



Angular Performance Tuning

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Turbo Button



Quick Wins

Bundling

Minification

enableProdMode()

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Contents

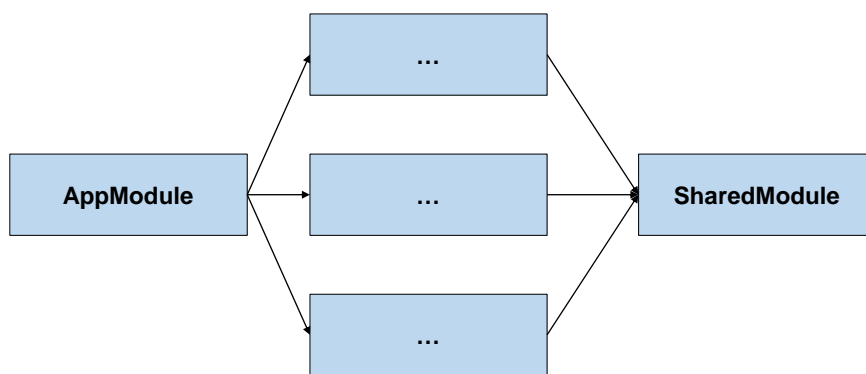
- Lazy Loading and Preloading
- Performance for Data Binding with OnPush
- AOT and Tree Shaking

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Lazy Loading



Module Structure

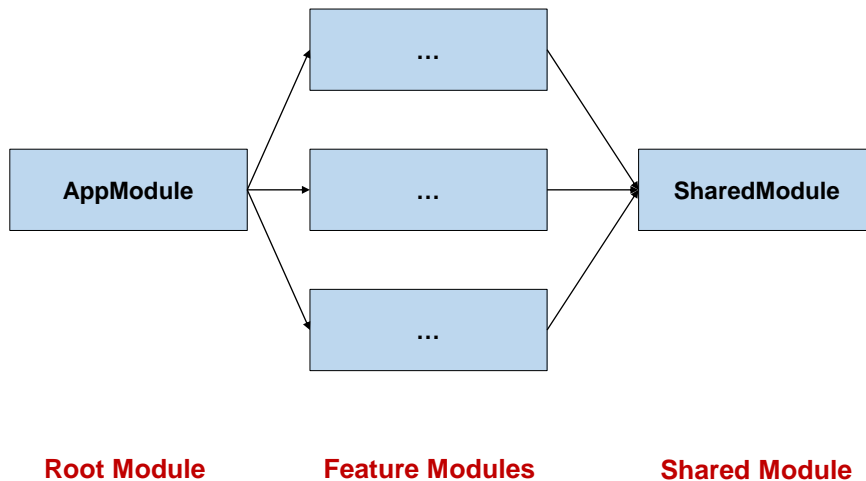


Root Module


Feature Modules

Shared Module

Lazy Loading



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Root Module with Lazy Loading

```

const APP_ROUTE_CONFIG: Routes = [
  {
    path: 'home',
    component: HomeComponent
  },
  {
    path: 'flights',
    loadChildren:
      './[...]flightBooking.module#FlightBookingModule'
  }
];
  
