Angular Tutorial

What is Angular?

This topic can help you understand Angular: what Angular is, what advantages it provides, and what you might expect as you start to build your applications.

Angular is a development platform, built on TypeScript. As a platform, Angular includes:

- A component-based framework for building scalable web applications
- A collection of well-integrated libraries that cover a wide variety of features, including routing, forms management, client-server communication, and more
- A suite of developer tools to help you develop, build, test, and update your code

With Angular, you're taking advantage of a platform that can scale from single-developer projects to enterprise-level applications. Angular is designed to make updating as straightforward as possible, so take advantage of the latest developments with minimal effort. Best of all, the Angular ecosystem consists of a diverse group of over 1.7 million developers, library authors, and content creators.

Angular applications: The essentials

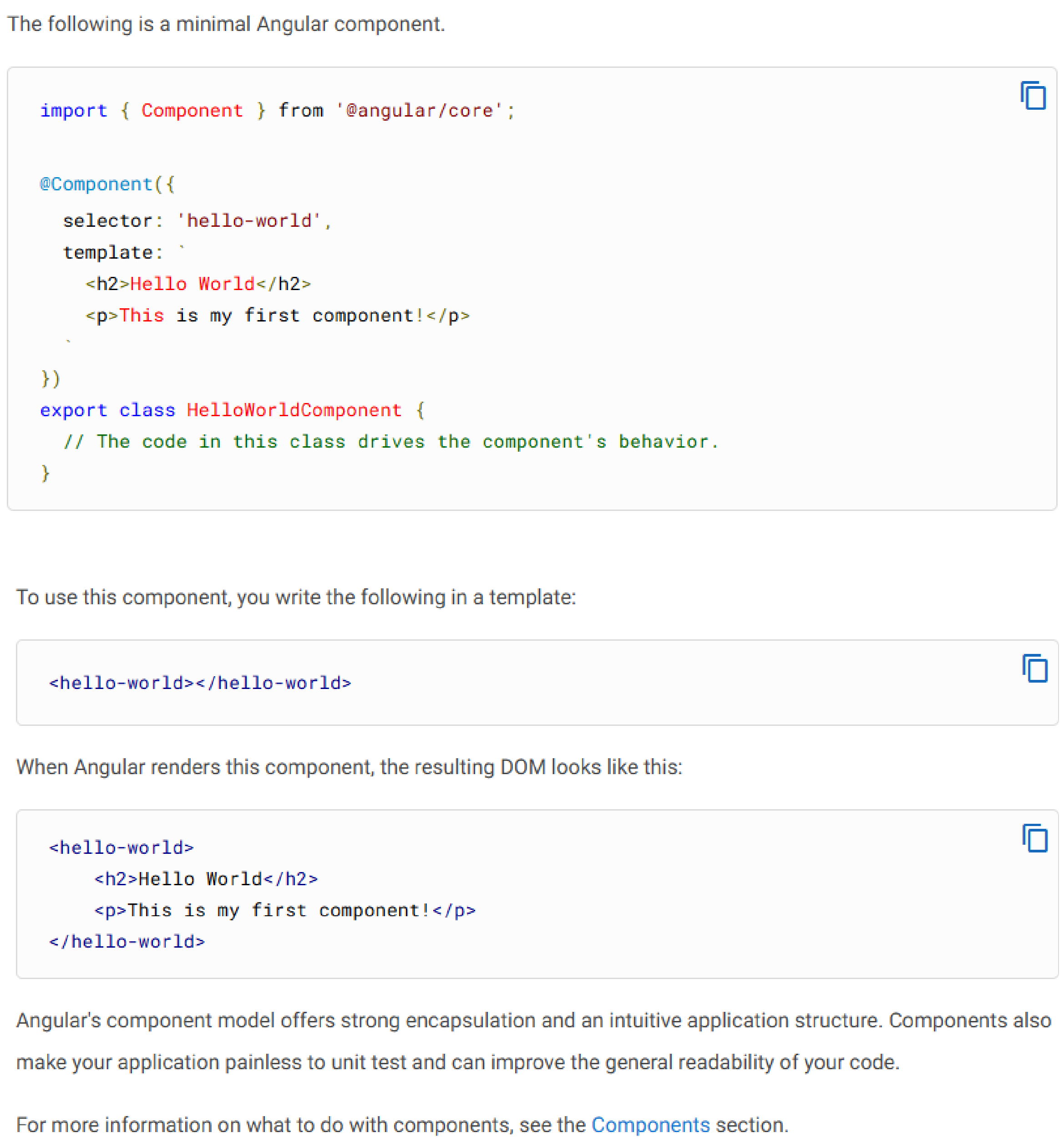
This section explains the core ideas behind Angular. Understanding these ideas can help you design and build your applications more effectively.

