fetch/XHR JS CSS Img Media Font Doc WS Wasm Manifest Other

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
localhost	http://localhost:4200/	GET	200	document	Other	1.1 kB	4..	
styles.css	http://localhost:4200/styles.css	GET	200	stylesheet	(index)	128 kB	3..	
polyfills.js	http://localhost:4200/polyfills.js	GET	200	script	(index)	367 kB	1..	
vendor.js	http://localhost:4200/vendor.js	GET	200	script	(index)	218 kB	1..	
main.js	http://localhost:4200/main.js	GET	200	script	(index)	53.1 kB	4..	
css?family=Robot... styles.js	https://fonts.googleapis.com/css?family=Robot... https://localhost:4200/styles.js	GET	200	stylesheet	(index)	700 B	9..	
icon?family=Mater... module-federation...	https://fonts.googleapis.com/icon?family=Mater... http://localhost:4200/assets/module-federat...	GET	200	stylesheet	(index)	260 kB	5..	
ng-cli-ws ng-cli-ws	ws://localhost:4200/ng-cli-ws ws://localhost:4200/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
KF0mCnqEu92Fr1... node_modules_tsli...	https://fonts.gstatic.com/s/roboto/v30/... http://localhost:4200/node_modules_tsli...	GET	200	font	css?family=Rob...	11.1 kB	4..	
default-node_mod... node_modules_rxj...	http://localhost:4200/default-node_mod... http://localhost:4200/node_modules_rxj...	GET	200	script	main.ts:6	17.6 kB	7..	
node_modules_rxj... node_modules_an...	http://localhost:4200/node_modules_rxj... http://localhost:4200/node_modules_an...	GET	200	script	main.ts:6	291 kB	9..	
default-node_mod... node_modules_an...	http://localhost:4200/default-node_mod... http://localhost:4200/node_modules_an...	GET	200	script	main.ts:6	102 kB	1..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	35.5 kB	9..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	1.1 MB	2..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	292 kB	1..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	40.5 kB	9..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	87.2 kB	2..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	175 kB	2..	
default-node_mod... default-node_mod...	http://localhost:4200/default-node_mod... http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	25.0 kB	3..	

localhost:4200

Home Movies Shows awdawd@asd

## Welcome to Phlex.app!

Your go-to stop for all things Movies and Shows

Hi, awdawd@asd! This is where you can find all your Movies and Shows. Feel free to navigate to the Movies or Shows page to see what's available.

Network tab (Chrome DevTools)

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
node_modules_rxjs	http://localhost:4200/node_modules_rxjs	GET	200	script	main.ts:6	33.3 kB	2..	
node_modules_ansi	http://localhost:4200/node_modules_ansi	GET	200	script	main.ts:6	1.1 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	292 kB	1..	
node_modules_anon	http://localhost:4200/node_modules_anon	GET	200	script	main.ts:6	40.5 kB	9..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	87.2 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	175 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	25.0 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	95.6 kB	2..	
common.js	http://localhost:4200/common.js	GET	200	script	main.ts:6	24.4 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	297 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	18.0 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	16.3 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	144 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	115 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	187 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	375 kB	3..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	1.1 MB	3..	
apps_phlex_src_b...	http://localhost:4200/apps_phlex_src_b...	GET	200	script	main.ts:6	16.5 kB	3..	
favicon.ico	http://localhost:4200/favicon.ico	GET	200	vnd.microsoft.icon	Other	15.4 kB	9..	
mockServiceWor...	http://localhost:4200/mockServiceWor...	GET	200	script	Other	234 B	1..	
apps_phlex_src_a...	http://localhost:4200/apps_phlex_src_a...	GET	200	script	app.routes.ts:7	0 B	2..	
apps_phlex_src_c...	http://localhost:4200/apps_phlex_src_c...	GET	200	fetch	mockServiceWor...	4.5 kB	5..	
KFOICnqEu92Fr1...	https://fonts.gstatic.com/s/roboto/v30/...	GET	200	font	css?family=Robo...	0 B	6..	

localhost:4200

Home Movies Shows awdawd@asd

## Welcome to Phlex.app!

Your go-to stop for all things Movies and Shows

Hi, awdawd@asd! This is where you can find all your Movies and Shows. Feel free to navigate to the Movies or Shows page to see what's available.

Network tab (Chrome DevTools)

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
remoteEntry.mjs	http://localhost:4201/remoteEntry.mjs	GET	200	script	app.routes.ts:17	0 B	1..	
remoteEntry.mjs	http://localhost:4201/remoteEntry.mjs	GET	200	fetch	mockServiceWor...	258 kB	5..	
common.js	http://localhost:4201/common.js	GET	200	script	app.routes.ts:17	0 B	9..	
ng-cli-ws	ws://localhost:4201/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
common.js	http://localhost:4201/common.js	GET	200	fetch	mockServiceWor...	16.8 kB	3..	
default-node_mod...	http://localhost:4201/default-node_mod...	GET	200	script	entry.routes.ts:12	0 B	1..	
apps_movies_src...	http://localhost:4201/apps_movies_src...	GET	200	script	entry.routes.ts:12	0 B	1..	
default-node_mod...	http://localhost:4201/default-node_mod...	GET	200	fetch	mockServiceWor...	35.3 kB	4..	
apps_movies_sr...	http://localhost:4201/apps_movies_sr...	GET	200	fetch	mockServiceWor...	7.4 kB	8..	
movies	http://localhost:4200/api/movies	GET	200	xhr	movies-list.comp...	0 B	5..	
2395182.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	1..	
5f274c00c85c1.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	1..	
2395182.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	507 kB	1..	
5f274c00c85c1.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	328 kB	1..	

localhost:4200/movies

Home Movies Shows awdawd@asd

## Welcome to Phlex.app!

Your go-to stop for all things Movies and Shows

Hi, awdawd@asd! Here are some movie recommendations for you

**Pulp Fiction**



Pulp Fiction

View Details

Network tab (Chrome DevTools)

