Workshop

Angular Routing

Routing

No Single Page Application without routing

Why routing

- A website consists of multiple pages for displaying various content.
- Angular applications are single-page applications (SPAs), meaning they typically have only one HTML page.
- Routing is the mechanism used to navigate within an Angular app without physically leaving or reloading the page.

Basic routing

Basic Routing

- Based on browser location and history
- Map of url to content
- Special package: @angular/router

Basic Routing

- Define routes per feature
- An extra file for route configuration:

feature-name.routes.ts

Basic Routing

Define routes

```
// app.routes.ts
import { Routes }  from '@angular/router'

export const routes: Routes = [{ /** **/ }];
```

Basic Routing

Register routes

```
// app.config.ts
import { provideRouter } from '@angular/router';
import { routes } from './app.routes';

export const appConfig: ApplicationConfig = {
  providers: [provideHttpClient(), provideRouter(routes)]
};
```

Basic Routing

<code>

Defining a route - without leading ‘/’!

```
export const appRoutes: Routes = [{
  path: 'books',
  component: BookComponent
}];
```

Default routes

Routing wildcard

Set a wildcard to handle all not defined routes

```
{
  path: '**',
  component: PageNotFoundComponent
}
```

Routing Redirection

Redirect to default router

```
export const appRoutes: Routes = [{
  path: '',
  redirectTo: '/books',
  pathMatch: 'full' // checks if full url matches path!
}, {
  ...
}];
```

Displaying routes

Basic Routing

- No connection between DOM and route, yet
- Router needs to know where he should append the component
- Special component: **RouterOutlet**

Basic Routing

Routing components are available through the routing import

```
// app.component.ts
@Component({
  //...
  imports: [RouterOutlet],
  //...
})
export class AppComponent {}

// app.component.html
<router-outlet></router-outlet>
```

Basic Routing

1. Url in browser matches against route path
2. Information of connected route are evaluated
3. Information are used to show correct component in routerOutlet

Basic Routing


```
Routes = [{ path: 'books', component: BookComponent }, ...];
```

```
<router-outlet></router-outlet>
<app-book>...</app-book>
```

routerLink

RouterLink example

```
<a routerLink="/books">
```

+

```
{ path: 'books', component: BookComponent }
```

=

```
<a href="/books">
```

RouterLink import


```
// app.component.ts
@Component({
  //...
  imports: [RouterLink],
  //...
})
export class AppComponent {}
```

Task

Add basic routing

Routing with parameters

Routing with parameters

- You need dynamic routes very often, e.g. Detail Views
- Content of a component is configurable
- You need additional data in your component

Routing with parameters

Add parameter placeholders with a leadling :

```
// app.routes.ts
const routes: Routes = [
  { path: 'books/detail/:isbn', component: BookDetailComponent }
];
```

routerLink with params

RouterLink with params example

```
<a [routerLink]=" ['/books','/detail', 1] ">
```

+

```
{ path: 'books/detail/:isbn', component: BookDetailComponent }
```

=

```
<a href="/books/detail/1">
```

Retrieve route params in a component class

Route params

<code>

Inject `ActivatedRoute` service and subscribe params observable.

```
@Component(...)
export class BookDetailComponent implements OnInit {
  constructor(
    private readonly route: ActivatedRoute
  ) {}

  ngOnInit () {
    this.route
        .params
        .subscribe((params) => ...);
  }
}
```

Why an Observable?

Route params

- Angular has some caching mechanisms
- Current component and components on the same level in the tree are cached for faster navigation
- Components are not instantiated again
- But parameters could have changed, e.g. paging

Simple approach with snapshots

Route params - Snapshots

- Snapshots are images of the current state
- **ActivatedRoute** gives access to the current router state
- Can be used if not future changes expected

Route params - Snapshots

The params of a route are stored in a snapshot object.

```
@Component(...)
export class BookDetailComponent implements OnInit {
  constructor(
    private readonly route: ActivatedRoute
  ) {}


  ngOnInit () {
    const bookIsbn = this.route.snapshot.paramMap.get('isbn');
  }
}
```