Components

Components are the building blocks that compose an application. A component includes a TypeScript class with a @Component() decorator, an HTML template, and styles. The @Component() decorator specifies the following Angular-specific information:

- A CSS selector that defines how the component is used in a template. HTML elements in your template that match this selector become instances of the component.
- An HTML template that instructs Angular how to render the component
- An optional set of CSS styles that define the appearance of the template's HTML elements

The following is a minimal Angular component.



The following is a minimal Angular component.

```
import { Component } from '@angular/core';

@Component({
  selector: 'hello-world',
  template: `
    <h2>Hello World</h2>
    <p>This is my first component!</p>
  `
})
export class HelloWorldComponent {
  // The code in this class drives the component's behavior.
}
```

To use this component, you write the following in a template:

```
<hello-world></hello-world>
```

When Angular renders this component, the resulting DOM looks like this:

```
<hello-world>
    <h2>Hello World</h2>
    <p>This is my first component!</p>
</hello-world>
```

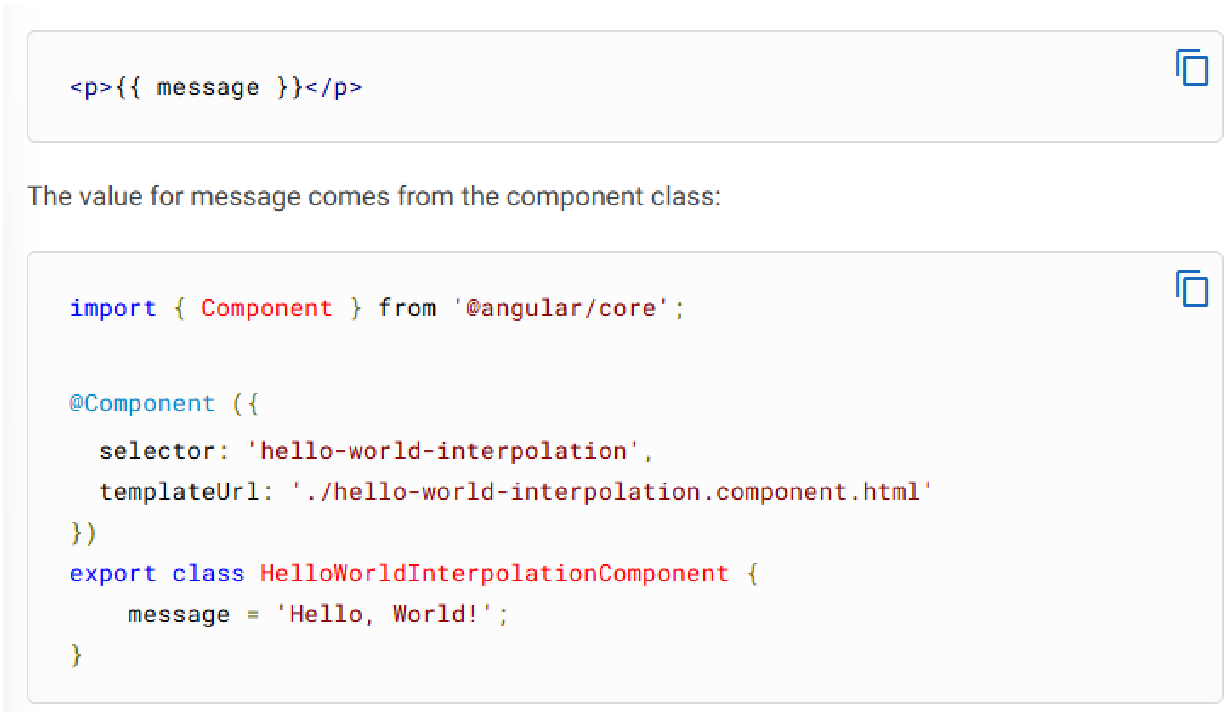
Angular's component model offers strong encapsulation and an intuitive application structure. Components also make your application painless to unit test and can improve the general readability of your code.

