

SDA ASSIGNMENT



SUBJECT

SOFTWARE DESIGN AND ARCHITECTURE

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DEADLINE

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Architectural Evolution of Angular Framework

Angular is a widely-used open-source web application framework developed by Google. Since its inception, it has undergone significant architectural changes to enhance performance, developer experience, and adaptability to modern web development needs.

1. Introduction

Angular, initially released as AngularJS in 2010, was a groundbreaking framework that introduced two-way data binding and dependency injection. Over time, it evolved into a more modular and efficient framework, now simply known as Angular, with its first major release (Angular 2) in 2016.

2. Selection of Framework

Angular was chosen due to its significant impact on web development and its well-documented evolution, making it an excellent case study for architectural progression.

3. Architectural Evolution

Release 1.0.0 (AngularJS)

- **Release Date:** October 20, 2010
- **Major Features:**
 - Two-way data binding
 - Dependency injection
 - Directives and templates
- **Architectural Diagram:**

[Model] <---> [View]

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| v

[Controller] <---> [Scope]

- **Release Notes:** Introduced a dynamic way to build web applications with MVC architecture, allowing for real-time synchronization between model and view.

Release 2.0.0 (Angular 2)

- **Release Date:** September 14, 2016
- **Major Features:**
 - Component-based architecture

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- Improved dependency injection
- Enhanced performance

- **Architectural Diagram:**

[Components]

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[Services]

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[Dependency Injection]

- **Release Notes:** A complete rewrite from AngularJS, focusing on a modular approach with components and improved performance.

Release 4.0.0 (Angular 4)

- **Release Date:** March 23, 2017
- **Major Features:**
 - Smaller and faster applications
 - Improved *ngIf and *ngFor
- **Architectural Diagram:**

[Components] --> [Templates]

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[Services]

[Directives]

- **Release Notes:** Skipped version 3 to align the router package's version. Introduced new features and performance improvements.

Release 5.0.0 (Angular 5)

- **Release Date:** November 1, 2017
- **Key Features:**
 - Build optimizer
 - Improved compiler
 - Internationalized Number, Date, and Currency Pipes
- **Architecture:**
 - Enhanced performance with build optimizer

- StaticInjector for reduced bundle sizes

Release 6.0.0 (Angular 6)

- **Release Date:** May 4, 2018
- **Major Features:**
 - Angular Elements for web components
 - Service Worker support
- **Architectural Diagram:**

[Components] --> [Angular Elements]

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[Services] --> [Service Workers]

- **Release Notes:** Focused on making Angular more versatile by allowing the creation of web components and enhancing PWA capabilities.

Release 7.0.0 (Angular 7)

- **Release Date:** October 18, 2018
- **Key Features:**
 - Virtual scrolling
 - Drag and drop
 - CLI prompts
- **Architecture:**
 - Improved performance with virtual scrolling
 - Enhanced user interactions with drag and drop

Release 8.0.0 (Angular 8)

- **Release Date:** May 28, 2019
- **Key Features:**
 - Ivy rendering engine (preview)
 - Differential loading
 - Dynamic imports for lazy loading
- **Architecture:**

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- Introduction of Ivy as an optional rendering engine
- Smaller bundle sizes with differential loading

Release 9.0.0 (Angular 9)

- **Release Date:** February 6, 2020
- **Major Features:**
 - Ivy compiler and runtime by default
 - Smaller bundle sizes

- **Architectural Diagram:**

[Components] --> [Ivy Compiler]

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[Services] --> [Optimized Rendering]

- **Release Notes:** Introduced the Ivy compiler, resulting in smaller bundle sizes and improved debugging.

Release 10.0.0 (Angular 10)

- **Release Date:** June 24, 2020
- **Key Features:**
 - New default browser configurations
 - Optional strict settings
 - Warnings for CommonJS imports
- **Architecture:**
 - Improved performance with updated browser support
 - Enhanced strictness for better maintainability

Release 11.0.0 (Angular 11)

- **Release Date:** November 11, 2020
- **Key Features:**
 - Faster builds
 - Automatic font inlining
 - Updated Hot Module Replacement (HMR) support

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- **Architecture:**
 - Optimized build process
 - Improved developer experience with HMR

Release 12.0.0 (Angular 12)

- **Release Date:** May 12, 2021
- **Major Features:**
 - Nullish Coalescing
 - Strict mode enabled by default
- **Architectural Diagram:**

[Components] --> [Strict Mode]

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[Services] --> [Enhanced Type Checking]

- **Release Notes:** Enhanced developer experience with stricter type checking and modern JavaScript features.

Release 13.0.0 (Angular 13)

- **Release Date:** November 3, 2021
- **Key Features:**
 - Removal of View Engine
 - Dynamic component creation
 - TypeScript 4.4 support
- **Architecture:**
 - Simplified API with the removal of View Engine
 - Improved performance and reduced complexity

Release 14.0.0 (Angular 14)

- **Release Date:** June 2, 2022
- **Key Features:**
 - 1. **Typed Forms:** Introduced strict typing for reactive forms, enhancing type safety and code quality.

2.Standalone Components: Enabled the creation of components without the need for Angular modules (NgModule), simplifying the development process.