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
remoteEntry.mjs	http://localhost:4201/remoteEntry.mjs	GET	200	script	app.routes.ts:17	0 B	1..	
remoteEntry.mjs	http://localhost:4201/remoteEntry.mjs	GET	200	fetch	mockServiceWor...	258 kB	5..	
common.js	http://localhost:4201/common.js	GET	200	script	app.routes.ts:17	0 B	9..	
ng-cli-ws	ws://localhost:4201/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
common.js	http://localhost:4201/common.js	GET	200	fetch	mockServiceWor...	16.8 kB	3..	
default-node_mod...	http://localhost:4201/default-node_mod...	GET	200	script	entry.routes.ts:12	0 B	1..	
apps_movies_src...	http://localhost:4201/apps_movies_src...	GET	200	script	entry.routes.ts:12	0 B	1..	
default-node_mod...	http://localhost:4201/default-node_mod...	GET	200	fetch	mockServiceWor...	35.3 kB	4..	
apps_movies_sr...	http://localhost:4201/apps_movies_sr...	GET	200	fetch	mockServiceWor...	7.4 kB	8..	
movies	http://localhost:4200/api/movies	GET	200	xhr	movies-list.comp...	0 B	5..	
2395182.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	1..	
5f274c00c85c1.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	1..	
2395182.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	507 kB	1..	
5f274c00c85c1.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	328 kB	1..	

localhost:4200/shows

Home Movies Shows awdawd@asd

Here is a random Show:

### The Sopranos

New Jersey mob boss Tony Soprano deals with personal and professional issues in his home and business life that affect his mental state, leading him to seek professional psychiatric counseling.

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
remoteEntry.mjs	https://localhost:4201/remoteEntry.mjs	GET	200	script	mockServiceWor...	258 kB	5..	
remoteEntry.mjs	http://localhost:4201/remoteEntry.mjs	GET	200	fetch	mockServiceWor...	0 B	9..	
common.js	http://localhost:4201/common.js	GET	200	script	app.routes.ts:17	0 B	P..	
ng-cli-ws	ws://localhost:4201/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
common.js	http://localhost:4201/common.js	GET	200	fetch	mockServiceWor...	16.8 kB	3..	
default-node_mod...	http://localhost:4201/default-node_mo...	GET	200	script	entry.routes.ts:12	0 B	1..	
apps_movies_src...	http://localhost:4201/apps_movies_src...	GET	200	script	entry.routes.ts:12	0 B	1..	
default-node_mo...	http://localhost:4201/default-node_mo...	GET	200	fetch	mockServiceWor...	35.3 kB	4..	
apps_movies_sr...	http://localhost:4201/apps_movies_sr...	GET	200	fetch	mockServiceWor...	7.4 kB	8..	
movies	http://localhost:4200/api/movies	GET	200	xhr	movies-list.comp...	0 B	5..	
2395182.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	1..	
5f274c00c85c1.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	1..	
o 2395182.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	507 kB	1..	
o 5f274c00c85c1.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	328 kB	1..	
remoteEntry.mjs	http://localhost:4202/remoteEntry.mjs	GET	200	script	app.routes.ts:12	0 B	1..	
remoteEntry.mjs	http://localhost:4202/remoteEntry.mjs	GET	200	fetch	mockServiceWor...	251 kB	5..	
common.js	http://localhost:4202/common.js	GET	200	script	app.routes.ts:12	0 B	9..	
ng-cli-ws	ws://localhost:4202/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
common.js	http://localhost:4202/common.js	GET	200	fetch	mockServiceWor...	7.4 kB	3..	
apps_shows_src_a...	http://localhost:4202/apps_shows_src...	GET	200	script	entry.routes.ts:12	0 B	1..	
apps_shows_src_a...	http://localhost:4202/apps_shows_src...	GET	200	fetch	mockServiceWor...	5.3 kB	4..	
random	http://localhost:4200/api/shows/random	GET	200	xhr	random-show.co...	0 B	1..	
75289-17.jpg	https://artworks.thetvdb.com/banners/...	GET	200	jpeg	platform-browser...	0 B	2..	

EXPLORER: INFINUM-TAL...

card.component.scss

```
libs > ui > src > lib > card > card.component.html > mat-card > img
```

```
1  <mat-card>
2    <mat-card-header>
3      <mat-card-title>{{ title }}</mat-card-title>
4    </mat-card-header>
5
6    <img
7      mat-card-image
8      [src]="imageUrl"
9      alt="Poster image for movie {{ title }}"
10     />
11
12    <mat-card-actions>
13      <ng-content></ng-content>
14    </mat-card-actions>
15  </mat-card>
```

EXPLORER: INFINUM-TAL...

card.component.scss

```
apps > phlex > src > assets > module-federation.manifest.json > ...
```

```
You, 3 days ago | 1 author (You)
```

```
1  {
2    "movies": "http://localhost:4201",
3    "shows": "http://localhost:4202"
4  }
```

localhost:4200/shows

Home Movies Shows awdawd@asd

Here is a random Show:

## Twin Peaks



The body of a young girl is washed up on a beach near the small Washington state town of Twin Peaks. Eccentric FBI Special Agent Dale Cooper is called in to investigate her strange demise only to uncover a web of mystery that ultimately leads him deep into the heart of the surrounding woodland and his very own soul. Season 3 - also known as Twin

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
shows	http://localhost:4200/shows	GET	200	document	Other	1.1 kB	3..	
styles.css	http://localhost:4200/styles.css	GET	200	stylesheet	shows	128 kB	3..	
polyfills.js	http://localhost:4200/polyfills.js	GET	200	script	shows	367 kB	1..	
vendor.js	http://localhost:4200/vendor.js	GET	200	script	shows	218 kB	1..	
main.js	http://localhost:4200/main.js	GET	200	script	shows	53.1 kB	1..	
css2?family=Robot...	https://fonts.googleapis.com/css2?family=Robot...	GET	200	stylesheet	shows	700 B	8..	
styles.js	http://localhost:4200/styles.js	GET	200	script	shows	260 kB	1..	
icon?family=Materi...	https://fonts.googleapis.com/icon?family=Materi...	GET	200	stylesheet	shows	355 B	8..	
module-federation....	http://localhost:4200/assets/module-federation....	GET	200	fetch	main.ts:3	365 B	4..	
ng-cli-ws	ws://localhost:4200/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
ng-cli-ws	ws://localhost:4200/ng-cli-ws	GET	101	websocket	WebSocketClient...	0 B	P..	
KFOmCnqEu92Fr1...	https://fonts.gstatic.com/s/roboto/v30/KFOmCnqEu92Fr1...	GET	200	font	css2?family=Rob...	11.1 kB	4..	
node_modules_tsli...	http://localhost:4200/node_modules_tsli...	GET	200	script	main.ts:6	17.6 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	291 kB	4..	
node_modules_rxj...	http://localhost:4200/node_modules_rxj...	GET	200	script	main.ts:6	102 kB	6..	
node_modules_rxj...	http://localhost:4200/node_modules_rxj...	GET	200	script	main.ts:6	35.5 kB	7..	
node_modules_an...	http://localhost:4200/node_modules_an...	GET	200	script	main.ts:6	1.1 MB	1..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	292 kB	2..	
node_modules_an...	http://localhost:4200/node_modules_an...	GET	200	script	main.ts:6	40.5 kB	2..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	87.2 kB	5..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	175 kB	1..	
default-node_mod...	http://localhost:4200/default-node_mod...	GET	200	script	main.ts:6	25.0 kB	1..	

