Lazy-loading feature modules

High level view

By default, NgModules are eagerly loaded, which means that as soon as the app loads, so do all the NgModules, whether or not they are immediately necessary. For large apps with lots of routes, consider lazy loading—a design pattern that loads NgModules as needed. Lazy loading helps keep initial bundle sizes smaller, which in turn helps decrease load times.

For the final sample app with two lazy-loaded modules that this page describes, see the live example / download example.

There are two main steps to setting up a lazy-loaded feature module:

1. Create the feature module with the CLI, using the `--route` flag.
2. Configure the routes.

Set up an app

If you don’t already have an app, you can follow the steps below to create one with the CLI. If you already have an app, skip to Configure the routes. Enter the following command where `customer-app` is the name of your app:

```
ng new customer-app --routing
```

This creates an app called `customer-app` and the `--routing` flag generates a file called `app-routing.module.ts`, which is one of the files you need for setting up lazy loading for your feature module. Navigate into the project by issuing the command `cd customer-app`.

> The `--routing` option requires Angular/CLI version 8.1 or higher. See Keeping Up to Date.

Create a feature module with routing

Next, you'll need a feature module with a component to route to. To make one, enter the following command in the terminal, where `customers` is the name of the feature module. The path for loading the `customers` feature modules is also `customers` because it is specified with the `--route` option:

```
ng generate module customers --route
customers --module app.module
```

This creates a `customers` folder with the new lazy-loadable module `CustomersModule` defined in the `customers.module.ts` file. The command automatically declares the `CustomersComponent` inside the new feature module.

Because the new module is meant to be lazy-loaded, the command does NOT add a reference to the new feature module in the application's root module file, `app.module.ts`. Instead, it adds the declared route, `customers` to the `routes` array declared in the module provided as the `--module` option.

src/app/app-routing.module.ts

```
const routes: Routes = [
  {
    path: 'customers',
    loadChildren: () =>
import('./customers/customers.module').t
 => m.CustomersModule)
  }
];
```

Notice that the lazy-loading syntax uses `loadChildren` followed by a function that uses the browser's built-in `import('...')` syntax for dynamic imports. The import path is the relative path to the module.

Add another feature module

Use the same command to create a second lazy-loaded feature module with routing, along with its stub component.

```
ng generate module orders --route
orders --module app.module
```

This creates a new folder called `orders` containing the `OrdersModule` and `OrdersRoutingModule`, along with the new `OrdersComponent` source files. The `orders` route, specified with the `--route` option, is added to the `routes` array inside the `app-routing.module.ts` file, using the lazy-loading syntax.

src/app/app-routing.module.ts

```
const routes: Routes = [
  {
    path: 'customers',
    loadChildren: () =>
import('./customers/customers.module').t
 => m.CustomersModule)
  },
  {
    path: 'orders',
    loadChildren: () =>
import('./orders/orders.module').then(m
=> m.OrdersModule)
  }
];
```

Set up the UI

Though you can type the URL into the address bar, a navigation UI is easier for the user and more common. Replace the default placeholder markup in `app.component.html` with a custom nav so you can easily navigate to your modules in the browser:

