To understand the HTTP code,
it's important to understand
Reactive Extensions and
Observables

Reactive Extensions (RxJS)

A library for composing data using observable sequences

And transforming that data using operators

- **Similar to .NET LINQ operators**

Angular uses Reactive Extensions for working with data

- **Especially asynchronous data**

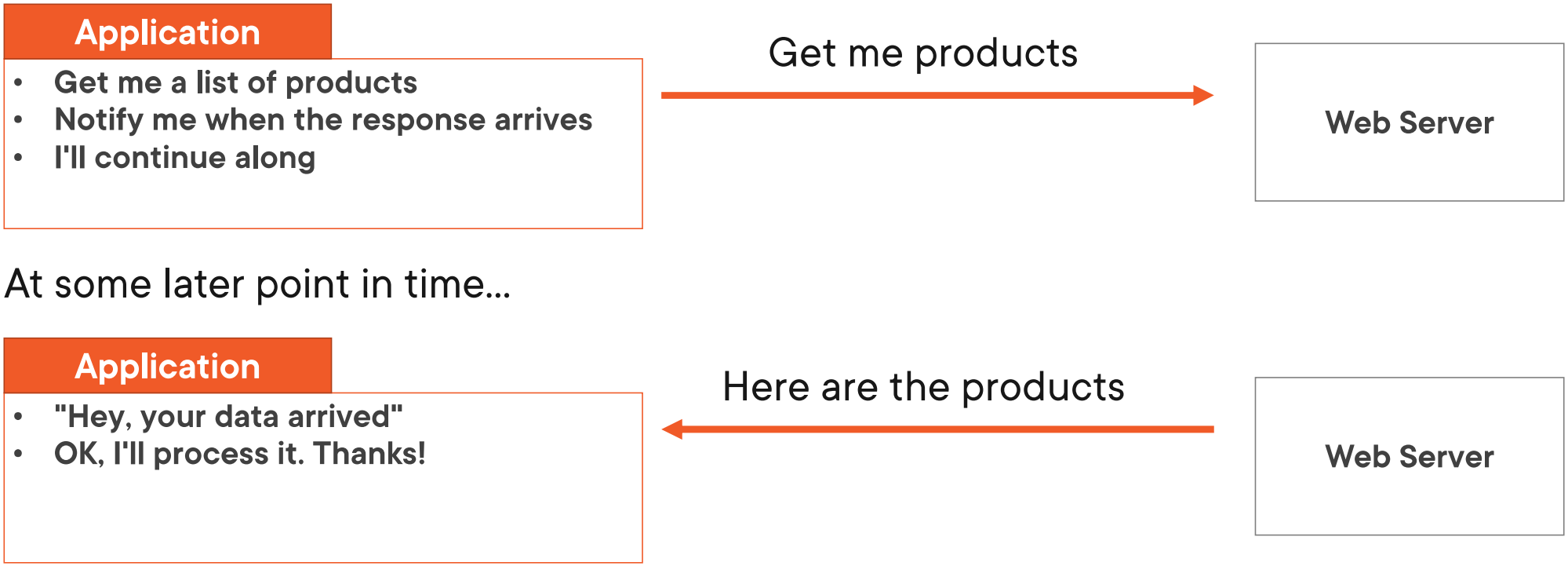
Synchronous vs. Asynchronous

Synchronous: real time

Asynchronous: No immediate response

HTTP requests are asynchronous: request and response

Getting Data



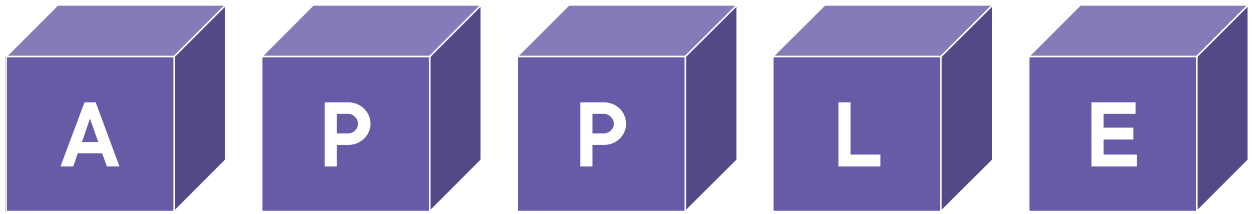
Observable

A collection of items over time

- **Unlike an array, it doesn't retain items**
- **Emitted items can be observed over time**