localhost:4200/shows

Home Movies Shows awdawd@asd

Here is a random Show:

## Twin Peaks



The body of a young girl is washed up on a beach near the small Washington state town of Twin Peaks. Eccentric FBI Special Agent Dale Cooper is called in to investigate her strange demise only to uncover a web of mystery that ultimately leads him deep into the heart of the surrounding woodland and his very own soul. Season 3 - also known as Twin

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
module-federation....	http://localhost:4200/assets/module-federation....	GET	200	fetch	main.ts:3	365 B	4..	
remoteEntry.mjs	http://localhost:4202/remoteEntry.mjs	GET	200	fetch	mockServiceWor...	251 kB	4..	
common.js	http://localhost:4202/common.js	GET	200	fetch	mockServiceWor...	7.4 kB	2..	
apps_shows_src...	http://localhost:4202/apps_shows_src...	GET	200	fetch	mockServiceWor...	5.3 kB	2..	
random	http://localhost:4200/api/shows/random	GET	200	xhr	random-show.co...	0 B	1..	
KFOICnqEu92Fr...	https://fonts.gstatic.com/s/roboto/v30/KFOICnqEu92Fr...	GET	200	fetch	mockServiceWor...	11.1 kB	4..	
70533-6.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	493 kB	2..	

The screenshot shows a web browser window at `localhost:4200/shows`. The page displays a random show from the "Shows" category, specifically "Twin Peaks". The main content area features a red curtain background with a statue of a woman on a pedestal. In front of the curtain, the words "TWIN PEAKS" are written in large, stylized, jagged letters. Below the title, there is a brief description of the show: "The body of a young girl is washed up on a beach near the small Washington state town of Twin Peaks. Eccentric FBI Special Agent Dale Cooper is called in to investigate her strange demise only to uncover a web of mystery that ultimately leads him deep into the heart of the surrounding woodland and his very own soul. Season 3 - also known as Twin Peaks". The browser's developer tools Network tab is open, showing requests for files like "module-federation.mjs", "remoteEntry.mjs", and "common.js". One request for "70533-6.jpg" is expanded, showing its response body contains JSON objects for "movies" and "shows".

The screenshot shows a VS Code interface with the Explorer sidebar open, displaying the project structure. The "shows" folder under "apps" is selected. The main editor area shows the content of `module-federation.config.js` in the "shows" directory. The code defines an export named "shows" with an "exposes" object mapping the route `./Routes` to the file `remote-entry.entry.routes.ts`.

```
module.exports = {
  name: 'shows',
  exposes: {
    './Routes': 'apps/shows/src/app/remote-entry/entry.routes.ts',
  },
};
```

EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

card.component.scss module-federation.config.js

apps > phlex > module-federation.config.js > <unknown>

```
You, 3 days ago | 1 author (You)
1 module.exports = {
2   name: 'phlex',
3   remotes: [],
4 };
5
```

.angular .vscode apps movies phlex src app assets .gitkeep module-federation.manifest.json environments styles bootstrap.ts favicon.ico index.html main.ts remotes.d.ts styles.scss test-setup.ts .eslintrc.json jest.config.ts

module-federation.config.js

project.json tsconfig.app.json tsconfig.editor.json

EXPLORER: INFINUM-TAL... ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

card.component.scss entry.routes.ts

apps > movies > src > app > remote-entry > entry.routes.ts > ...

```
You, 3 days ago | 1 author (You)
1 import { Route } from '@angular/router';
2 import { RemoteEntryComponent } from './entry.component';
3
4 export const remoteRoutes: Route[] = [
5   {
6     path: '',
7     component: RemoteEntryComponent,
8     children: [
9       {
10         path: '',
11         loadComponent: () =>
12           import('../pages/movies-list/movies-list.component'),
13         ,
14       },
15       {
16         path: ':id',
17         loadComponent: () =>
18           import('../pages/movie-details/movie-details.component'),
19         ,
20       },
21     ],
22   ];
23
```

.angular .vscode apps movies src app pages remote-entry entry.component.ts entry.routes.ts app.routes.ts assets environments bootstrap.ts favicon.ico index.html main.ts styles.scss test-setup.ts .eslintrc.json

The screenshot shows the VS Code interface with the following details:

- Explorer View:** Shows the project structure. The file `entry.routes.ts` is currently selected.
- Editor View:** Displays the code for `entry.routes.ts`. The code defines a route configuration for a remote entry component.

```
entry.routes.ts .../movies/...
apps > shows > src > app > remote-entry > entry.routes.ts > remoteRoutes > children > entry.routes.ts

You, 2 days ago | 1 author (You)

1 import { Route } from '@angular/routing';
2 import { RemoteEntryComponent } from './remote-entry.component';
3
4 export const remoteRoutes: Route[] = [
5   {
6     path: '',
7     component: RemoteEntryComponent,
8     children: [
9       {
10         path: '',
11         loadComponent: () => import('../pages/random-show/random-show.component'),
12       },
13     ],
14   },
15 ];
16
17 ];
```

The screenshot shows a code editor interface with the following details:

- Explorer View:** Shows a tree structure of files and folders. The 'card' folder under 'src/lib' is selected, revealing its contents: card.component.html, card.component.scss, card.component.spec.ts, and card.component.ts, along with index.ts and test-setup.ts.
- Code Editor:** Displays the content of 'card.component.html'. The code uses Angular's Material Design components like `<mat-card>`, `<mat-card-header>`, `<mat-card-title>`, `<img>`, and `<mat-card-actions>`. A tooltip is visible over the `<img>` tag.
- Terminal:** Shows a terminal window with the following output:

```
infinum-talks-mfe-demo on main via @ v18.13.0
● > gco -b changes
Switched to a new branch 'changes'
infinum-talks-mfe-demo on changes via @ v18.13.0
○ > |
```

