



ANGULAR
ARCHITECTS
INSIDE KNOWLEDGE

Performance Tuning

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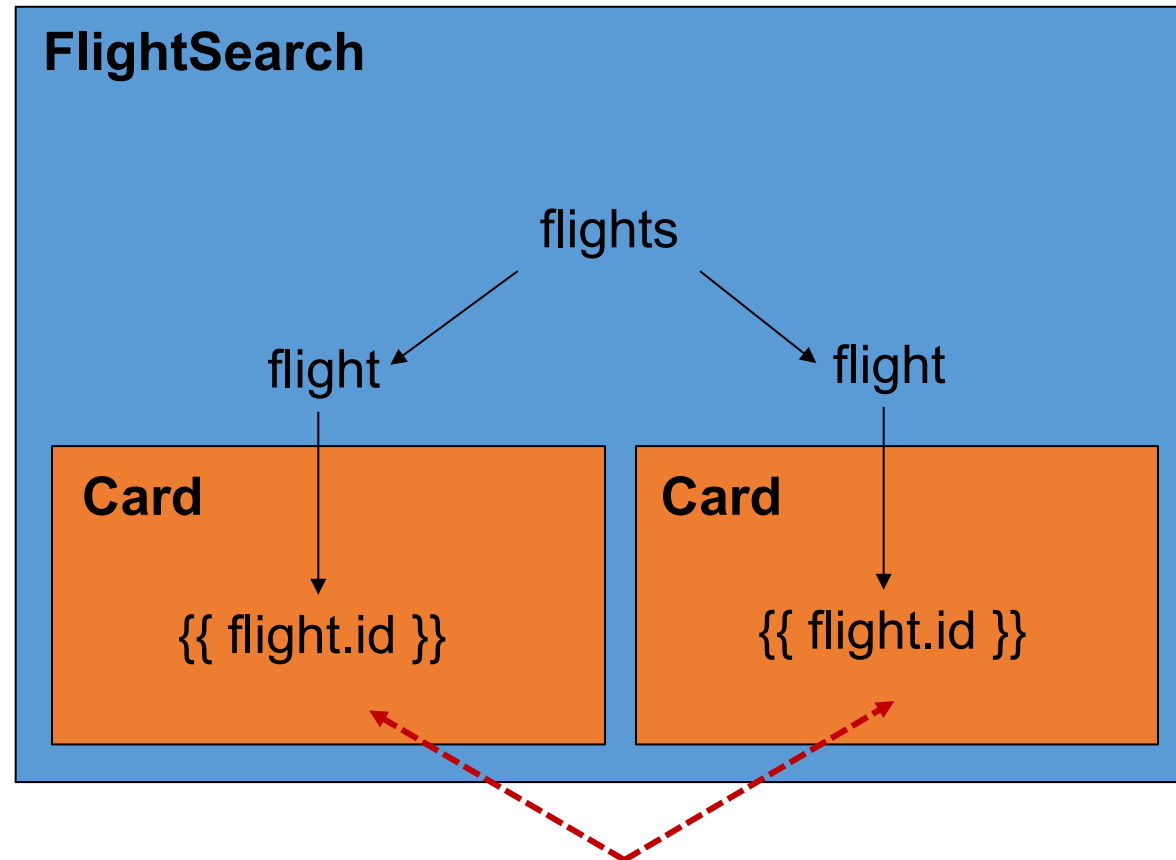


Performance-Tuning with OnPush

DEMO



OnPush



Angular just checks when “notified”

"Notify" about change?