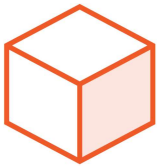
Array: [A, P, P, L, E]

Observable:

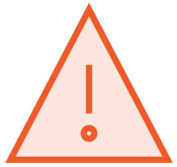


What Does an Observable Do?

Nothing until we subscribe



`next`: **Next item is emitted**



`error`: **An error occurred and no more items are emitted**

`complete`: **No more items are emitted**

Getting Data

Application

- Call http get
- http get returns an Observable, which will emit notifications
- Subscribe to start the Observable and the get request is sent
- Code continues along

Get me products →

Web Server

At some later point in time...

Application

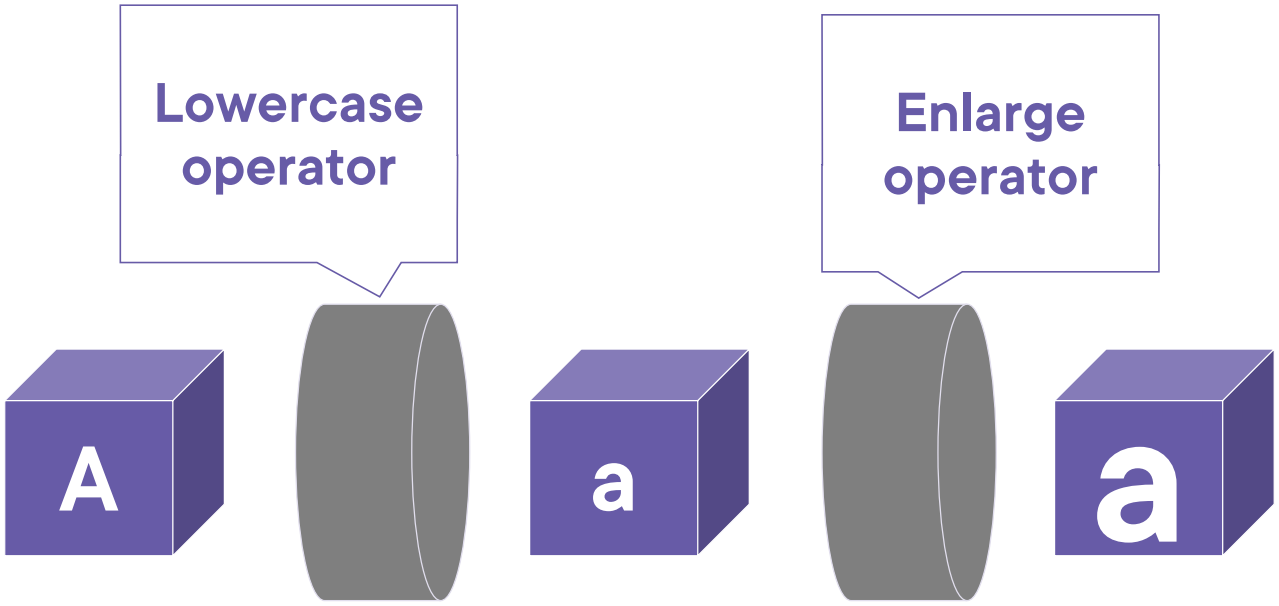
- The response is returned
- The Observable emits a `next` notification
- We process the emitted response

← Here are the products

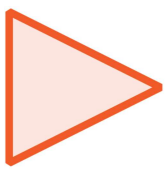
[{cart},{hammer},{saw}]