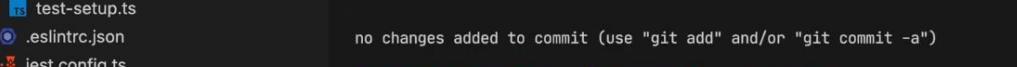
The screenshot shows a VS Code interface with the following elements:

- EXPLORER:** Shows a file tree with a .gitkeep file at the root. Sub-directories include dist, libs (auth, mocks, tvdb), ui (src, lib, card), and card (card.component.html, card.component.scss, card.component.spec.ts, card.component.ts, index.ts, test-setup.ts). A .eslintrc.json, jest.config.ts, ng-package.json, package.json, and project.json file are also listed.
- EDITOR:** The card.component.scss file is open. The code contains a single rule for mat-card-title:

```
You, 1 second ago | 1 author (You)
1 mat-card-title {
2   |   text-transform: uppercase;
3 }
4 |
```
- TERMINAL:** Shows two sessions:
  - Session 1 (infinum-talks-mfe-demo):

```
infinum-talks-mfe-demo on main via @ v18.13.0
● > gco -b changes
Switched to a new branch 'changes'
```
  - Session 2 (infinum-talks-mfe-demo):

```
infinum-talks-mfe-demo on changes via @ v18.13.0
○ > |
```
- STATUS BAR:** Shows icons for file operations like save, close, and copy, along with tabs for card.component.scss, entry.routes.ts, and card.compon...



The screenshot shows the VS Code interface with a terminal window open at the bottom. The terminal output is as follows:

```
no changes added to commit (use "git add" and/or "git commit -a")
infinum-talks-mfe-demo on ✘ changes [!] via @ v18.13.0
④ > ga ,
fatal: pathspec ',' did not match any files
infinum-talks-mfe-demo on ✘ changes [!] via @ v18.13.0
④ > ga ,
infinum-talks-mfe-demo on ✘ changes [!] via @ v18.13.0
④ > ga .
```

```
>Last login: Thu Feb  9 18:49:15 on ttys000

infinum-talks-mfe-demo on ✘ main via ⚡ v18.13.0
> nx graph

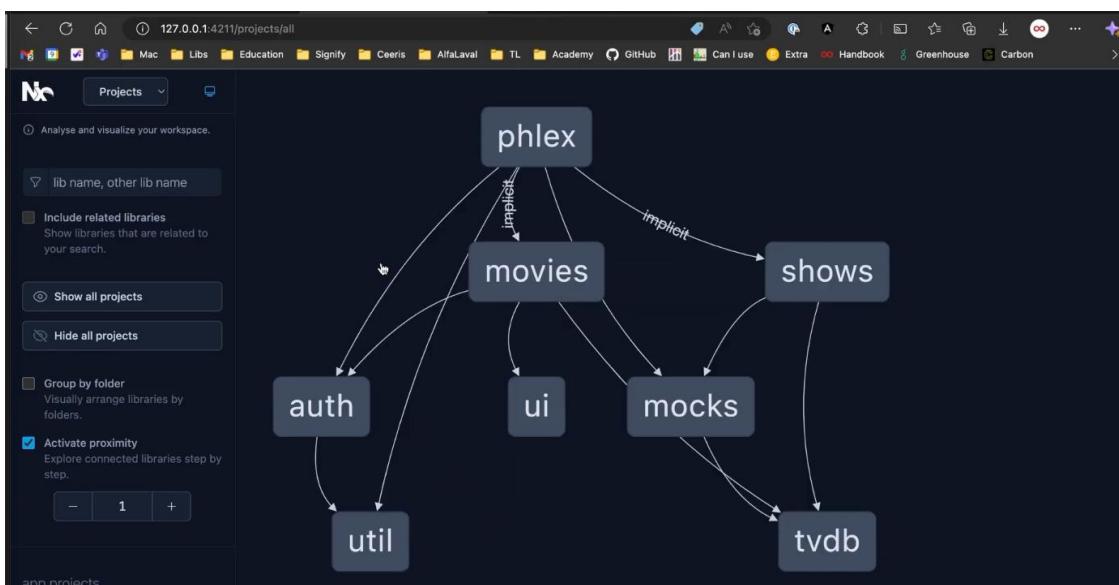
> NX Project graph started at http://127.0.0.1:4211

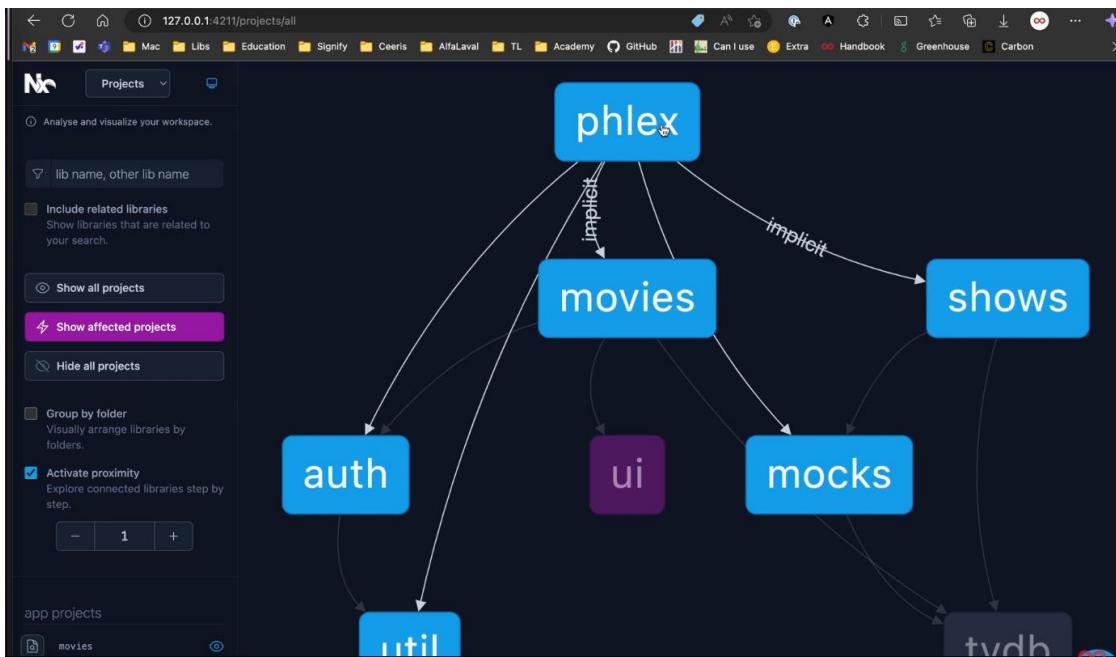
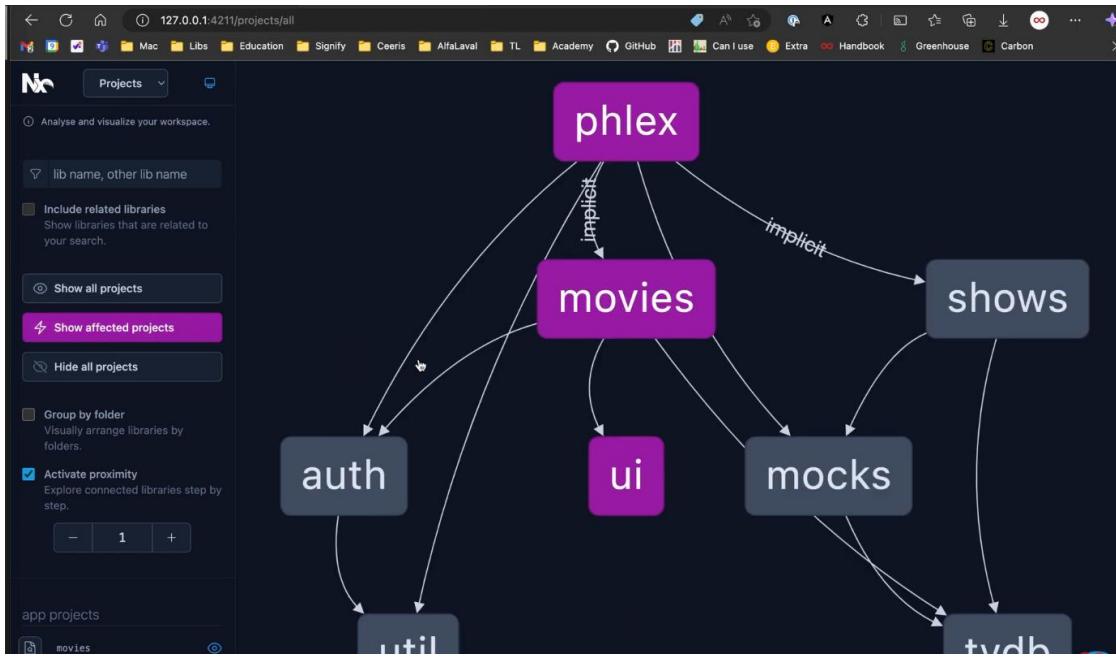
^C%

infinum-talks-mfe-demo on ✘ changes via ⚡ v18.13.0 took 7m47s
> nx affected:graph

> NX Affected criteria defaulted to --base=main --head=HEAD

> NX Project graph started at http://127.0.0.1:4211
```