- Change bound data (@Input)
 - OnPush: Angular just compares the object reference!
 - e. g. `oldFlight === newFlight`
- Raise event within the component
- Notify a bound observable
 - `{{ flights$ | async }}`
- Trigger it manually
 - Don't do this at home ;-)
 - At least: Try to avoid this



Activate OnPush

```
@Component({  
  [...]  
  changeDetection: ChangeDetectionStrategy.OnPush  
})  
export class FlightCard {  
  [...]  
  @Input() flight;  
}
```



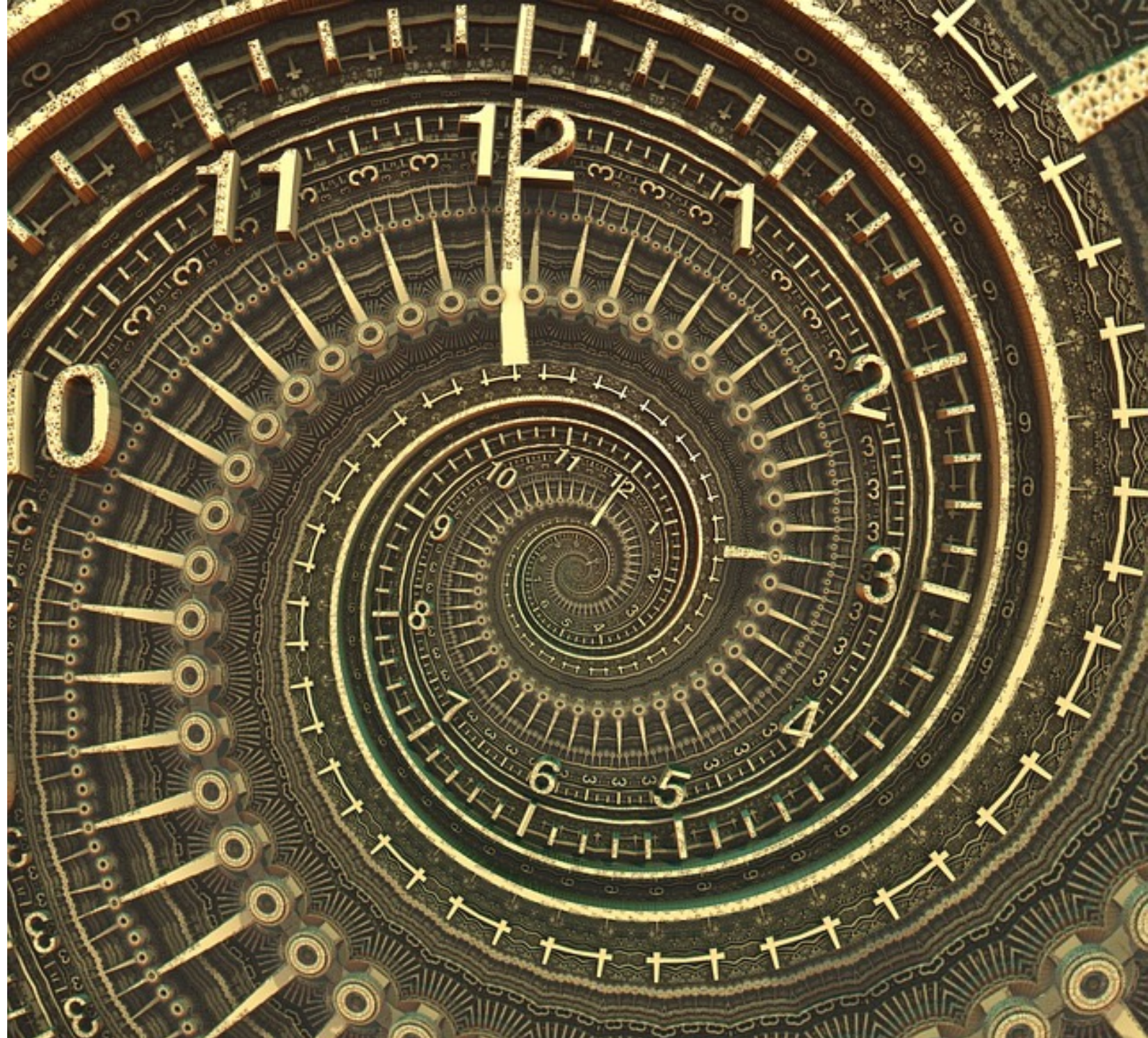
DEMO



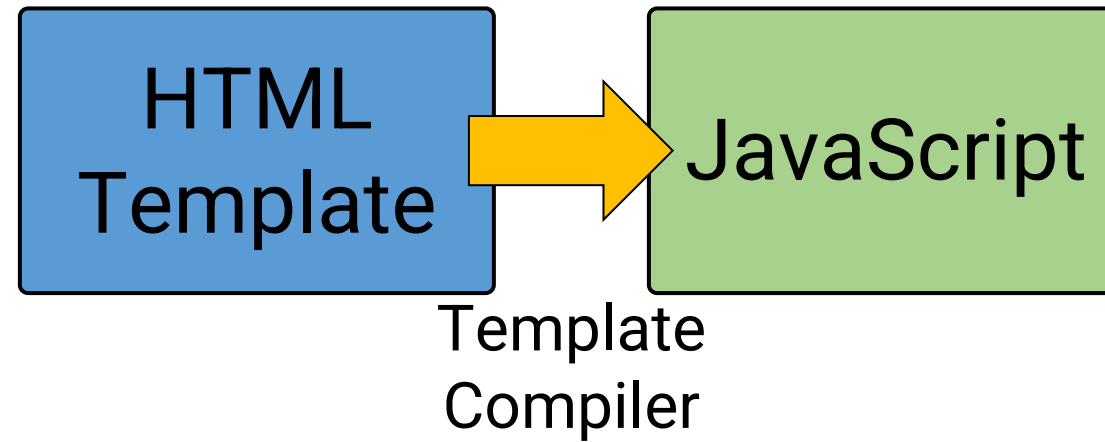
LAB



Ahead of Time (AOT) Compilation



Angular Compiler



Approaches

- JIT: Just in Time, at runtime
- AOT: Ahead of Time, during build



Advantages of AOT

- Better Startup-Performance
- Smaller Bundles: You don't need to include the compiler!
- Tools can easier analyse the code
 - Remove unneeded parts of frameworks
 - Tree Shaking