Navigate with Router Injectable

Router Service

<code>

Trigger navigation from Component Class

```
@Component({ /* ... */})
class BookComponent {
  constructor(
    private readonly router: Router,
    private readonly bookApi: BookApiService) {}

  goToBookDetails(book: Book) {
    this.router.navigate(['books', 'detail', book.isbn]);
  }
}
```

Task

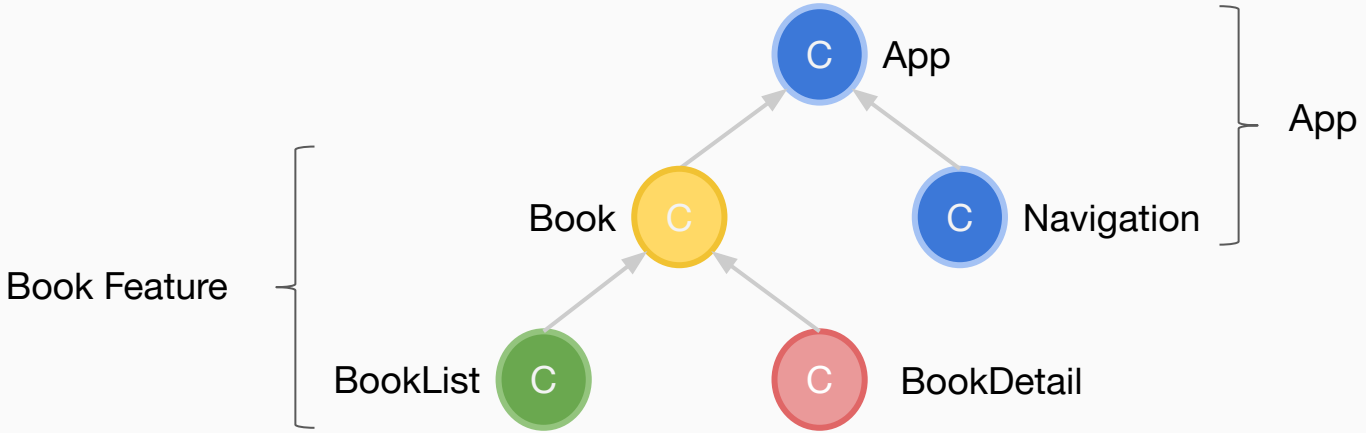
Add BookDetail Route

Nested & child routes

Nested routes

- An app / feature can have sub features with own components
- Each (sub) feature can manage its own routes
- No need to change root routing

Think in Features & Components



Nested routes

Routes of a book feature with a root book component

```
export const bookRoutes: Routes = [
  {
    path: 'books',
    component: BookComponent
  }
];
```

Nested routes

<code>

HTML with nested route - book.component.html has its own routerOutlet

```
<app-root>
  <router-outlet></router-outlet>
  <book>
    <router-outlet></router-outlet>
    ...
  </book>
</app-root>
```