```

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Routes for "lazy" Module

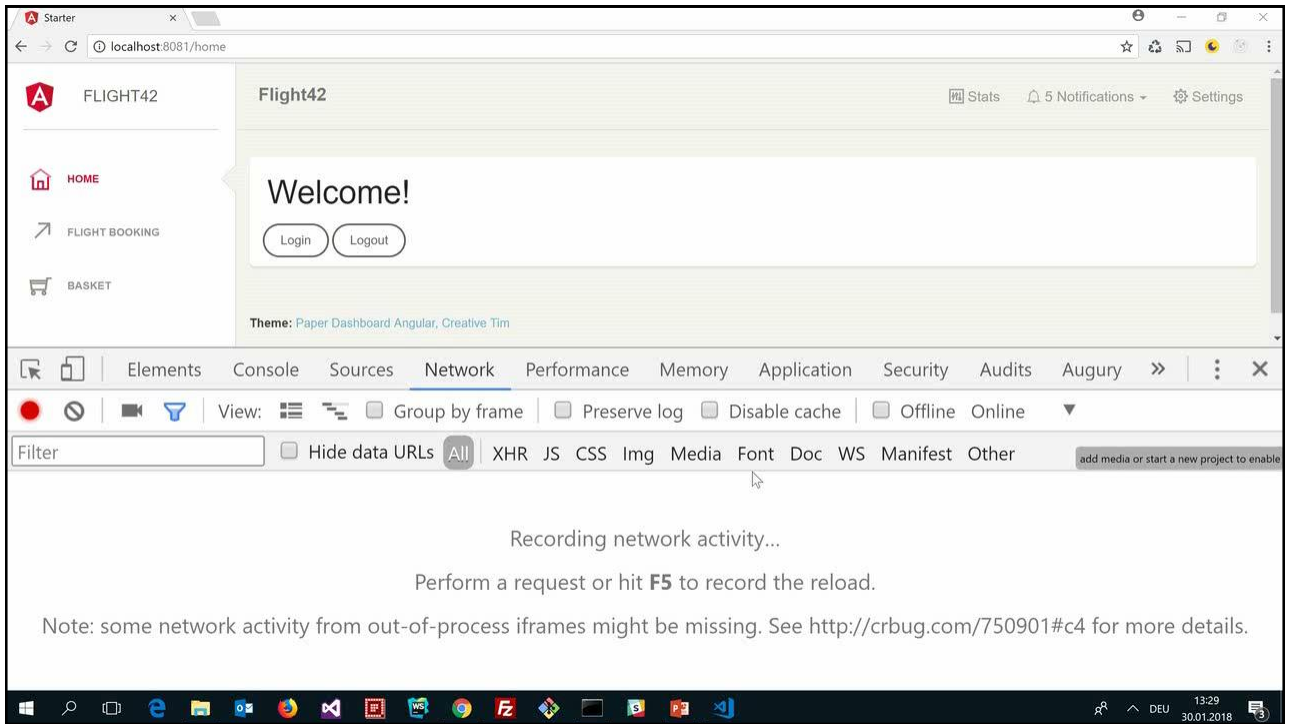
```
const FLIGHT_ROUTES = [
  {
    path: '',
    component: FlightBookingComponent,
    [...]
  },
  [...]
]
```

Routes for "lazy" Module

```
const FLIGHT_ROUTES = [
  {
    path: 'subroute',
    component: FlightBookingComponent,
    [...]
  },
  [...]
]
```

flight-booking/subroute

Triggers Lazy Loading w/ loadChildren



Lazy Loading

- Lazy Loading means: Loading it later
- Better startup performance
- Delay during execution for loading on demand

Preloading



Idea

- Module that might be needed later are loaded after the application started
- When module is needed it is available immediately

Activate Preloading

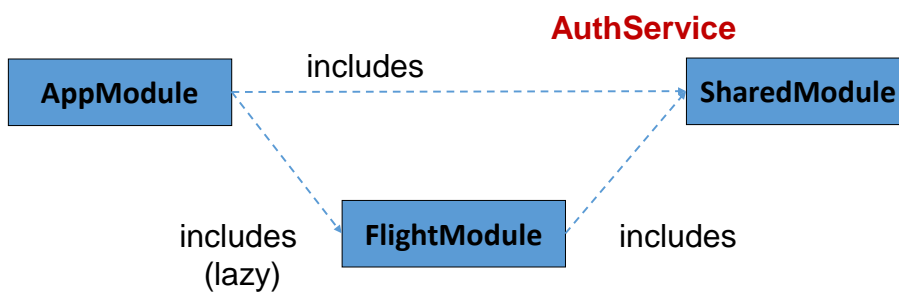
```
...
imports: [
  [...]
  RouterModule.forRoot(
    ROUTE_CONFIG,
    { preloadingStrategy: PreloadAllModules });
]
...
```