Web Server

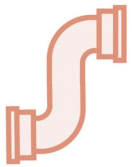
Observable Pipe



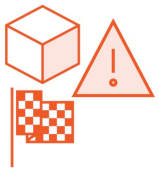
Common Observable Usage



Start the Observable (subscribe)



Pipe emitted items through a set of operators



Process notifications: next, error, complete

Stop the Observable (unsubscribe)

Example

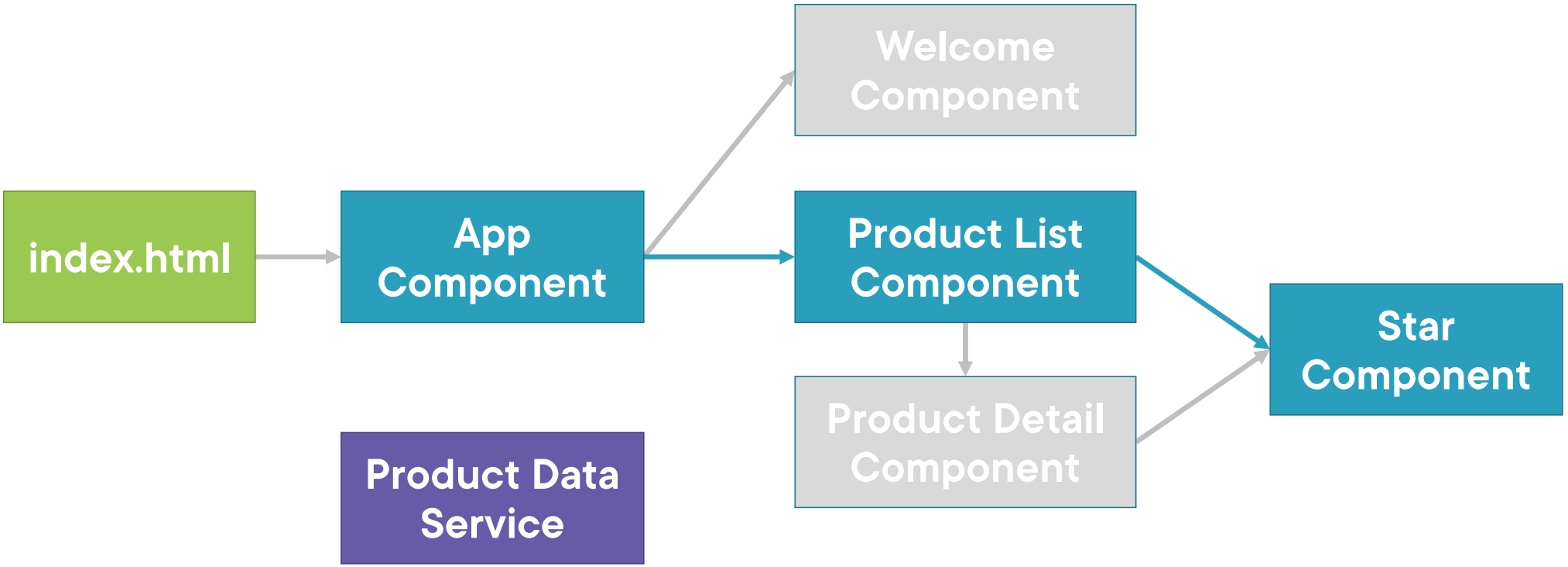
Example

```
import { Observable, range, map, filter } from 'rxjs';

const source$: Observable<number> = range(0, 10);

source$.pipe(
   map(x => x * 3),
   filter(x => x % 2 === 0)
).subscribe(x => console.log(x));
```