Child routes

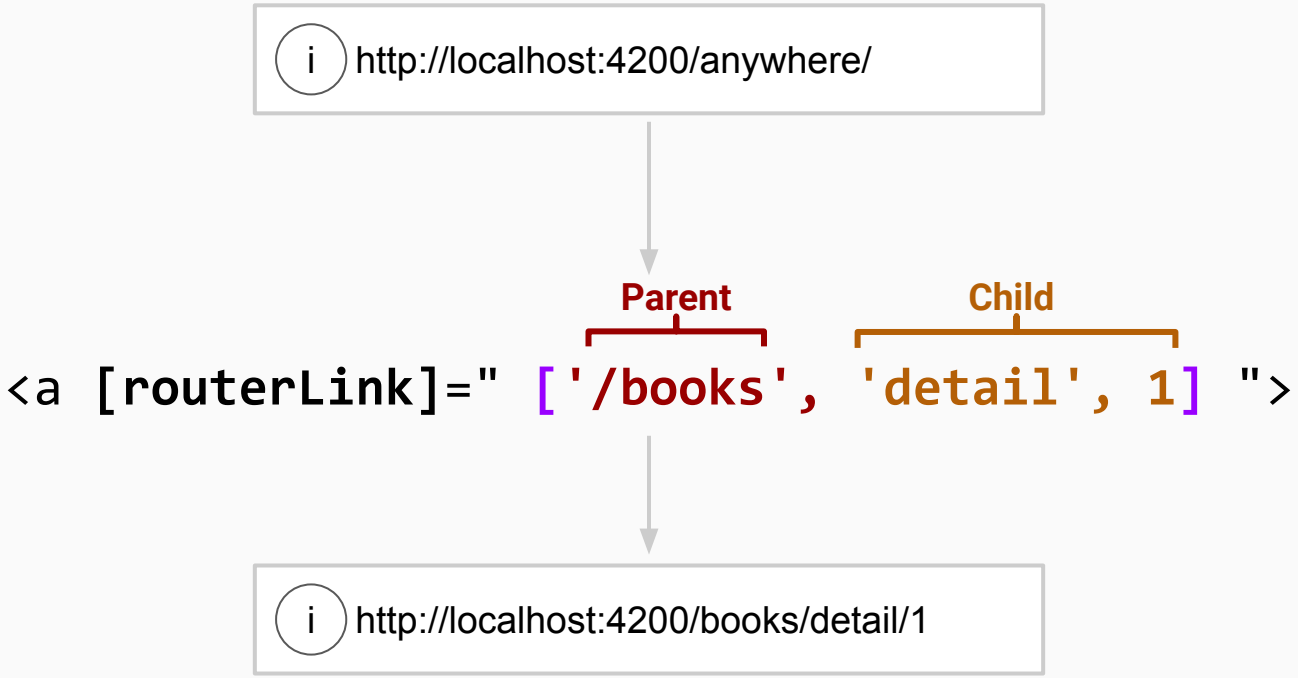
- A route can have children
- Each child gets its parent path as base path
- Child route will be displayed in the RouterOutlet of its parent

Child routes

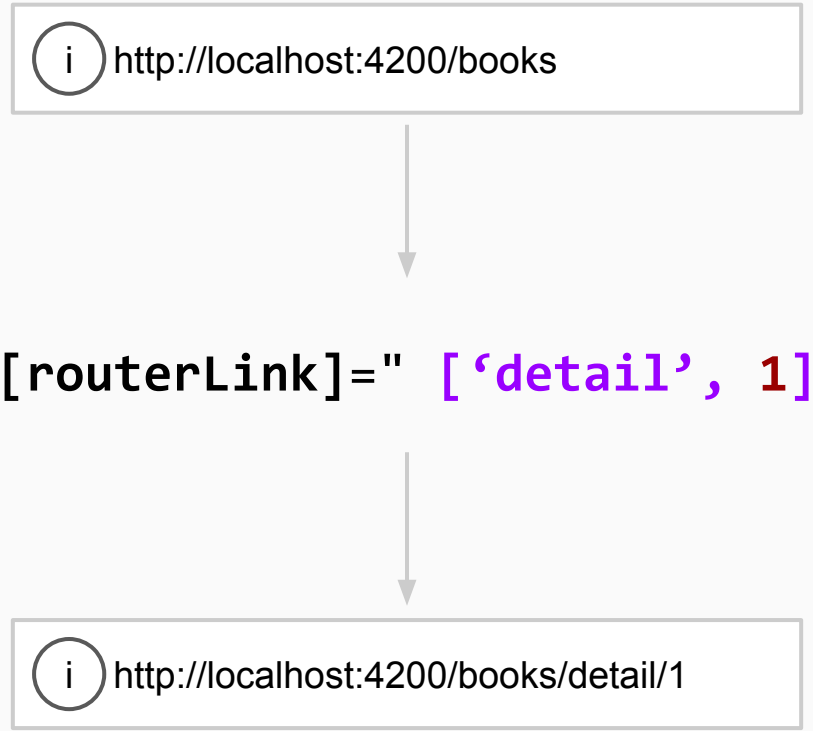
BookList and BookDetail as route children under its parent Book

```
// book.routes.ts
 {
    path: 'books',
    component: BookComponent,
    children: [
      {
        path: '', component: BookListComponent
      },
      {
        path: 'detail/:isbn', component: BookDetailComponent
      }
    ]
```