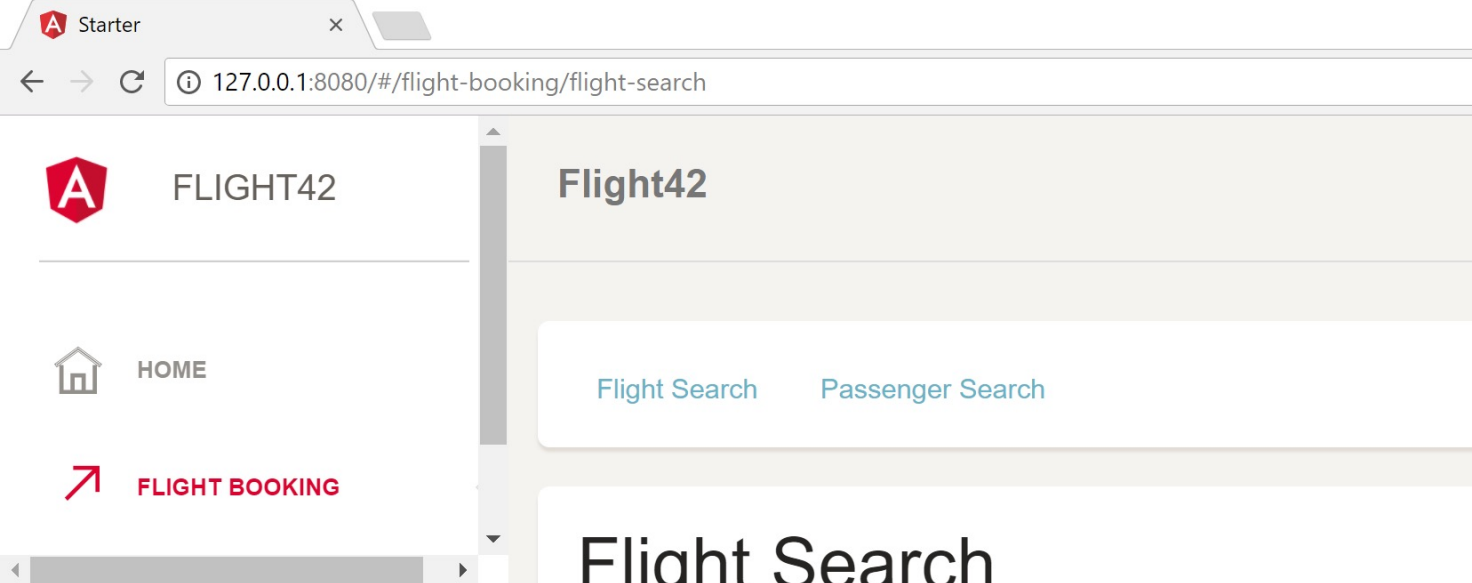
Angular CLI

- `ng build --prod`
- `@ngtools/webpack` with `AngularCompilerPlugin`
- Can be used without CLI too