For more information on what to do with components, see the Components section.

Templates

Every component has an HTML template that declares how that component renders. You define this template either inline or by file path.

Angular adds syntax elements that extend HTML so you can insert dynamic values from your component. Angular automatically updates the rendered DOM when your component's state changes. One application of this feature is inserting dynamic text, as shown in the following example.

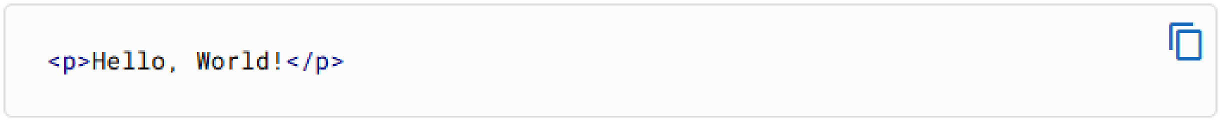


```
<p>{{ message }}</p>
```

The value for message comes from the component class:

```
import { Component } from '@angular/core';

@Component ({
  selector: 'hello-world-interpolation',
  templateUrl: './hello-world-interpolation.component.html'
})
export class HelloWorldInterpolationComponent {
    message = 'Hello, World!';
}
```

When the application loads the component and its template, the user sees the following:



```
<p>Hello, World!</p>
```

Notice the use of double curly braces—they instruct Angular to interpolate the contents within them.

Angular also supports property bindings, to help you set values for properties and attributes of HTML elements and pass values to your application's presentation logic.

```
<p
  [id]="sayHelloId"
  [style.color]="fontColor">
  You can set my color in the component!
</p>
```

Notice the use of the square brackets—that syntax indicates that you're binding the property or attribute to a value in the component class.

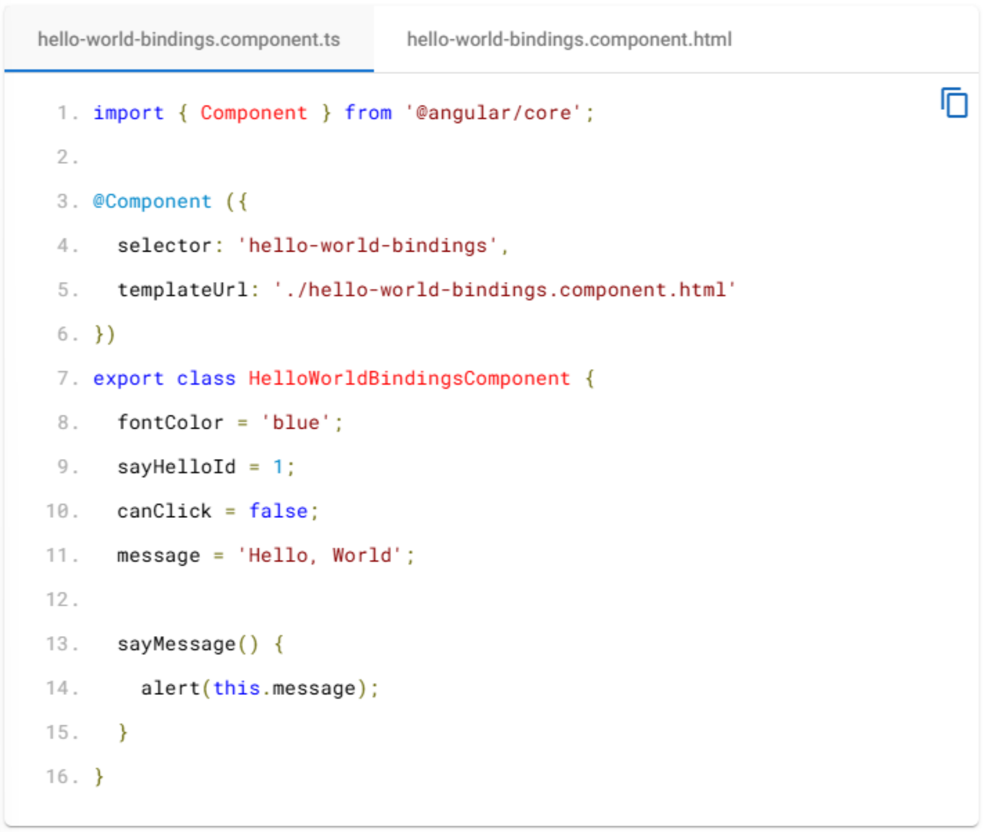
Declare event listeners to listen for and respond to user actions such as keystrokes, mouse movements, clicks, and touches. You declare an event listener by specifying the event name in parentheses:

```
<button
  type="button"
  [disabled]="canClick"
  (click)="sayMessage()">
  Trigger alert message
</button>
```