Lazy Loading and Shared Modules

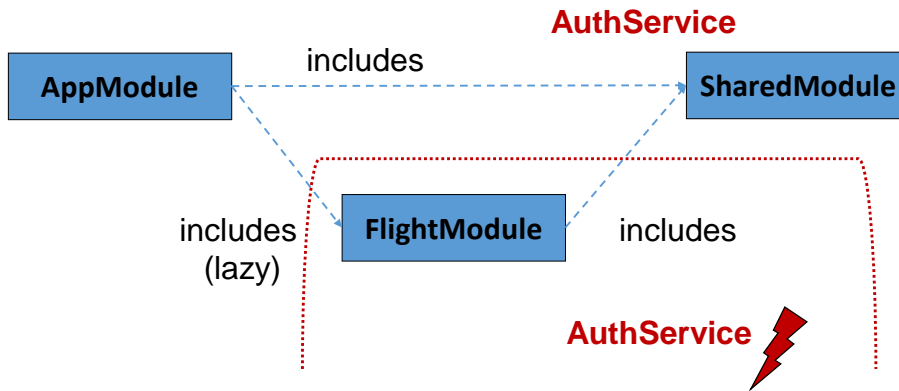


DEMO

Lazy Loading and Shared Modules



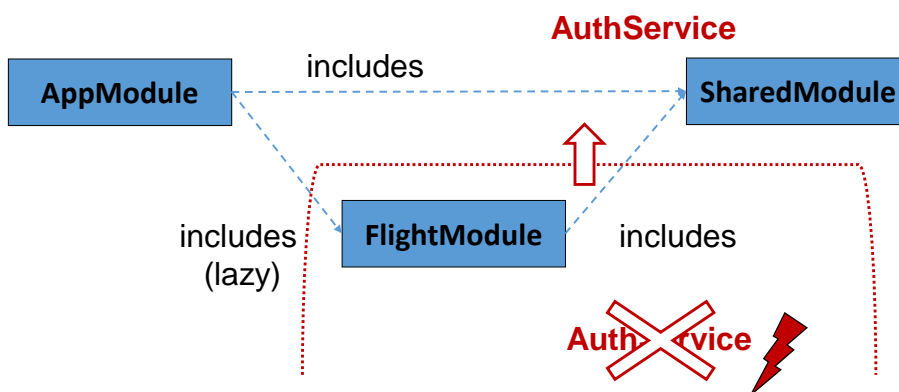
Lazy Loading and Shared Modules



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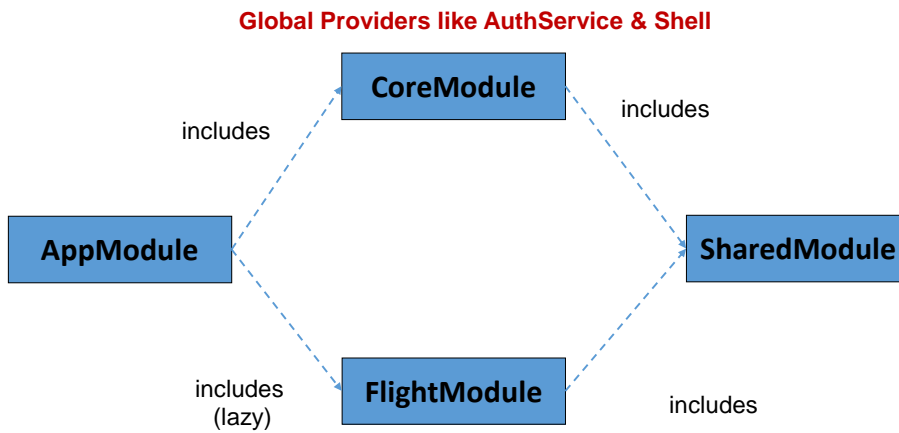
Lazy Loading and Shared Modules



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Solution



Only import CoreModule into AppModule!