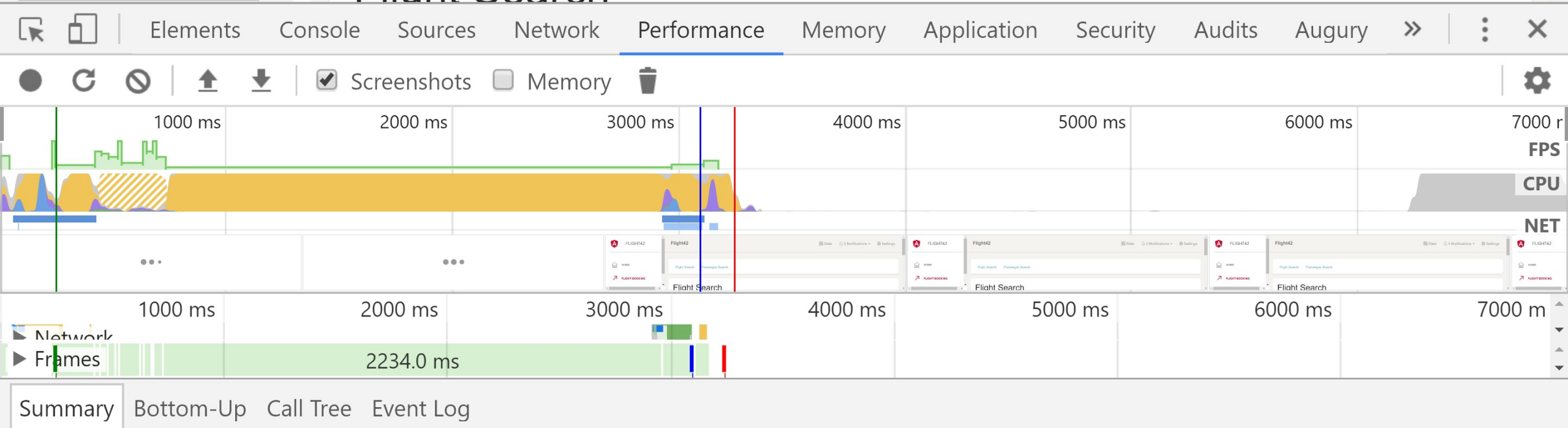


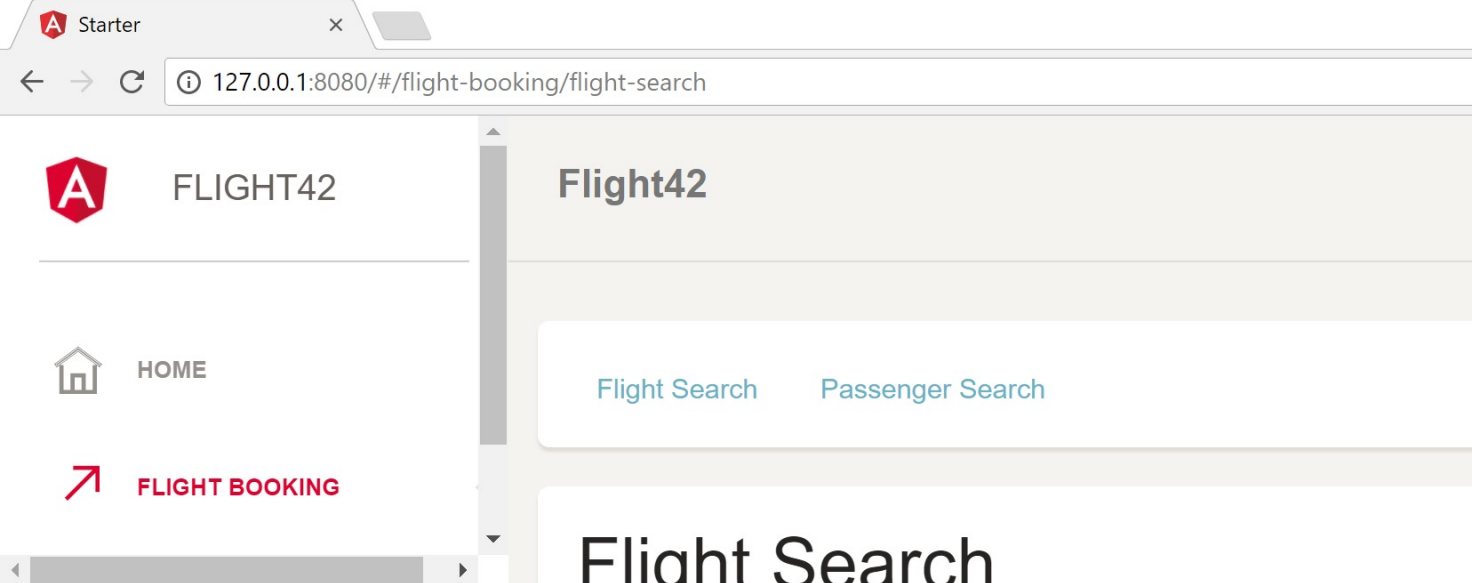
DEMO



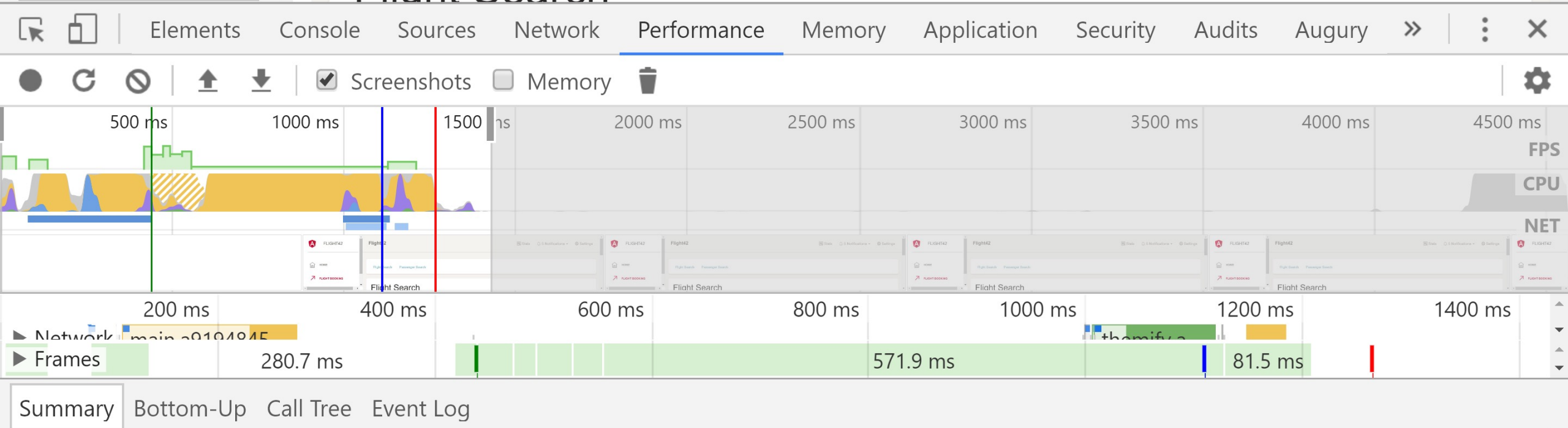


**Production Mode without AOT
(no lazy loading)**