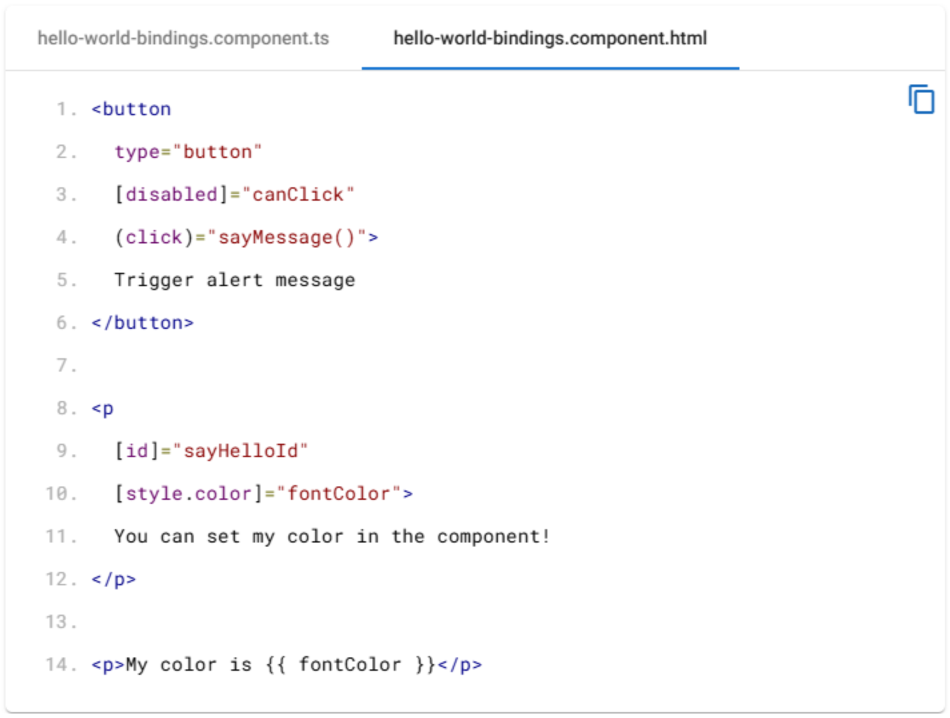
The preceding example calls a method, which is defined in the component class:

```
sayMessage() {
  alert(this.message);
}
```