Child routes - absolute links



Child routes - relative links



Lazy Loading

Load Routes and Features only if they are needed

Lazy Loading

- You do not want to load everything at once
- Split up your app in smaller parts → load them when needed
- Smaller initial bundle size → faster initial loading
- Routes with complex code or many dependencies but mostly not opened → add lazy loading

Lazy Loading

Request Books feature if needed - app.routes.ts

```
export const routes: Routes = [
  // ...
  {
    path: 'books',
    loadChildren: () => import('./book/book.routes')
                          .then(mod => mod.bookRoutes)
  }
];
```

Book components imports in other app.*.ts are NOT needed anymore!

Lazy Loading Compiler

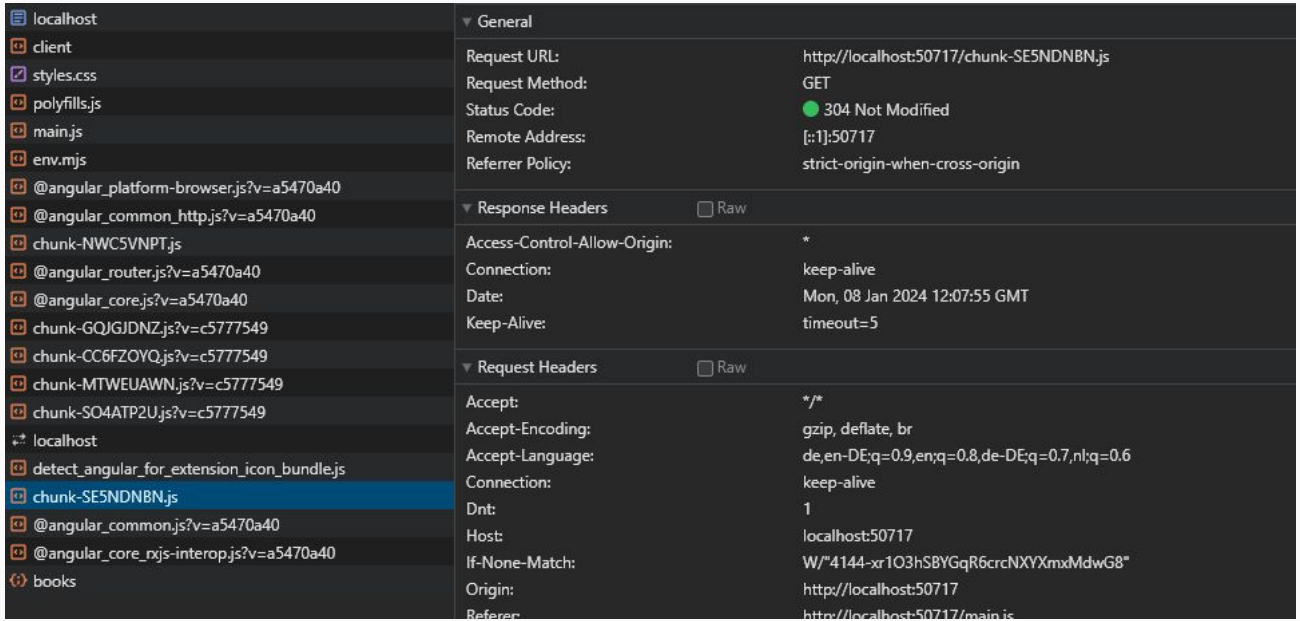
```
Initial Chunk Files | Names         | Raw Size
polyfills.js        | polyfills     | 82.71 kB |
chunk-CGMYEB6A.js   | -             |  9.91 kB |
main.js             | main          |  6.90 kB |
styles.css          | styles        | 96 bytes |

                    | Initial Total | 99.62 kB

Lazy Chunk Files    | Names         | Raw Size
chunk-355RHTXU.js   | book-routes   |  4.98 kB |

Application bundle generation complete. [3.434 seconds]
Watch mode enabled. Watching for file changes...
  ➜  Local:   http://localhost:50717/
```

Lazy Loading Browser



http://localhost:4200/books → `chunk-*.js` is loaded

Task

Use Lazy Loading for Book feature

Route Guards

Why guards?