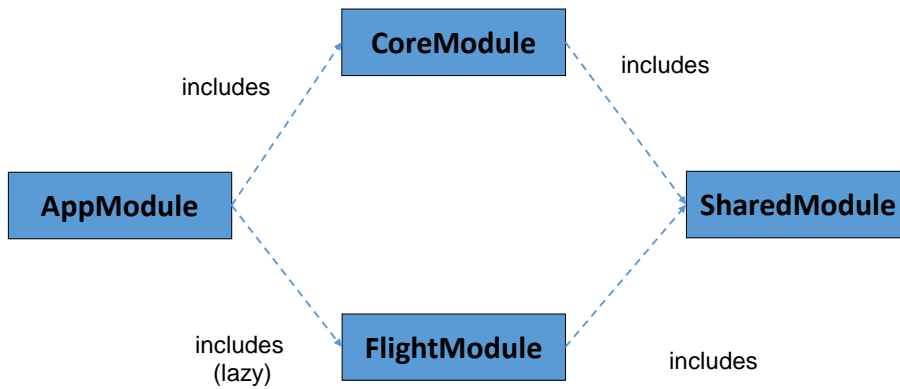
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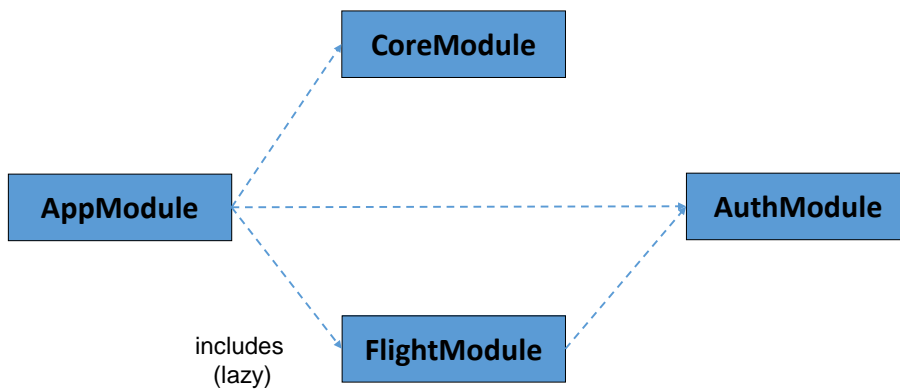
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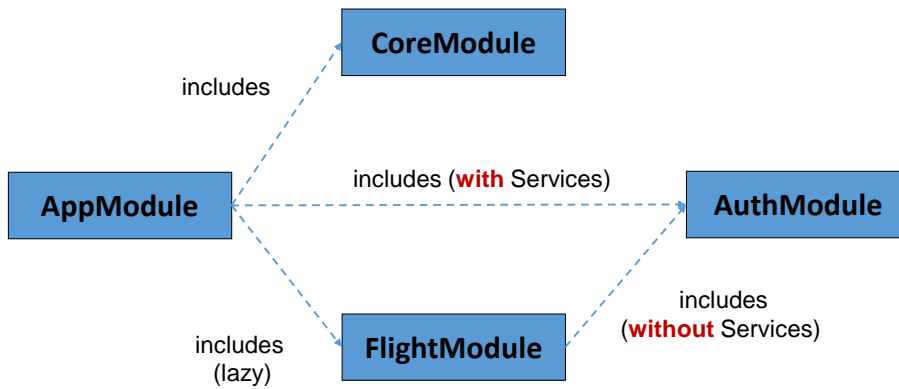
Huge CoreModule?



Solution (for Libraries)



Solution (for Libraries)



Auth Module

```

@NgModule({
  [...],
  providers: []
})
export class AuthModule {
}
  
```

Auth Module

```
@NgModule({  
  [...],  
  providers: []  
})  
export class AuthModule {  
  static forRoot(): ModuleWithProviders {  
    return {  
      ngModule: AuthModule,  
      providers: [AuthService, [...]]  
    }  
  }  
}
```

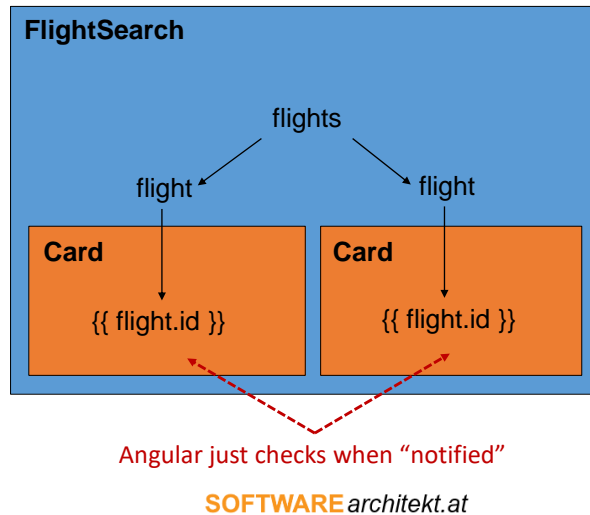
DEMO






Performance-Tuning with OnPush

DEMO

OnPush



"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 
- Trigger it manually
 - Don't do this at home ;-)
 - At least: Try to avoid this 

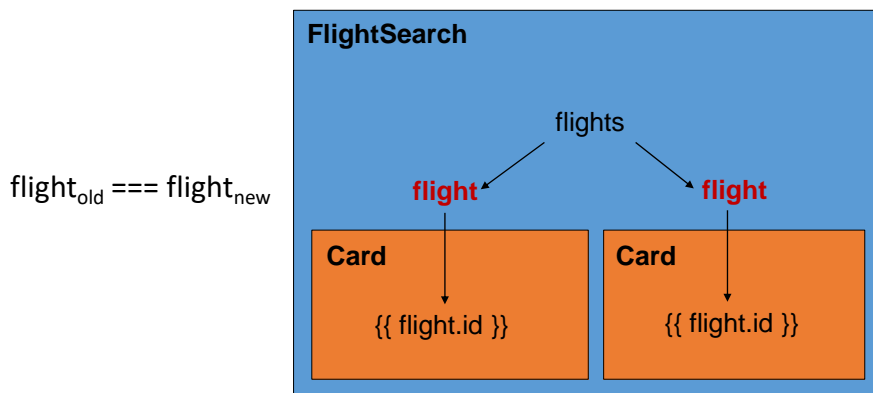
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Activate OnPush