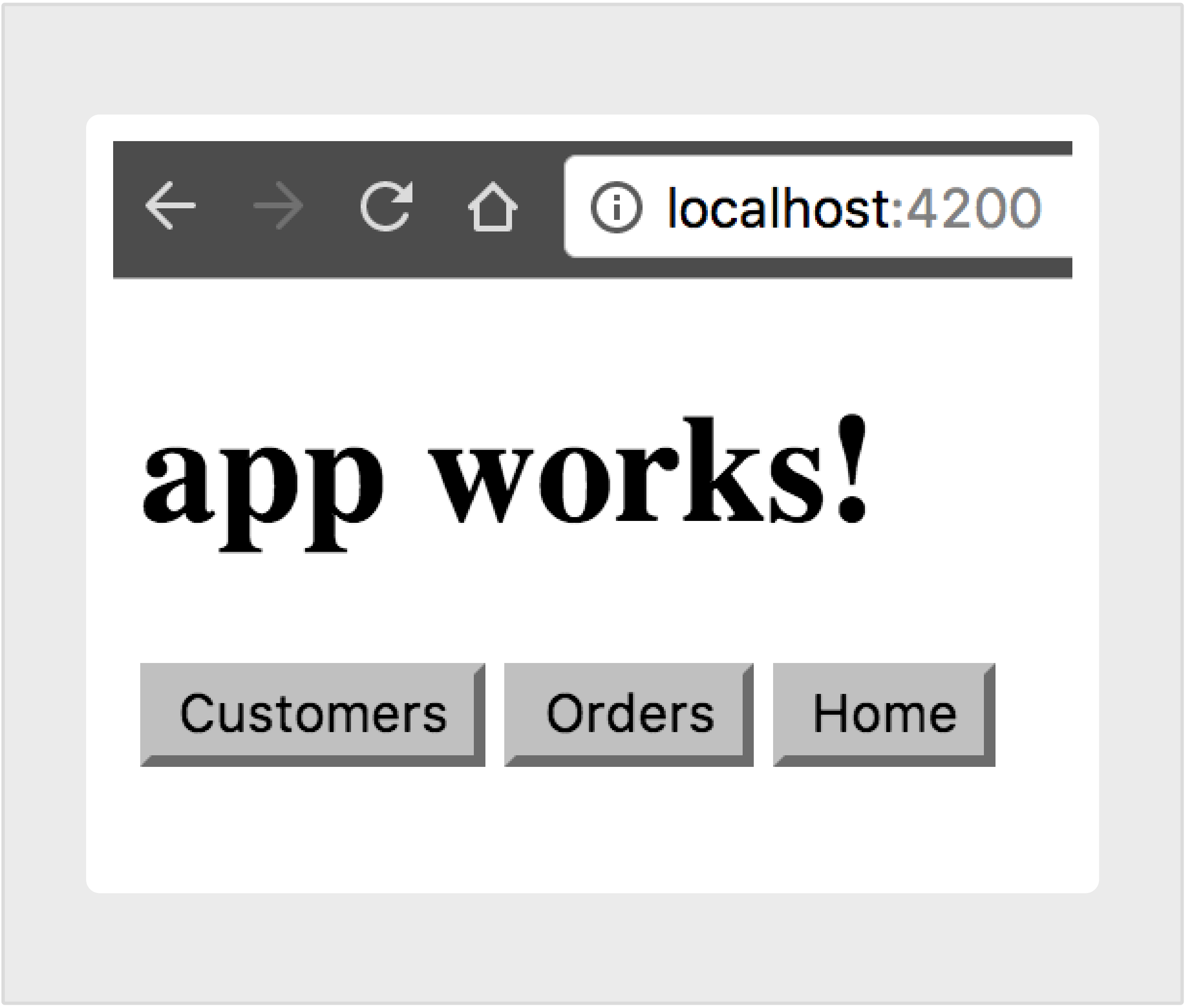
src/app/app.component.html

```
<h1>
  {{title}}
</h1>

<button
routerLink="/customers">Customers</butt

<button
routerLink="/orders">Orders</button>
<button routerLink="">Home</button>

<router-outlet></router-outlet>
```

To see your app in the browser so far, enter the following command in the terminal window:

```
ng serve
```

Then go to `localhost:4200` where you should see “customer-app” and three buttons.



These buttons work, because the CLI automatically added the routes to the feature modules to the `routes` array in `app.module.ts`.

Imports and route configuration

The CLI automatically added each feature module to the routes map at the application level. Finish this off by adding the default route. In the `app-routing.module.ts` file, update the `routes` array with the following:

src/app/app-routing.module.ts

```
const routes: Routes = [
  {
    path: 'customers',
    loadChildren: () =>
import('./customers/customers.module').t
 => m.CustomersModule)
  },
  {
    path: 'orders',
    loadChildren: () =>
import('./orders/orders.module').then(m
=> m.OrdersModule)
  },
  {
    path: '',
    redirectTo: '',
    pathMatch: 'full'
  }
];
```

The first two paths are the routes to the `CustomersModule` and the `OrdersModule`. The final entry defines a default route. The empty path matches everything that doesn't match an earlier path.

Inside the feature module

Next, take a look at the `customers.module.ts` file. If you’re using the CLI and following the steps outlined in this page, you don’t have to do anything here.

src/app/customers/customers.module.ts

```
import { NgModule } from
'@angular/core';
import { CommonModule } from
'@angular/common';
import { CustomersRoutingModule } from
'./customers-routing.module';
import { CustomersComponent } from
'./customers.component';

@NgModule({
  imports: [
    CommonModule,
    CustomersRoutingModule
  ],
  declarations: [CustomersComponent]
})
export class CustomersModule { }
```

The `customers.module.ts` file imports the `customers-routing.module.ts` and `customers.component.ts` files. `CustomersRoutingModule` is listed in the `@NgModule` `imports` array giving `CustomersModule` access to its own routing module. `CustomersComponent` is in the `declarations` array, which means `CustomersComponent` belongs to the `CustomersModule`.