The screenshot shows the VS Code interface with the Explorer sidebar open. The workspace contains several files and folders related to an Angular project, including .angular, .vscode, apps, dist, libs, node\_modules, tools, editorconfig, eslintrc.json, gitignore, prettierignore, prettierrc, jest.config.ts, jest.preset.js, LICENSE, Micro Frontends with Nx and Angular.pdf, nx.json, package-lock.json, package.json, README.md, and tsconfig.base.json. The terminal at the bottom shows the command `nx g @nrwl/angular:remote music --host=phlex` being run, followed by output from NX regarding workspace configuration and file creation for the 'music' application.

Next, let us create a new application, a remote app called music

The screenshot shows the VS Code interface with the Source Control sidebar open. The workspace contains a single application named 'music'. This application includes subfolders for e2e tests, fixtures, and support, along with files like app.cy.ts, example.json, app.po.ts, commands.ts, e2e.ts, .eslintrc.json, cypress.config.ts, project.json, and tsconfig.json. The terminal at the bottom shows the command `nx g @nrwl/angular:remote music --host=phlex` being run, followed by output from NX regarding workspace configuration and file creation for the 'music' application. A tooltip in the source control sidebar indicates that the 'music' folder contains the file `~/projects/infinum/talks/mfes/infinum-talks-mile-demo/apps/music-e2e`.

It also optionally created a Cypress E2E testing project for the music app

```
1 {
2   "movies": "http://localhost:4201"
3   "shows": "http://localhost:4202" →
4 }
5
```

It also added a new entry into the module-federation manifest file

```
1 declare module 'movies/Routes';
2
3 declare module 'shows/Routes';
4
5+ declare module 'music/Module';
6+
```

```
1 import { Route } from '@angular/router';
2 import { loadRemoteModule } from '@angular/flex-layout';
3
4 export const appRoutes: Route[] = [
5   {
6     path: '',
7     LoadComponent: () => import('./')
8   },
9   {
10     path: 'shows',
11     LoadComponent: () =>
12       loadRemoteModule('shows', './')
13   },
14   {
15     path: 'music',
16     LoadComponent: () =>
17       loadRemoteModule('music', './')
18   }
19 ];
```

SOURCE CONTROL

✓ Commit

Changes

- apps
- music
- music-e2e
- phlex/src
- app
- app.routes.ts

Message (⌘Enter to commit on "changes")

✓ Commit

app.routes.ts (Working Tree) M X

apps > phlex > src > app > app.routes.ts > [e] appRoutes

```
6+     path: 'music', You, 1 second
7+     loadChildren: () =>
8+       loadRemoteModule('music', './')
9+
10+    {
11+      path: '',
12+      loadComponent: () => import('./')
13+    },
14+    {
15+      path: 'shows',
16+      loadChildren: () =>
17+        loadRemoteModule('shows', './')
18+    },
19+    {
20+      path: 'movies'.
```

SOURCE CONTROL

✓ Commit

Changes

- apps
- music
- music-e2e
- phlex/src
- app
- app.routes.ts

Message (⌘Enter to commit on "changes")

✓ Commit

app.routes.ts (Working Tree) M X

apps > phlex > src > app > app.routes.ts > [e] appRoutes

```
1
2  jar/mf';
3
4
5
6+ then((m) => m.RemoteEntryModule),
7+   intent ...
8
9
```

SOURCE CONTROL

✓ Commit

Changes

- apps
- music
- src
- app
- remote-entry
- entry.component.ts
- entry.module.ts
- entry.routes.ts
- nx-welcome.component.ts
- app-component.ts