Why guards?

- You want to protect your routes against unwanted access
- Sometimes you may have restricted permissions
  - User have to be signed in to see the content
- Protect the user
  - Notify him about unsaved changes, before leaving the route

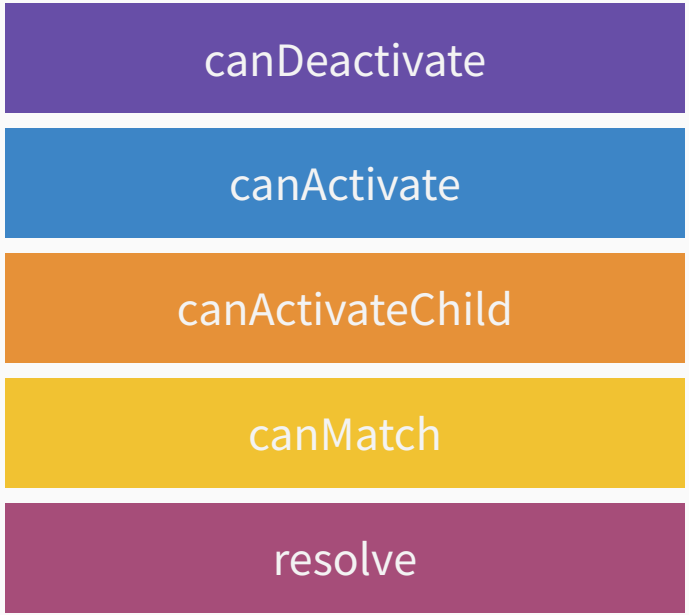
Route Guards

- Angular defines Function Types
- Guard functions have to return a boolean, a boolean promise or a boolean observable → something to evaluate to true or false at the end
- Possibility to have asynchronous guard functions, e.g. authorization check with an API

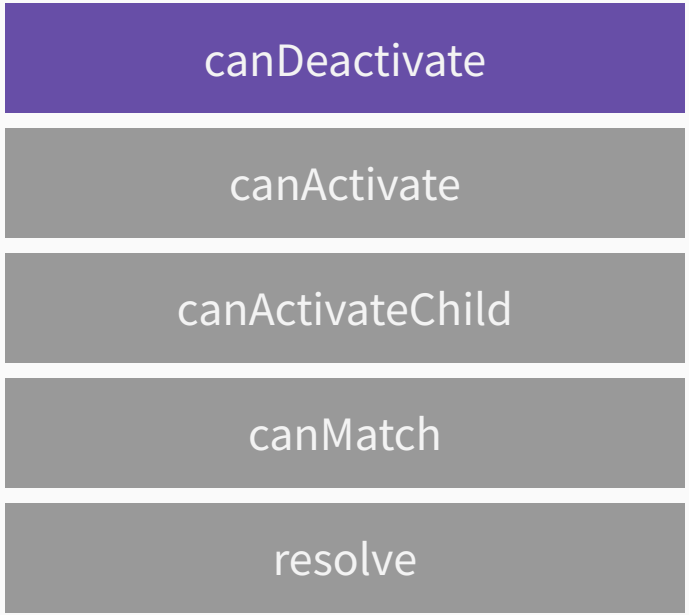
Route Guards

- 5 kinds of route guards
- Implement multiple guards in one service
- Guards are route based and not component based