**Production Mode with AOT
(no lazy loading)**



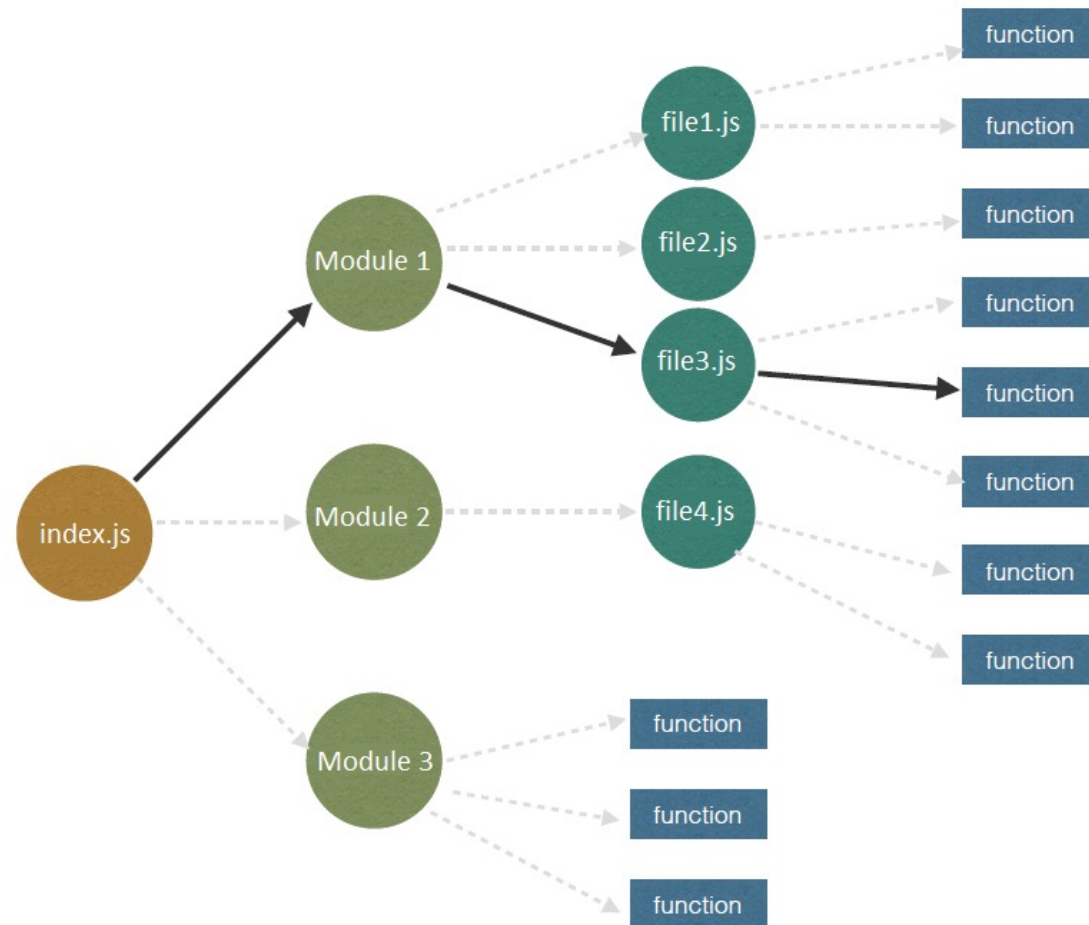
Ivy makes AOT the default 😊

- Ivy also does a lot of under the hood optimization
- No breaking changes, nothing to do from our side 😊
- Angular ViewEngine itself was not tree-shakable
- Angular Ivy is tree-shakable 😊
- Default since NG 10, for libs default since NG 12