Message (⌘Enter to commit on "changes")

✓ Commit

entry.module.ts (Untracked) U X

apps > music > src > app > remote-entry > entry.module.ts > ...

```
1+ import { NgModule } from '@angular/core'
2+ import { CommonModule } from '@angular/common'
3+ import { RouterModule } from '@angular/router'
4+
5+ import { RemoteEntryComponent } from './remote-entry'
6+ import { NxWelcomeComponent } from './nx-welcome'
7+ import { remoteRoutes } from './remote-routes'
8+
9+ @NgModule({
10+   declarations: [RemoteEntryComponent],
11+   imports: [CommonModule, RouterModule],
12+   providers: []
13+ })
14+ export class RemoteEntryModule {}
```

SOURCE CONTROL

✓ Commit

Changes

- apps
- music
- src
- app
- remote-entry
- entry.component.ts
- entry.module.ts
- entry.routes.ts
- nx-welcome.component.ts

Message (⌘Enter to commit on "changes")

✓ Commit

entry.routes.ts (Untracked) U X

apps > music > src > app > remote-entry > entry.routes.ts > ...

```
1+ import { Route } from '@angular/router'
2+ import { RemoteEntryComponent } from './remote-entry'
3+
4+ export const remoteRoutes: Route[] =
5+   [
6+     { path: '', component: RemoteEntryComponent }
7+   ];
```

EXPLORER: INFINUM-TAL... ...

entry.component.ts U X

```
apps > music > src > app > remote-entry > entry.component.ts > ...
1 import { Component } from '@angular/core';
2
3 @Component({
4   selector: 'infinum-talks-mfe-demo-music-entry',
5   template: '<infinum-talks-mfe-demo-nx>Welcome</infinum-talks-mfe-demo-nx-welcom
6 })
7 export class RemoteEntryComponent {}
```

EXPLORER: INFINUM-TAL... ...

entry.routes.ts U X

```
apps > music > src > app > remote-entry > entry.routes.ts > ...
1 import { Route } from '@angular/router';
2 import { RemoteEntryComponent } from './entry.component';
3
4 export const remoteRoutes: Route[] = [
5   { path: '', component: RemoteEntryComponent },
6 ];
7
```

EXPLORER: INFINUM-TAL... ...

nx-welcome.component.ts U X

```
apps > music > src > app > remote-entry > nx-welcome.component.ts > ...
1 import { Component, ViewEncapsulation } from '@angular/core';
2
3 /* eslint-disable */
4
5 @Component({
6   selector: 'infinum-talks-mfe-demo-nx-welcome',
7   template: `
8     <!--
9     ****
10    This is a starter component and can be deleted.
11    ****
12    Delete this file and get started with your project!
13    ****
14    -->
15     <style>
```

EXPLORER: INFINUM-TAL... ...

nx-welcome.component.ts U X

```
apps > music > src > app > remote-entry > nx-welcome.component.ts > ...
1 import { Component, ViewEncapsulation } from '@angular/core';
2
3 /* eslint-disable */
4
5 @Component({
6   selector: 'infinum-talks-mfe-demo-nx-welcome',
7   template: `
8     <!--
9     ****
10    This is a starter component and can be deleted.
11    ****
12    Delete this file and get started with your project!
13    ****
14    -->
15     <style>
```

The screenshot shows the VS Code interface with the following details:

- EXPLORER:** Shows the project structure under "INFINUM-TAL...". The "apps" folder contains "movies", "music", and "src". Inside "src", there is an "app" folder which contains "remote-entry" and other files like "entry.component.ts", "entry.module.ts", etc.
- EDITOR:** The file "app.routes.ts" is open in the editor. The code defines a route configuration:

```
1 import { Route } from '@angular/router';
2
3 export const appRoutes: Route[] = [
4   {
5     path: '',
6     loadChildren: () =>
7       import('./remote-entry/entry.module').then((m) => m.RemoteEntryModule),
8   },
9 ];
10
```

- TERMINAL:** The terminal pane at the bottom shows the output of an npm build command, listing many files being created or updated in the "apps/music" directory, such as ".eslintrc.json", "bootstrap.ts", "index.html", "main.ts", "styles.scss", "test-setup.ts", ".eslintrc.json", and "jest.config.ts".

```
infinum-talks-mfe-demo on ✘ changes [!?] via ® v18.13.0 took 36ms
> npm start

> infinum-talks-mfe-demo@0.0.0 start
> nx serve phlex --dev-remotes=movies,shows

> nx run phlex:serve:development --dev-remotes=movies,shows
```

```
  ● ● ●  ~%1          npm start

Directory Listings: visible
AutoIndex: visible
Serve GZIP Files: false
Serve Brotli Files: false
Default File Extension: none

Available on:
  http://localhost:4203
Hit CTRL-C to stop the server

" Generating browser application bundles (phase: setup)... " Generating browser application bundles (phase: setup)... " Generating browser application bundles (phase: setup)... TypeScript compiler options "target" and "useDefineForClassFields" are set to "ES2022" and "false" respectively by the Angular CLI. To control ECMA version and features use the Browserslist configuration. For more information, see https://angular.io/guide/build#configuring-browser-compatibility
  TypeScript compiler options "target" and "useDefineForClassFields" are set to "ES2022" and "false" respectively by the Angular CLI. To control ECMA version and features use the Browserslist configuration. For more information, see https://angular.io/guide/build#configuring-browser-compatibility
  TypeScript compiler options "target" and "useDefineForClassFields" are set to "ES2022" and "false" respectively by the Angular CLI. To control ECMA version and features use the Browserslist configuration. For more information, see https://angular.io/guide/build#configuring-browser-compatibility
```

```

P ⚡ 100% npm start
Warning: /Users/fvoska/projects/infinum/talks/mfes/infinum-talks-mfe-demo/node_modules/msw/lib/index.js depends on 'outvariant'. CommonJS or AMD dependencies can cause optimization bailouts.
For more info see: https://angular.io/guide/build#configuring-commonjs-dependencies

[33mWarning: /Users/fvoska/projects/infinum/talks/mfes/infinum-talks-mfe-demo/node_modules/msw/lib/index.js depends on 'strict-event-emitter'. CommonJS or AMD dependencies can cause optimization bailouts.
For more info see: https://angular.io/guide/build#configuring-commonjs-dependencies

Warning: undefined depends on 'msw'. CommonJS or AMD dependencies can cause optimization bailouts.
For more info see: https://angular.io/guide/build#configuring-commonjs-dependencies

** Angular Live Development Server is listening on localhost:4200, open your browser on http://localhost:4200/ **

✓ Compiled successfully.