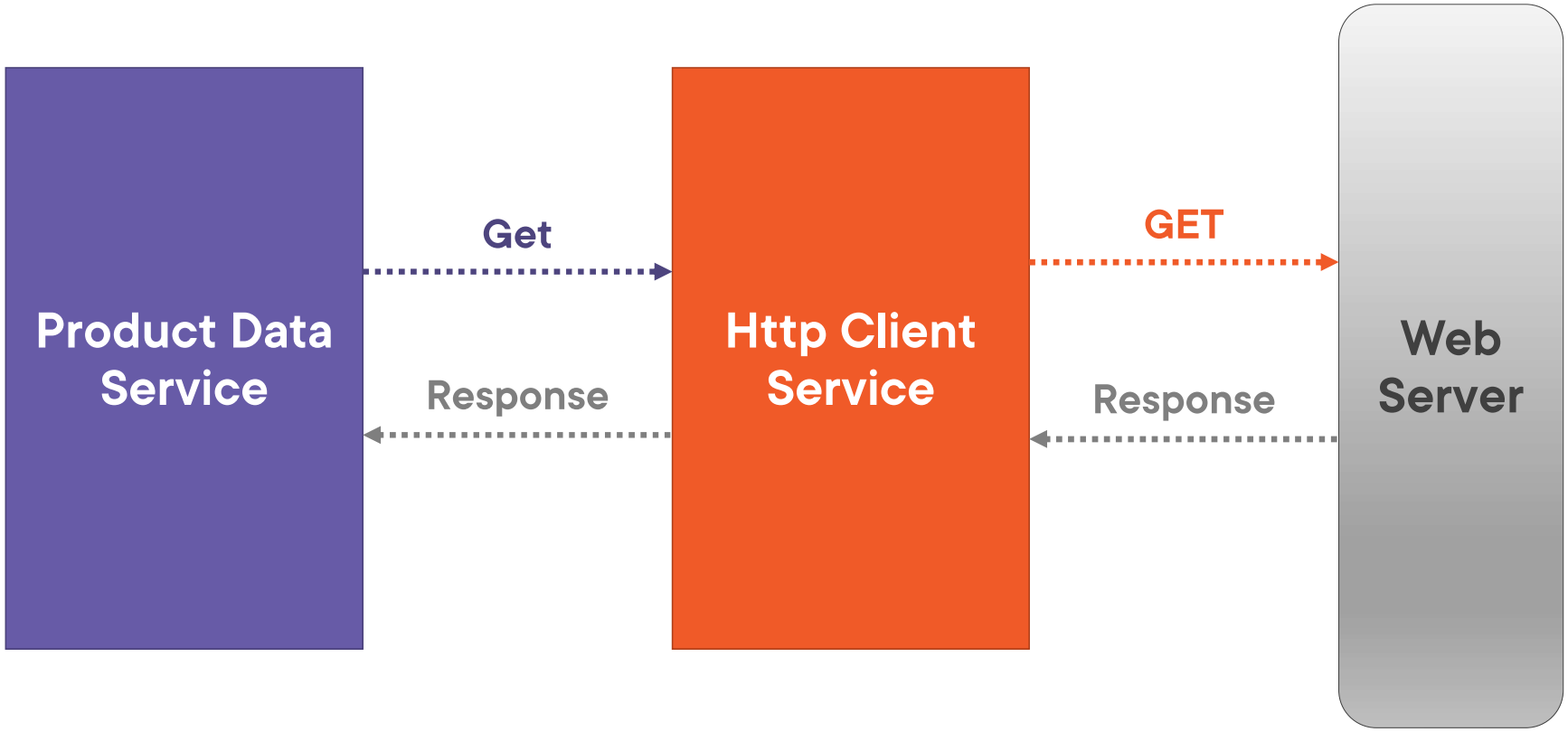
Result

```
0
6
12
18
24
```

Application Architecture



Sending an HTTP Request



Setting up an HTTP Request

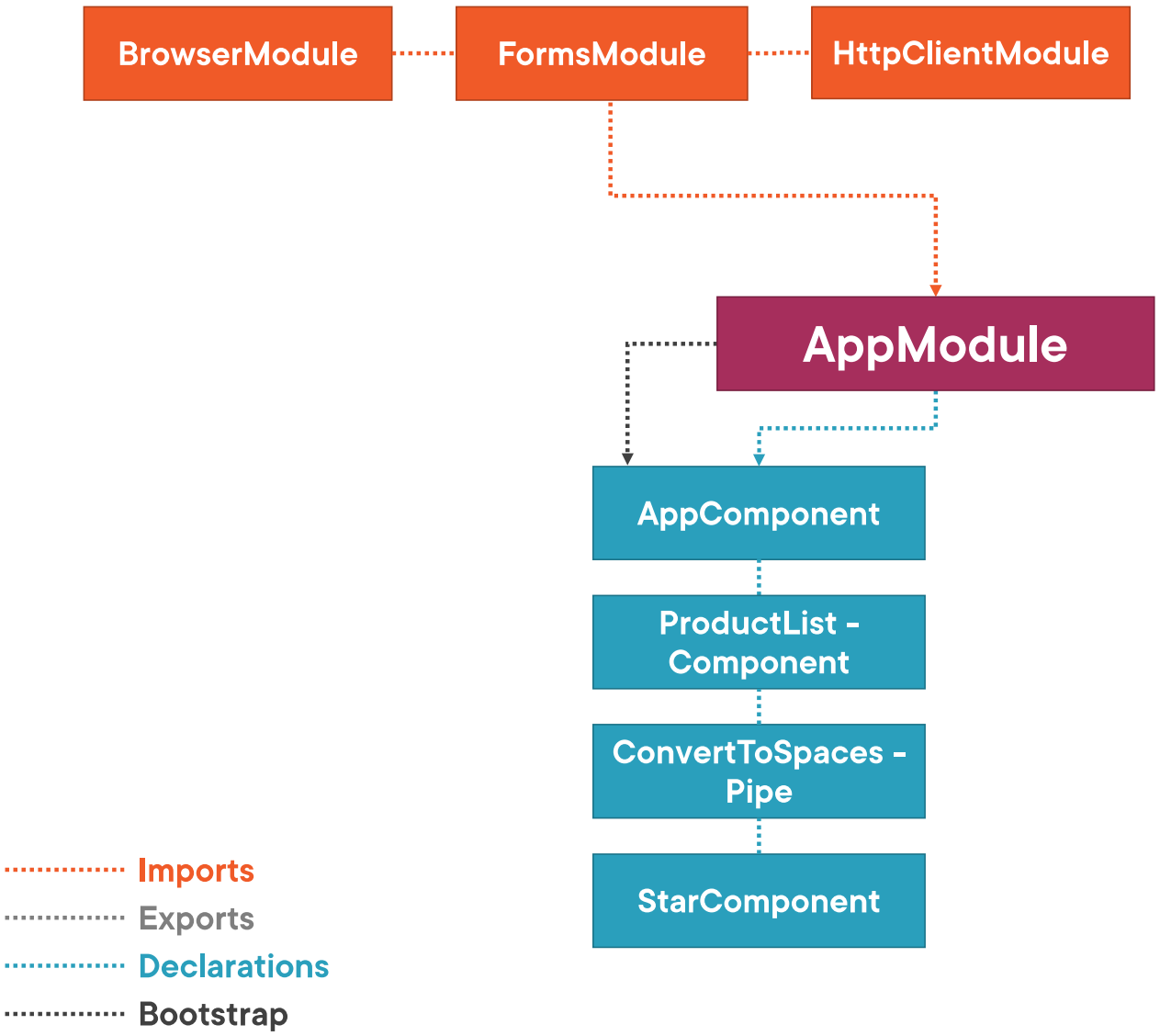
product.service.ts

```
...
import { HttpClient } from '@angular/common/http';

@Injectable({
   providedIn: 'root'
})
export class ProductService {
  private productUrl = 'www.myWebService.com/api/products';

  constructor(private http: HttpClient) { }

  getProducts() {
   return this.http.get(this.productUrl);

  }
}
```