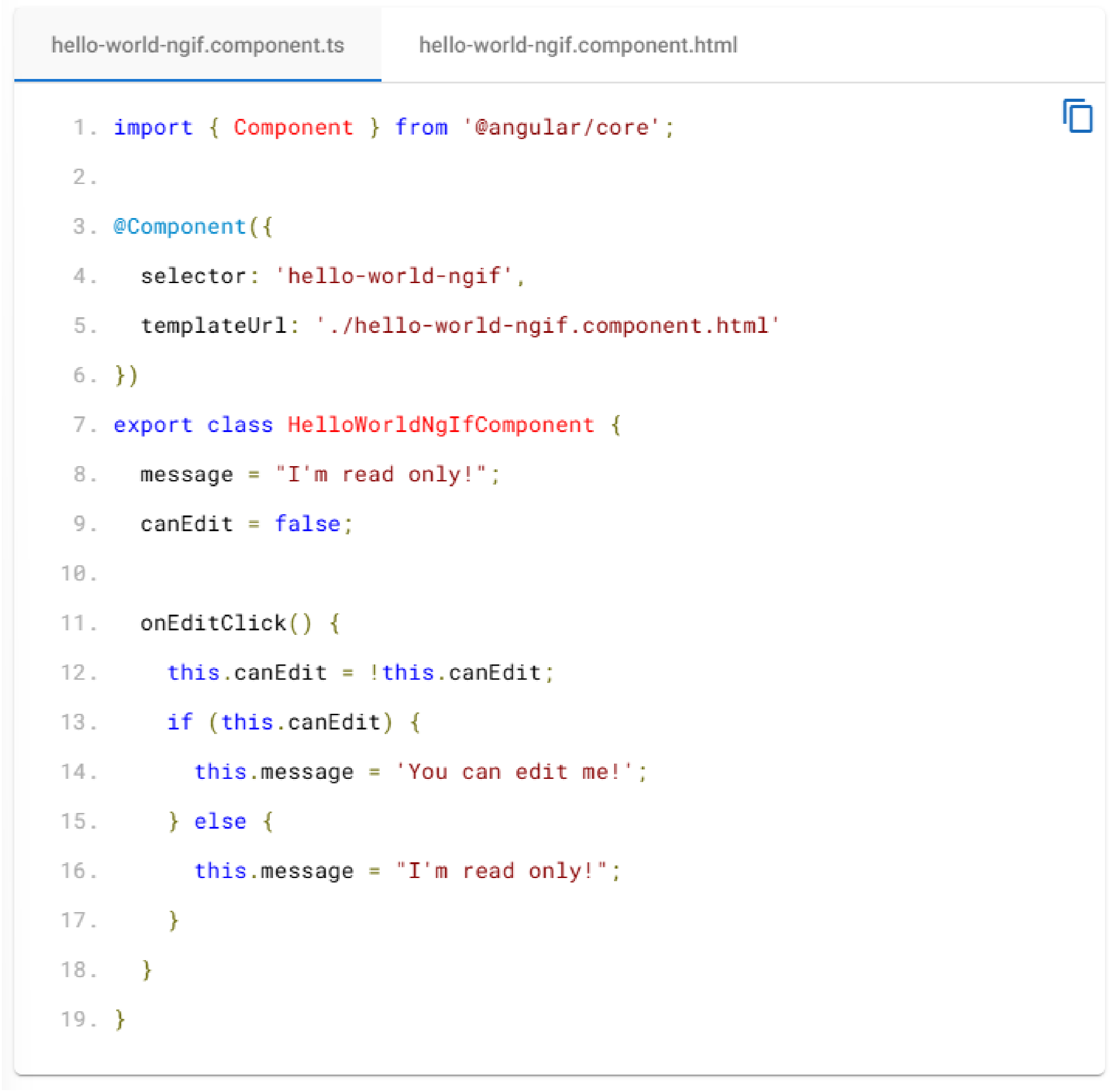
The following is a combined example of Interpolation, Property Binding, and Event Binding within an Angular template:


hello-world-bindings.component.ts
hello-world-bindings.component.html

```typescript
import { Component } from '@angular/core';

@Component ({
  selector: 'hello-world-bindings',
  templateUrl: './hello-world-bindings.component.html'
})
export class HelloWorldBindingsComponent {
  fontColor = 'blue';
  sayHelloId = 1;
  canClick = false;
  message = 'Hello, World';

  sayMessage() {
    alert(this.message);
  }
}
```


hello-world-bindings.component.ts
hello-world-bindings.component.html

```html
<button
  type="button"
  [disabled]="canClick"
  (click)="sayMessage()">
  Trigger alert message
</button>

<p
  [id]="sayHelloId"
  [style.color]="fontColor">
  You can set my color in the component!
</p>

<p>My color is {{ fontColor }}</p>
```