The `app-routing.module.ts` then imports the feature module, `customers.module.ts` using JavaScript's dynamic import.

The feature-specific route definition file `customers-routing.module.ts` imports its own feature component defined in the `customers.component.ts` file, along with the other JavaScript import statements. It then maps the empty path to the `CustomersComponent`.

src/app/customers/customers-routing.module.ts

```
import { NgModule } from
'@angular/core';
import { Routes, RouterModule } from
'@angular/router';

import { CustomersComponent } from
'./customers.component';


const routes: Routes = [
  {
    path: '',
    component: CustomersComponent
  }
];

@NgModule({
  imports:
[RouterModule.forChild(routes)],
  exports: [RouterModule]
})
export class CustomersRoutingModule { }
```

The `path` here is set to an empty string because the path in `AppRoutingModule` is already set to `customers`, so this route in the `CustomersRoutingModule`, is already within the `customers` context. Every route in this routing module is a child route.

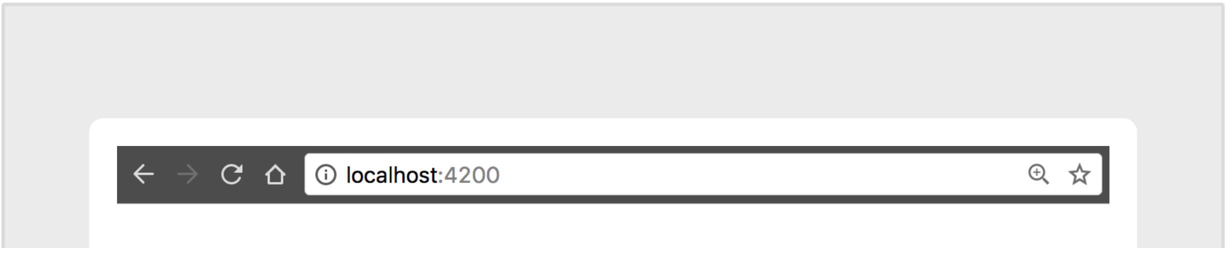
The other feature module's routing module is configured similarly.

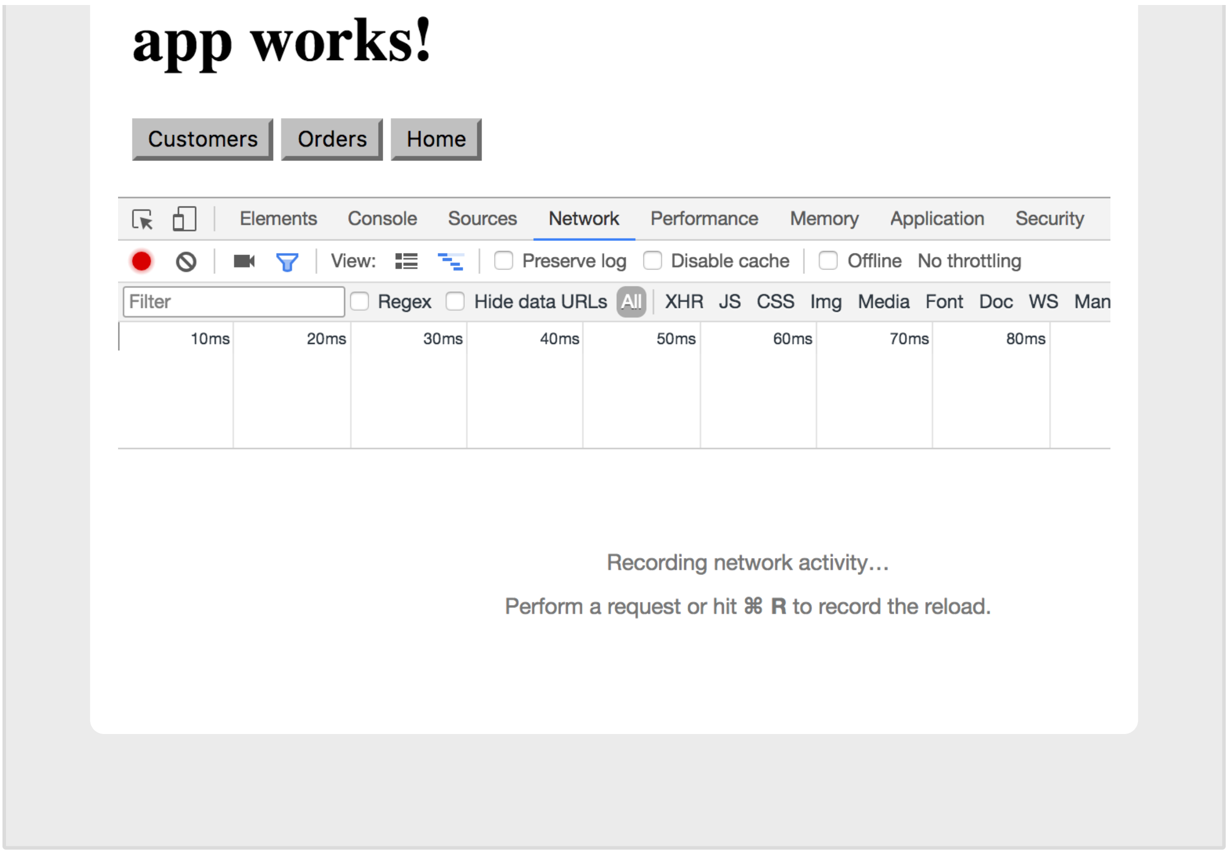
src/app/orders/orders-routing.module.ts (excerpt)

```
import { OrdersComponent } from
'./orders.component';

const routes: Routes = [
  {
    path: '',
    component: OrdersComponent
  }
];
```