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

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Change Inputs



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Observables and OnPush

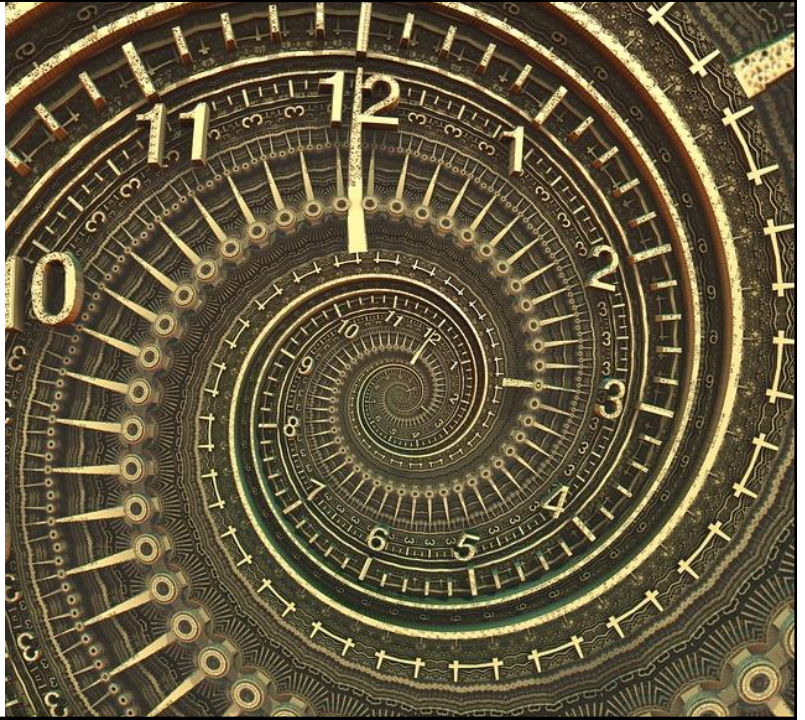
```
<flight-card  
  [item]="flight$ | async" [...]>  
</flight-card>
```

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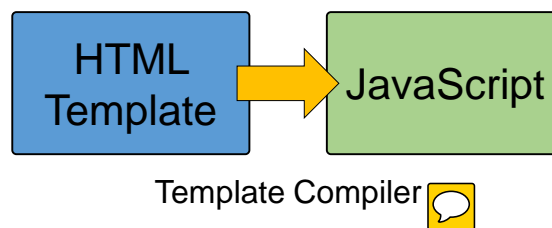
DEMO

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Ahead of
Time (AOT)
Compilation



Angular Compiler





Approaches

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

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Advantages of AOT

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

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Angular CLI

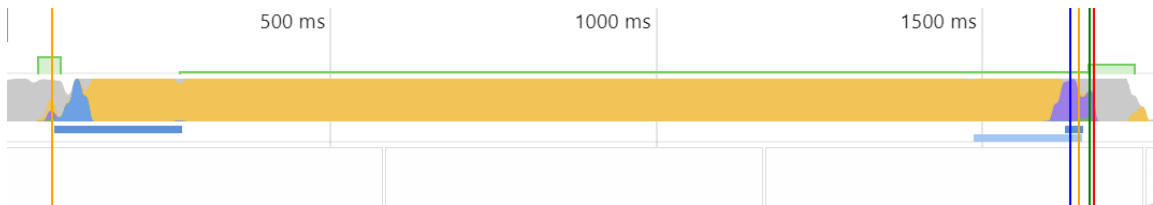
- `ng build --prod`
- `@ngtools/webpack` with `AotPlugin`
- Soon `AngularCompilerPlugin`
- Can be used without CLI too

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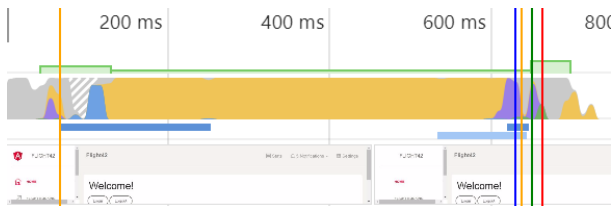
DEMO

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Flight Search (Prod Build w/o AOT)



Flight Search (Prod Build w/ AOT)



Conclusion

Quick Wins



Lazy Loading
and
Preloading



OnPush w/
Immutables and
Observables



AOT and Tree
Shaking

Use the CLI

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