Route Guards

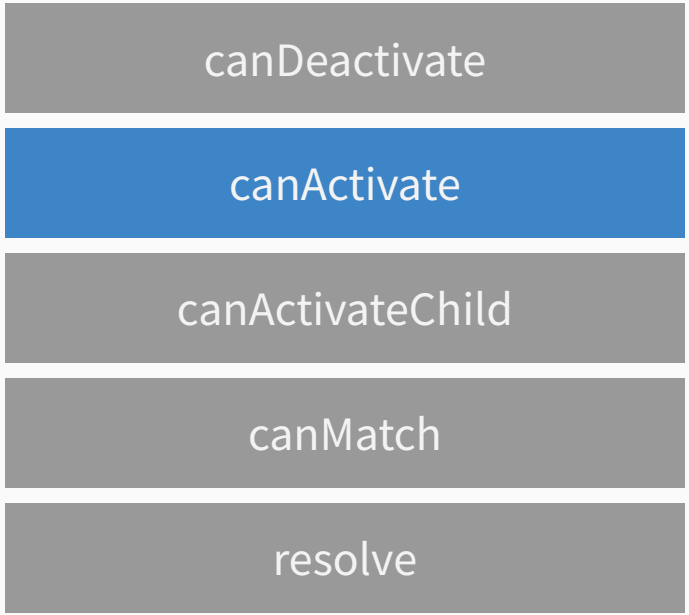


Route Guards



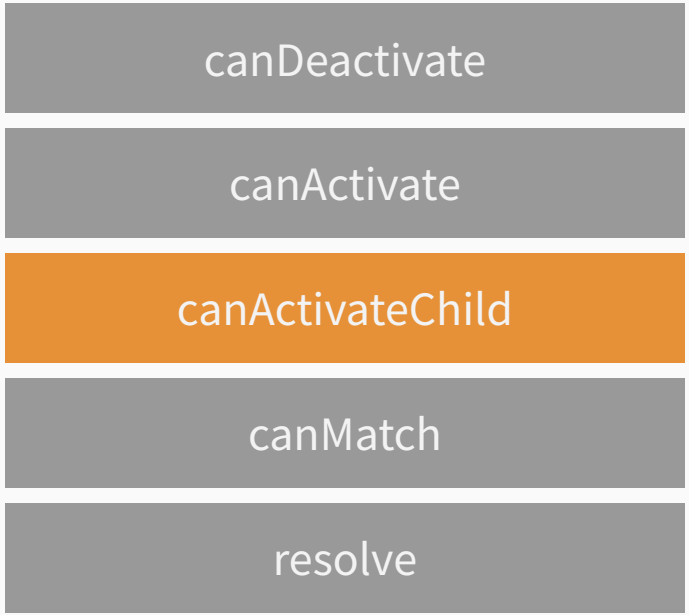
- Is it permissible for users to exit a route?
- Verify if the data has been successfully saved.
- Receive notifications when leaving the route.

Route Guards



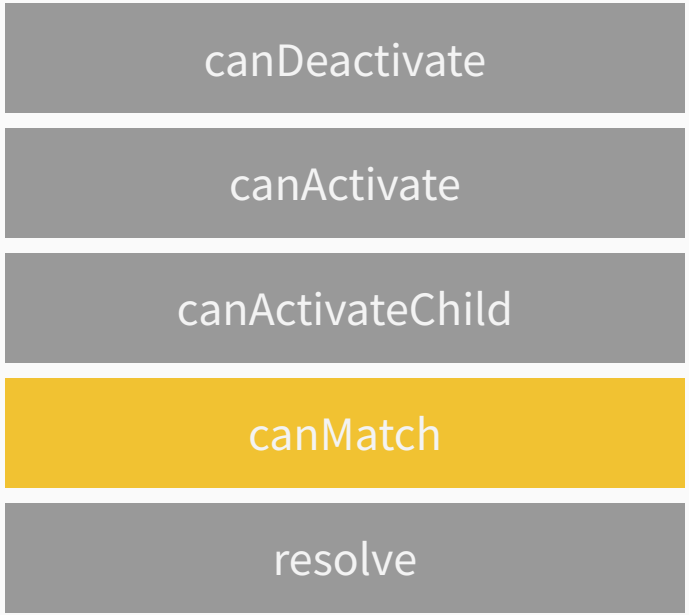
- Verify whether the route can be activated.
- Confirm the user's authentication status.
- Validate the user's access rights.