Confirm it’s working

You can check to see that a module is indeed being lazy loaded with the Chrome developer tools. In Chrome, open the dev tools by pressing `Cmd+Option+i` on a Mac or `Ctrl+Shift+j` on a PC and go to the Network Tab.

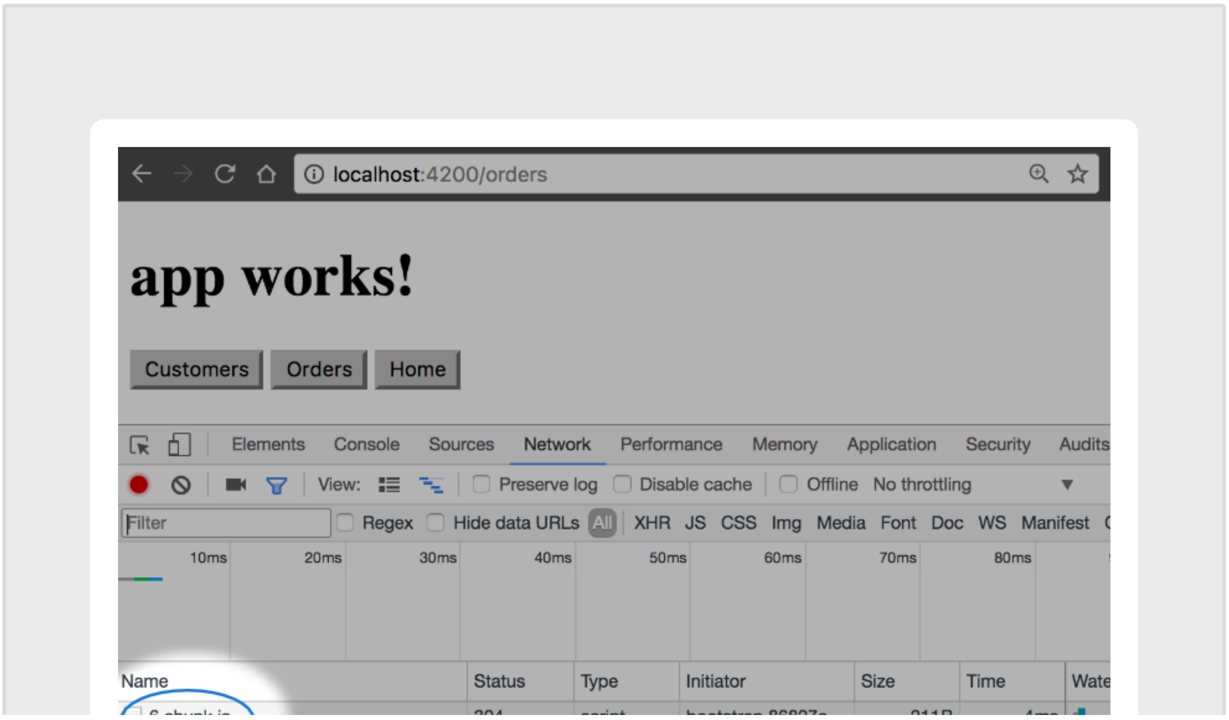


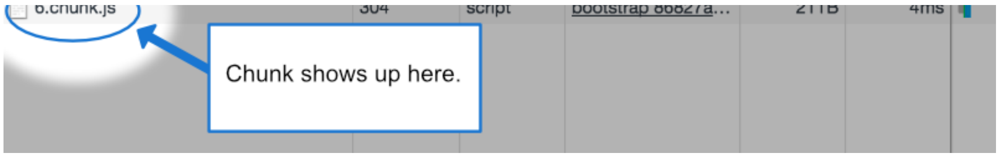


Recording network activity…

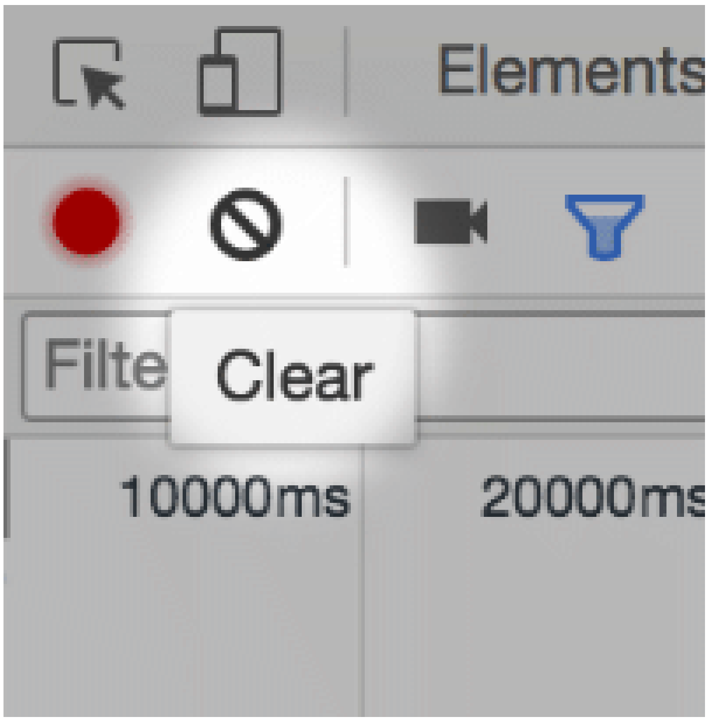
Perform a request or hit ⌘ R to record the reload.

Click on the Orders or Customers button. If you see a chunk appear, everything is wired up properly and the feature module is being lazy loaded. A chunk should appear for Orders and for Customers but will only appear once for each.





To see it again, or to test after working in the project, clear everything out by clicking the circle with a line through it in the upper left of the Network Tab:



Then reload with `Cmd+r` or `Ctrl+r`, depending on your platform.

`forRoot()` and `forChild()`

You might have noticed that the CLI adds `RouterModule.forRoot(routes)` to the `AppRoutingModule` `imports` array. This lets Angular know that the `AppRoutingModule` is a routing module and `forRoot()` specifies that this is the root routing module. It configures all the routes you pass to it, gives you access to the router directives, and registers the `Router` service. Use `forRoot()` only once in the application, inside the `AppRoutingModule`.

The CLI also adds `RouterModule.forChild(routes)` to feature routing modules. This way, Angular knows that the route list is only responsible for providing additional routes and is intended for feature modules. You can use `forChild()` in multiple modules.

The `forRoot()` method takes care of the *global* injector configuration for the Router. The `forChild()`

method has no injector configuration. It uses directives such as `RouterOutlet` and `RouterLink`. For more information, see the `forRoot()` pattern section of the Singleton Services guide.

More on NgModules and routing

You may also be interested in the following:

- Routing and Navigation.
- Providers.
- Types of Feature Modules.
- Route-level code-splitting in Angular
- Route preloading strategies in Angular