hello-world-ngif.component.ts
hello-world-ngif.component.html

```typescript
import { Component } from '@angular/core';

@Component({
  selector: 'hello-world-ngif',
  templateUrl: './hello-world-ngif.component.html'
})
export class HelloWorldNgIfComponent {
  message = "I'm read only!";
  canEdit = false;

  onEditClick() {
    this.canEdit = !this.canEdit;
    if (this.canEdit) {
      this.message = 'You can edit me!';
    } else {
      this.message = "I'm read only!";
    }
  }
}
```

Add features to your templates by using directives. The most popular directives in Angular are *ngIf and *ngFor. Use directives to perform a variety of tasks, such as dynamically modifying the DOM structure. And create your own custom directives to create great user experiences.

The following code is an example of the *ngIf directive.

Angular's declarative templates let you cleanly separate your application's logic from its presentation. Templates are based on standard HTML, for ease in building, maintaining, and updating.

For more information on templates, see the Templates section.

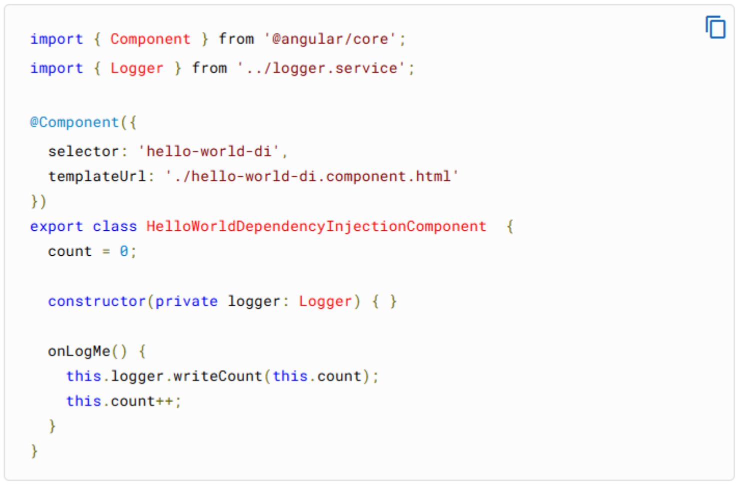
Dependency injection

Dependency injection lets you declare the dependencies of your TypeScript classes without taking care of their instantiation. Instead, Angular handles the instantiation for you. This design pattern lets you write more testable and flexible code. Understanding dependency injection is not critical to start using Angular, but it is strongly recommended as a best practice. Many aspects of Angular take advantage of it to some degree.

To illustrate how dependency injection works, consider the following example. The first file, logger.service.ts, defines a Logger class. This class contains a writeCount function that logs a number to the console.

```
import { Injectable } from '@angular/core';

@Injectable({providedIn: 'root'})
export class Logger {
  writeCount(count: number) {
    console.warn(count);
  }
}
```

Next, the hello-world-di.component.ts file defines an Angular component. This component contains a button that uses the writeCount function of the Logger class. To access that function, the Logger service is injected into the HelloWorldDI class by adding private logger: Logger to the constructor.