Route Guards



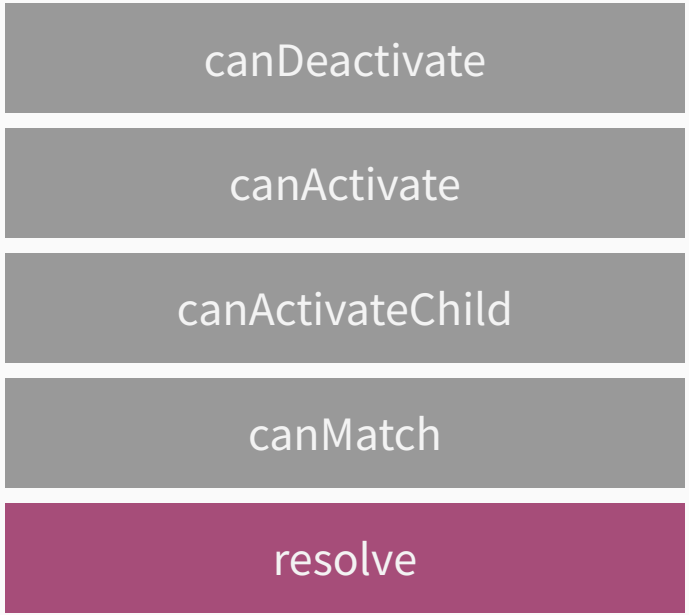
- A route may have subordinate routes.
- Verify whether subordinate routes can be activated.
- If all child routes share the same "canActivate" function, you can implement a single check for all of them.

Route Guards



- Is it permitted to exit a route?
- Verify if the data has been persisted correctly.
- Notifications regarding leaving the route.

Route Guards



- Fetch data prior to component loading.
- Able to handle any return value, such as Observables.

Guards as functions

Guards as functions

- Return types are exported by @angular/router
- Type names:
  - canActivate guard → CanActivateFn type
  - canDeactivate guard → CanDeactivateFn type
  - …

Guards as functions

- Some types have a generic option
  - You might want access to the component, their information and current state
  - `function confirmLeaveGuard:CanDeactivateFn<BookDetailComponent>`

- Others not:
  - `function hasAccessGuard: CanActivateFn`

Guards as functions

Simple guard function

```
import { CanActivateFn } from '@angular/router';

export const hasAccessGuard: CanActivateFn =
  (route: ActivatedRouteSnapshot, state: RouterStateSnapshot) => {
    return true;
  };
```

Guards as functions

Connect a guard with a route

```
{
  path: 'books',
  component: BookComponent,
  canActivate: [hasAccessGuard]
}
```

Guards as classes (deprecated)

- An Angular Service
- A class that implements the guard interfaces

Guards as classes (deprecated)

Simple guard service

```
@Injectable({
  providedIn: 'root'
})
export class CanActivateViaServiceGuard implements CanActivate {
  canActivate(route: ActivatedRouteSnapshot, state: RouterStateSnapshot) {
    return true;
  }
}
```

Task

Build a simple canDeactivate guard

Stateful guard functions

Stateful Route Guards

- Functions can use existing services to be stateful
- **inject** function can be used in this context

Stateful Route Guards

inject service

```
import { inject } from '@angular/core';
import { ServiceA } from './service-a';

export const hasAccessGuard: CanActivateFn =
  (route: ActivatedRouteSnapshot, state: RouterStateSnapshot) => {
    const service = inject(ServiceA);
    // ...
```

Task

Build a guard with state

Automatic Parameter Binding

Automatic Component Input Binding

- Router can bind inputs from parameters automatically
  - Additional feature of the router itself
- Input parameter name must match path parameter name

Router feature ComponentInputBinding

Activate feature

```
// app.config.ts
provideRouter(routes, withComponentInputBinding())
```

Router feature ComponentInputBinding

Use feature

```
{
  path: 'detail/:isbn',
  component: BookDetailComponent,
}


export class BookDetailComponent {
  @Input()
  set isbn(isbn: string) {
  }
```

Task

Use ComponentInputBinding


symetics