Registering the HTTP Service Provider

app.module.ts

```
...
import { HttpClientModule } from '@angular/common/http';

@NgModule({
  imports: [
      BrowserModule,
      FormsModule,
      HttpClientModule ],
  declarations: [
       AppComponent,
       ProductListComponent,
       ConvertToSpacesPipe,
       StarComponent ],
  bootstrap: [ AppComponent ]
})
export class AppModule { }
```


BrowserModule
FormsModule
HttpClientModule
AppModule
AppComponent
ProductList - Component
ConvertToSpaces - Pipe
StarComponent
Imports
Exports
Declarations
Bootstrap

Setting up an HTTP Request

product.service.ts

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}
```

Setting up an HTTP Request

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export class ProductService {
  private productUrl = 'www.myWebService.com/api/products';

  constructor(private http: HttpClient) { }

  getProducts() {
   return this.http.get<IProduct[]>(this.productUrl);

  }
}
```
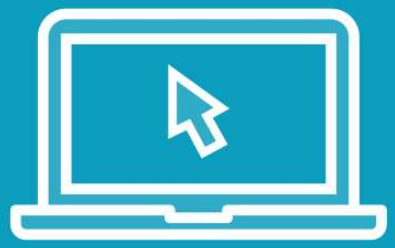

Setting up an HTTP Request

product.service.ts

```
...
import { HttpClient } from '@angular/common/http';
import { Observable } from 'rxjs';

@Injectable({
   providedIn: 'root'
})
export class ProductService {
  private productUrl = 'www.myWebService.com/api/products';

  constructor(private http: HttpClient) { }

  getProducts(): Observable<IProduct[]> {
   return this.http.get<IProduct[]>(this.productUrl);

  }
}
```

Demo



Setting up an HTTP request

Exception Handling

product.service.ts

```
...
import { HttpClient, HttpErrorResponse } from '@angular/common/http';
import { Observable, catchError, tap } from 'rxjs';
...

  getProducts(): Observable<IProduct[]> {
   return this.http.get<IProduct[]>(this.productUrl).pipe(
     tap(data => console.log('All: ', JSON.stringify(data))),
     catchError(this.handleError)
   );
  }

  private handleError(err: HttpErrorResponse) {
  }
```

Subscribing to an Observable

```
x.subscribe()

x.subscribe(Observer)

x.subscribe({
    nextFn,
    errorFn,
    completeFn
})

const sub = x.subscribe({
     nextFn,
     errorFn,
     completeFn
})
```

Subscribing to an Observable

product.service.ts

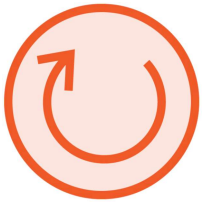
```
getProducts(): Observable<IProduct[]> {
 return this.http.get<IProduct[]>(this.productUrl).pipe(
   tap(data => console.log('All: ', JSON.stringify(data))),
   catchError(this.handleError)
 );
}
```

product-list.component.ts

```
ngOnInit(): void {
   this.productService.getProducts().subscribe({
      next: products => this.products = products,
      error: err => this.errorMessage = err
   });
}
```

Unsubscribing from an Observable

Store the subscription in a variable



Implement the OnDestroy lifecycle hook

Use the subscription variable to unsubscribe

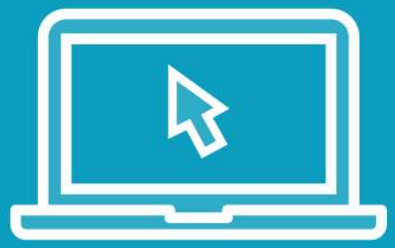
Unsubscribing from an Observable

product-list.component.ts

```
ngOnInit(): void {
    this.sub = this.productService.getProducts().subscribe({
        next: products => this.products = products,
        error: err => this.errorMessage = err
    });
}
```

```
ngOnDestroy(): void {
    this.sub.unsubscribe();
}
```

Demo



Subscribing to an Observable

Unsubscribing from an Observable