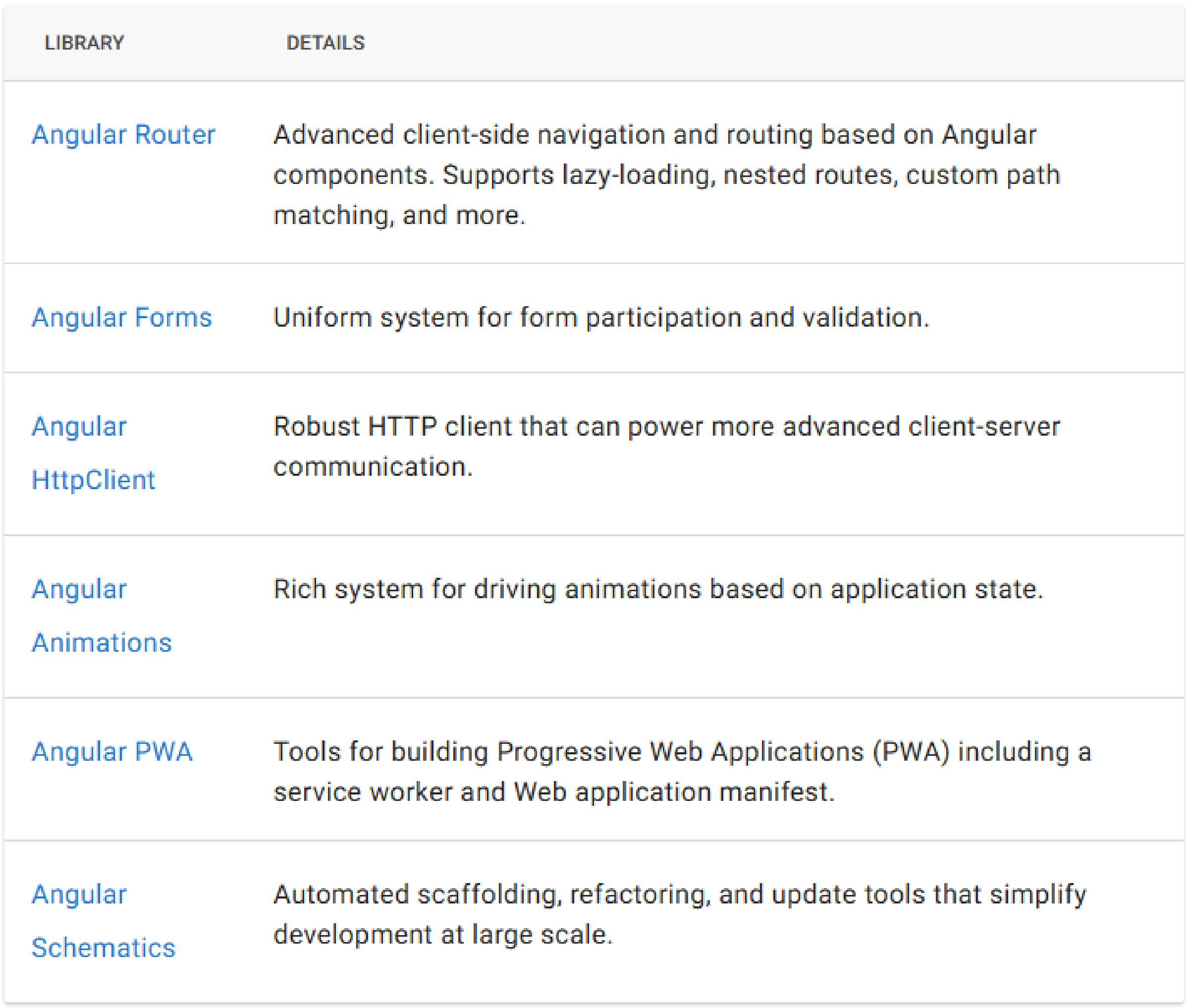
```
import { Component } from '@angular/core';
import { Logger } from '../logger.service';

@Component({
  selector: 'hello-world-di',
  templateUrl: './hello-world-di.component.html'
})
export class HelloWorldDependencyInjectionComponent  {
  count = 0;

  constructor(private logger: Logger) { }

  onLogMe() {
    this.logger.writeCount(this.count);
    this.count++;
  }
}
```

For more information about dependency injection and Angular, see the Dependency injection in Angular section.

First-party libraries

The section, Angular applications: the essentials, provides a brief overview of a couple of the key architectural elements that are used when building Angular applications. The many benefits of Angular really become clear when your application grows and you want to add functions such as site navigation or user input. Use the Angular platform to incorporate one of the many first-party libraries that Angular provides.

Some of the libraries available to you include:



LIBRARY	DETAILS
Angular Router	Advanced client-side navigation and routing based on Angular components. Supports lazy-loading, nested routes, custom path matching, and more.
Angular Forms	Uniform system for form participation and validation.
Angular HttpClient	Robust HTTP client that can power more advanced client-server communication.
Angular Animations	Rich system for driving animations based on application state.
Angular PWA	Tools for building Progressive Web Applications (PWA) including a service worker and Web application manifest.
Angular Schematics	Automated scaffolding, refactoring, and update tools that simplify development at large scale.