```

localhost:4200/shows

Home Movies Shows awdawd@asd

Here is a random Show:  
Battlestar Galactica (2003)

In a distant part of the universe, a civilization of humans live on planets known as the Twelve Colonies. In the past, the Colonies have been at war with a cybernetic race known as the Cylons. 40 years after the first war the Cylons launch a devastating attack on the Colonies. The only military ship that survived

Network

Name	Url	Method	Status	Type	Initiator	Size	T.	Waterfall
module-federation...	http://localhost:4200/assets/module-fe...	GET	200	fetch	main.ts:3	402 B	3..	
remoteEntry.mjs	http://localhost:4202/remoteEntry.mjs	GET	200	fetch	mockServiceWor...	251 kB	3..	
common.js	http://localhost:4202/common.js	GET	200	fetch	mockServiceWor...	7.4 kB	2..	
apps_shows_src...	http://localhost:4202/apps_shows_src...	GET	200	fetch	mockServiceWor...	5.3 kB	4..	
random	http://localhost:4200/api/shows/random	GET	200	xhr	random-show.co...	0 B	1..	
KFOICnqEu92Fr...	https://fonts.gstatic.com/s/roboto/v30/...	GET	200	fetch	mockServiceWor...	11.1 kB	4..	
73545-2.jpg	https://artworks.thetvdb.com/banners/...	GET	200	fetch	mockServiceWor...	278 kB	3..	

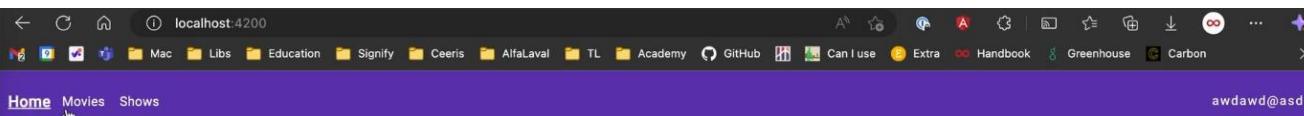
Here is a random Show:

Battlestar Galactica (2003)



Hello there,

Welcome music 🙌



localhost:4200/movies

Home Movies Shows awdawd@asd

Hi, awdawd@asd! Here are some movie recommendations for you

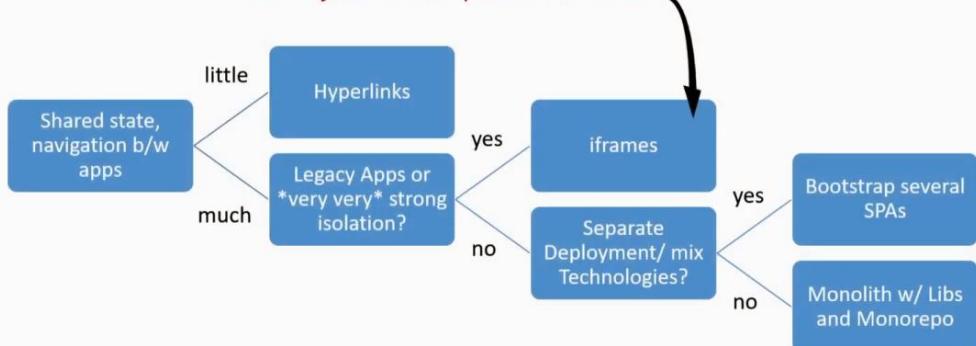
**PULP FICTION**

**THE MATRIX**

[View Details](#) [View Details](#)

## 06 When to use MFEs

*Not a good fit for public web sites*



Enterprise angular microfrontends and monoliths with angular steyer pdf



Federation. The next sections discuss how to do the same with libraries of a monorepo.

## The Shared Lib

Before we delve into the solution, let's have a look at the auth-lib. It contains an AuthService that logs-in the user and remembers them using the property \_userName:

```
1  @Injectable({
2    providedIn: 'root'
3  })
4  export class AuthService {
5
6    // tslint:disable-next-line: variable-name
7    private _userName: string = null;
8
9    public get userName(): string {
10      return this._userName;
11    }
12
13  constructor() { }
14
15  login(userName: string, password: string): void {
16    // Authentication for honest users
17    // (c) Manfred Steyer
18    this._userName = userName;
19  }
20
```



After starting the applications, log-in in the shell and make it to load mfe1. If you see the logged-in user name in mfe1, you have the proof that auth-lib is only loaded once and shared across the applications.

## Isolating Micro Frontends

One important goal of a Micro Frontend architecture is to isolate Micro Frontends from each other. Only if they don't depend on each other, they can be evolved by autarkic teams. For this, Nx provides linting rules. Once in place, they give us errors when we directly reference code belonging to another Micro Frontend and hence another business domain.

In the following example, the shell tries to access a library belonging to mfe1:

```
ts home.component.ts 2, U X
apps > shell > src > app > home > ts home.component.ts > ...
1  // apps/mfe1/src/app/home/home.component.ts
2
3  import { Component, OnInit } from '@angular/core';
4  import { AuthService } from '@demo/auth-lib';
5  import { mfe1DomainLogic } from '@demo/mfe1/domain-logic';
6
7  (alias) function mfe1DomainLogic(): string
8  import mfe1DomainLogic
9
10 'mfe1DomainLogic' is declared but its value is never read. ts(6133)
11
12 A project tagged with "scope:shell" can only depend on libs tagged
13 with "scope:shell", "scope:shared" eslint(@nrwl/nx/enforce-module-
14 boundaries)
```

**“Don’t do it if you don’t have to”**

**“Don’t do it if you can’t  
reap the benefits”**

**07**

**Things to  
look out for**

# The devil is in the details

- **Individual MFE app initialisation logic**
    - Solution: "MODULE\_INITIALIZER"
  - **Serving and fetching of assets**
    - Solution: Provide APP\_URL to each MFE
  - **Environment-specific configuration at runtime**
    - Solution: Fetch env.json for each MFE
  - **Global styles and providers**
    - Solution: Do them all in root MFE
  - **Deployment synchronisation**
    - Solution: Nx affected
  - **Framework Pick n Mix**
    - Solution: Don't do it if you don't have to (you lose some of the benefits)