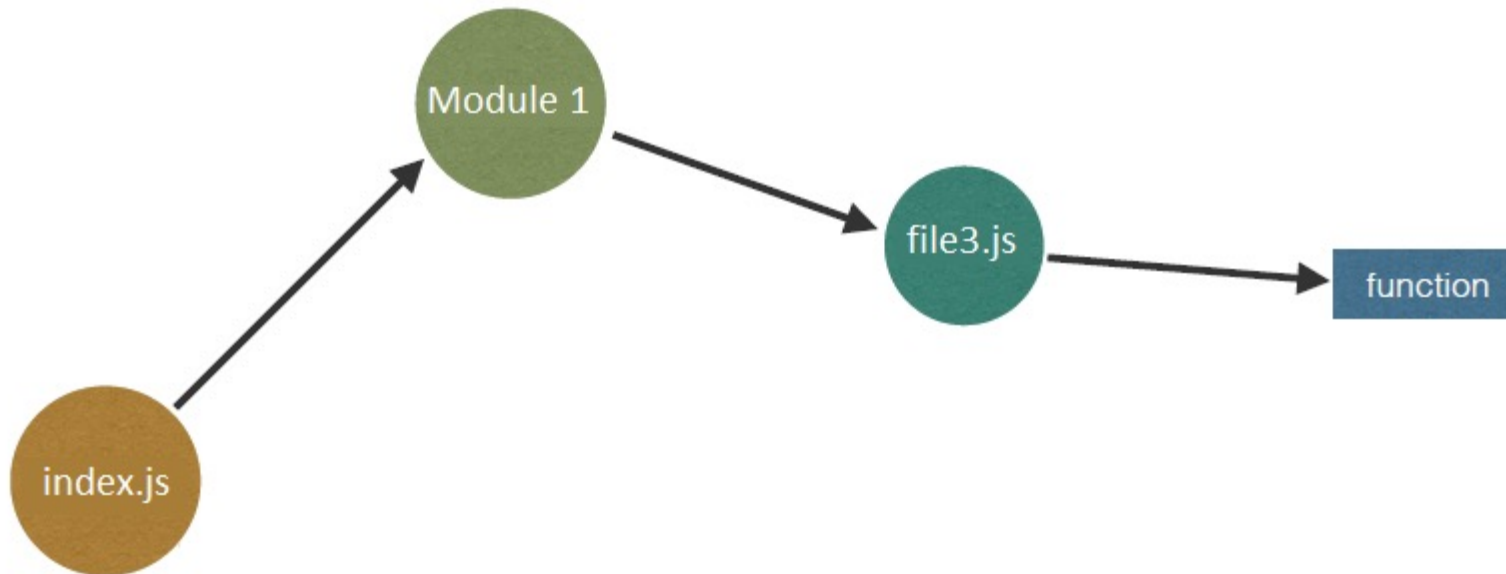
Tree Shaking

Before Tree Shaking



Tree Shaking

After Tree Shaking



Webpack Bundle Analyzer

Bundles without AOT and Tree Shaking

vendor.978ac3ef762178ef4aa8.bundle.js

node_modules

JIT Compiler

@angular

platform-browser-dynamic

esm5

platform-browser-dynamic.js
+ 1 modules

core

esm5

core.js

router

esm5

router.js +
23 modules

common

esm5

common.js

http.js

forms

esm5

forms.js +
2 modules

platform-browser

esm5

platform-browser.js

http

esm5

http.js

rxjs

_esm5

add

delay.js + 2

modules

switchMap.js

+ 2 modules

fromEvent.js

+ 2 modules

mergeMap.js

+ 2 modules

share.js

+ 4 modules

merge.js

+ 2 modules

Subscriber.js

+ 1 modules

mergeMap.js

+ 1 modules

AsyncAction.js

+ 1 modules

ReplaySubject.js

+ 3 modules

Subscription.js

+ 1 modules

Subject.js

+ 1 modules

Observable.js

+ 1 modules

src

main.ts
+ 68
modules

polyfills.7c4efb87d4ba5dbbc58c.bundle.js

node_modules

zone.js

dist

zone.js

core-js

modules



FoamTree

DEMO



Conclusion

Lazy Loading

Preloading

OnPush w/
Immutables and
Observables

AOT and Tree
Shaking



For performance deep dive

Watch this (starting at 8:30):

https://drive.google.com/file/d/15fmyedJPYSOlV_0YvFtg26XGS8tZpZ03/view

Repo: <https://github.com/jeffbcross/victor-videos/>