These libraries expand your application's capabilities while also letting you focus more on the features that make your application unique. Add these libraries knowing that they're designed to integrate flawlessly into and update simultaneously with the Angular framework.

These libraries are only required when they can help you add features to your applications or solve a particular problem.

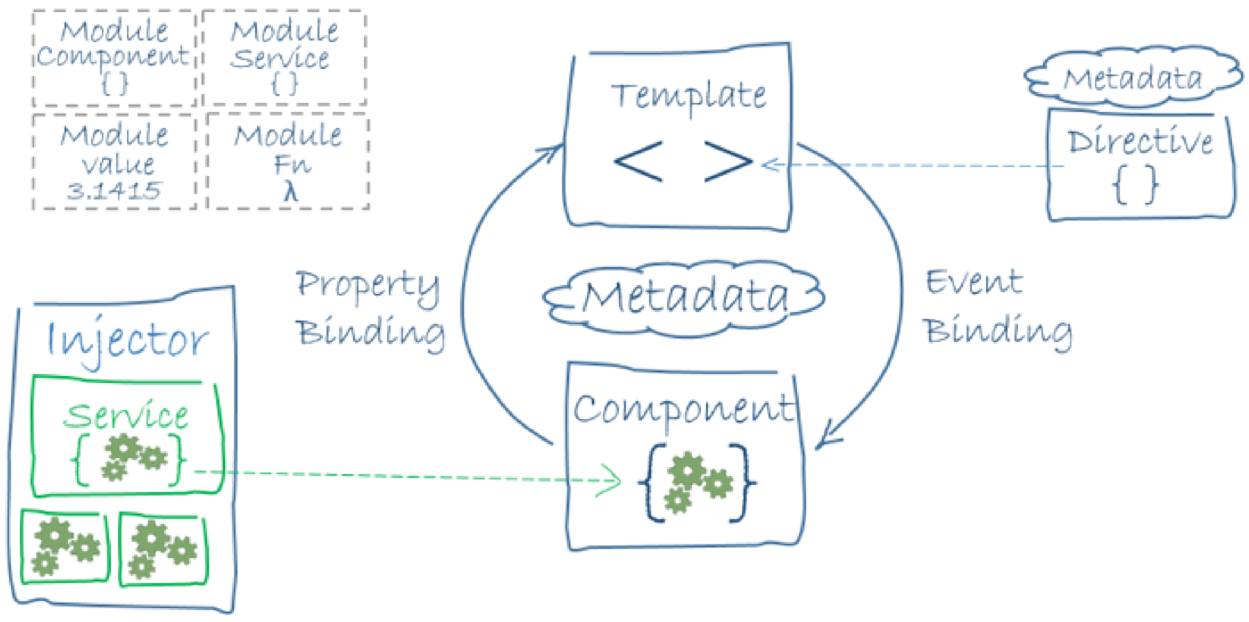
Modules

Angular *NgModules* differ from and complement JavaScript (ES2015) modules. An NgModule declares a compilation context for a set of components that is dedicated to an application domain, a workflow, or a closely related set of capabilities. An NgModule can associate its components with related code, such as services, to form functional units.

Every Angular application has a *root module*, conventionally named AppModule, which provides the bootstrap mechanism that launches the application. An application typically contains many functional modules.

Like JavaScript modules, NgModules can import functionality from other NgModules, and allow their own functionality to be exported and used by other NgModules. For example, to use the router service in your app, you import the Router NgModule.

Organizing your code into distinct functional modules helps in managing development of complex applications, and in designing for reusability. In addition, this technique lets you take advantage of *lazy-loading* —that is, loading modules on demand— to minimize the amount of code that needs to be loaded at startup.


Module Component { }
Module Service { }
Module value 3.1415
Module Fn λ
Template < >
Metadata
Directive { }
Property Binding
Metadata
Event Binding
Injector
Service { }
Component { }