The screenshot shows a Microsoft Visual Studio Code (VS Code) interface. The left sidebar displays a file tree for a project named 'INFINUM-TAL...'. The 'app.routes.ts' file is open in the main editor area. The code defines routes for 'music' and the root path, utilizing Angular's remote loading feature. The terminal at the bottom shows the command-line output of the build process, listing numerous files created or updated during the build, such as 'index.html', 'bootstrap.ts', and various component and module files.

```
apps > phlex > src > app > app.routes.ts [o] appRoutes > l loadChildren
You, 17 seconds ago | 1 author (You)
1 import { Route } from '@angular/router';
2 import { loadRemoteModule } from '@nrwl/angular/mf';
3
4 export const appRoutes: Route[] = [
5   {
6     path: 'music',
7     loadChildren: () =>
8       loadRemoteModule('music', './Module').then((m) => m.RemoteEntryModule),
9   },
10   {
11     path: '',
12     loadComponent: () => import('./components/welcome/welcome.component'),
13   },
14   {
15     path: '**',
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL ... zsh + ×

```
CREATE apps/music-e2e/.eslintrc.json
UPDATE apps/phlex/src/assets/module-federation.manifest.json
UPDATE apps/phlex/src/remotes.d.ts
UPDATE apps/phlex/src/app/app.routes.ts
CREATE apps/music/src/app/remote-entry/entry.component.ts
CREATE apps/music/src/app/remote-entry/entry.module.ts
CREATE apps/music/src/app/remote-entry/entry.routes.ts
CREATE apps/music/src/app/remote-entry/nx-welcome.component.ts
CREATE apps/music/module-federation.config.js
CREATE apps/music/webpack.config.js
CREATE apps/music/webpack.prod.config.js
CREATE apps/music/src/bootstrap.ts
```

The screenshot shows the VS Code interface with the following details:

- EXPLORER:** Shows the project structure:
  - apps
  - .angular
  - .vscode
  - movies
  - music
  - music-e2e
  - phlex
  - src
    - app
      - components
        - app.component.html
        - app.component.scss
        - app.component.spec.ts
        - app.component.ts
- EDITOR:** The file `app.routes.ts` is open in the editor. The code defines a route configuration for the `app` module:

```
9 | },
10| {
11|   path: '',
12|   LoadComponent: () => import('./components/welcome/welcome.component'),
13| },
14| {
15|   path: 'shows',
16|   loadChildren: () =>
17|     loadRemoteModule('shows', './Routes').then((m) => m.remoteRoutes),
18| },
19| {
20|   path: 'movies',
21|   loadChildren: () =>
22|     loadRemoteModule('movies', './Routes').then((m) => m.remoteRoutes),
23| },
```
- PANELS:** The bottom panel shows tabs for PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL, and other developer tools.

This is a regular app route being defined

The screenshot shows the VS Code interface with the following details:

- EXPLORER:** Shows the project structure:
  - .angular
  - .vscode
  - apps
    - movies
    - music
    - music-e2e
  - phlex
    - src
      - app
        - components
  - assets
- EDITOR:** The file `app.routes.ts` is open in the editor. The code defines routes for the 'phlex' application's 'app' module. It includes a route for 'shows' that loads a remote module, and routes for 'movies' and 'movies' that also load remote modules.

```
app.routes.ts M X
apps > phlex > src > app > app.routes.ts > [appRoutes] > [loadChildren]
9 | },
10 | {
11 |   path: '',
12 |   loadComponent: () => import('../components/welcome/welcome.component'),
13 | },
14 | {
15 |   path: 'shows',
16 |   loadChildren: () =>
17 |     LoadRemoteModule('shows', './Routes').then((m) => m.remoteRoutes),
18 | },
19 | {
20 |   path: 'movies',
21 |   loadChildren: () =>
22 |     LoadRemoteModule('movies', './Routes').then((m) => m.remoteRoutes),
23 | },
```

This is lazy loading of the MFE being defined

## **The devil is in the details**

- **Individual MFE app initialisation logic**
    - Solution: "MODULE\_INITIALIZER"
  - **Serving and fetching of assets**
    - Solution: Provide APP\_URL to each MFE
  - **Environment-specific configuration at runtime**
    - Solution: Fetch env.json for each MFE
  - **Global styles and providers**
    - Solution: Do them all in root MFE
  - **Deployment synchronisation**
    - Solution: Nx affected
  - **Framework Pick n Mix**
    - Solution: Don't do it if you don't have to (you lose some of the benefits)

## The devil is in the details

- **Dependency updates & management**
  - Solution: Do it regularly, on a schedule
- **Inter-team dependencies**
  - Solution: Plan & communicate
- **Branching process**
  - Solution: Less branches / Trunk-based development / Good tagging
- **Making people stick to coding standards**
  - Solution: Enforce as much as possible with tooling
- **Apps that stop being maintained**
  - Solution: Fork and do classic stand-alone non-MFE SPA build
- **Noise in the monorepo**
  - Solution: Proper CODEOWNERS setup & clear definition of responsibilities



## 08 Alternate approaches

### Alternate approaches

- **Custom Elements (a.k.a. Web Components)**
  - <https://web.dev/custom-elements-v1/>

```
<head>
  <script src="https://components.mycompany.com/my-widget.js">
</head>
<body>
  <my-widget></my-widget>
</body>
```
- **Server-side includes**
  - [https://en.wikipedia.org/wiki/Server\\_Side\\_Includes](https://en.wikipedia.org/wiki/Server_Side_Includes)

```
<!--#include virtual="menu.cgi" -->
<!--#include file="footer.html" -->
```
- **Edge-side includes**
  - [https://en.wikipedia.org/wiki/Edge\\_Side\\_Includes](https://en.wikipedia.org/wiki/Edge_Side_Includes)

```
<esi:include
  src="http://example.com/1.html"
  alt="http://bak.example.com/2.html"
  onerror="continue"
/>
```

## Resources

- <https://micro-frontends.org>
- <https://www.youtube.com/watch?v=tsIZjUAtF1U>
- <https://www.angulararchitects.io/en/book>
- <https://webpack.js.org/concepts/module-federation>
- <https://nx.dev/more-concepts/micro-frontend-architecture>
- <https://nx.dev/recipes/module-federation/dynamic-module-federation-with-angular>
- <https://auth0.com/blog/micro-frontends-with-angular-module-federation-and-auth0>
- <https://nx.dev/more-concepts/library-types>
- <https://nx.dev/concepts/mental-model>
- <https://nx.dev/concepts/integrated-vs-package-based>