3.Angular CDK Enhancements: Added new primitives in the Component Dev Kit (CDK) to streamline component development.

- **Architecture:**

Marked the beginning of the "Angular Renaissance," focusing on modernizing the framework and reducing reliance on modules.

Release 15.0.0 (Angular 15)

- **Release Date:** November 16, 2022

- **Major Features:**

- Standalone components
- Directive composition API

- **Architectural Diagram:**

[Standalone Components]

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[Directive Composition API]

- **Release Notes:** Introduced standalone components, reducing the need for NgModules, and added a new API for directive composition.

Release 16.0.0 (Angular 16)

- **Release Date:** May 3, 2023

- **Key Features:**

- **Partial Hydration for Angular Universal:** Improved server-side rendering with partial hydration, enhancing performance and user experience.
- **Experimental Jest Support:** Provided experimental support for the Jest testing framework, offering developers more testing options.
- **Esbuild-Based Build System:** Introduced an esbuild-based build system for development servers, improving build times and efficiency.

- **Architecture:**

- Focused on performance optimizations and expanding tooling support to accommodate diverse developer needs.

Release 17.0.0 (Angular 17)

- **Release Date:** November 8, 2023
- **Major Features:**
 - Signals for reactivity
 - Hybrid rendering support
- **Architectural Diagram:**

[Components] --> [Signals]

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[Hybrid Rendering]

- **Release Notes:** Focused on modernizing Angular with signal-based reactivity and hybrid rendering capabilities.

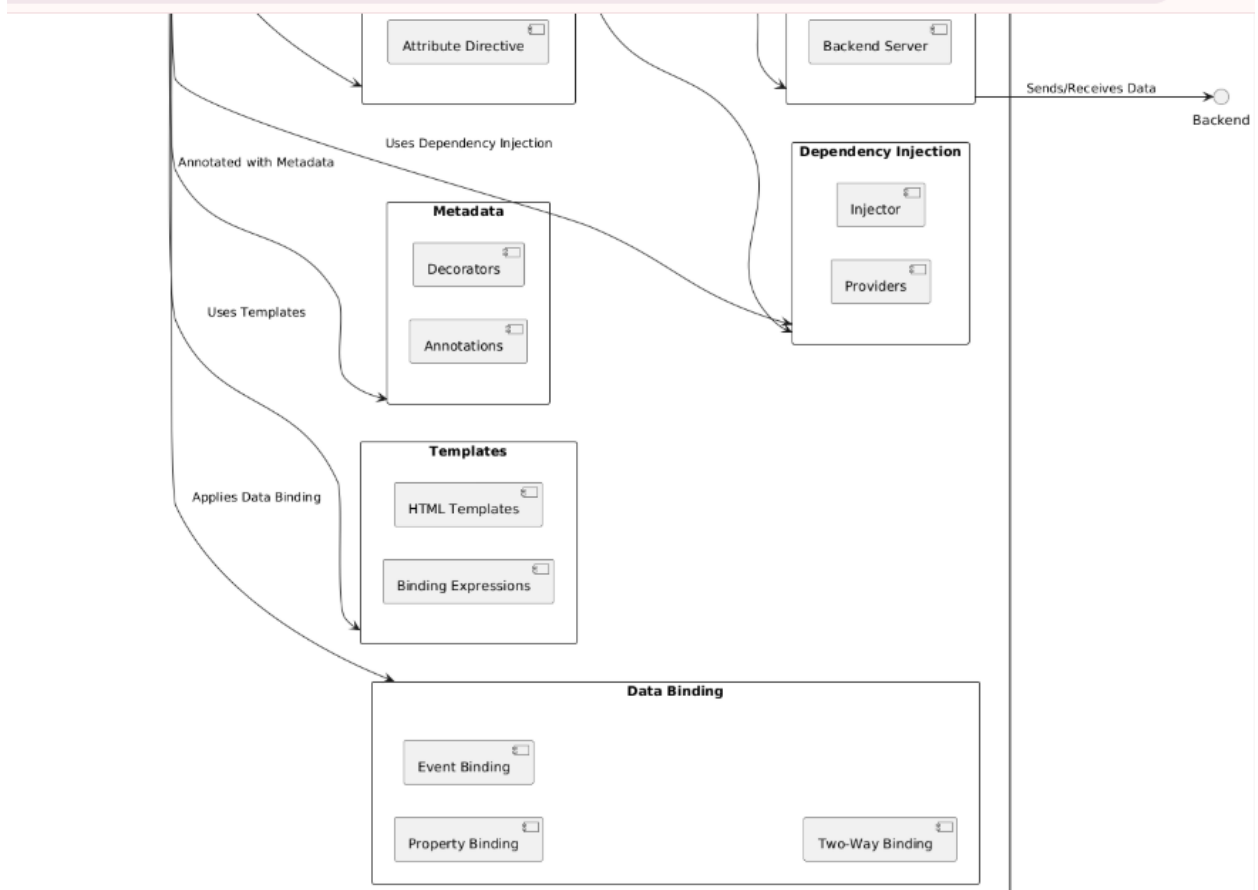
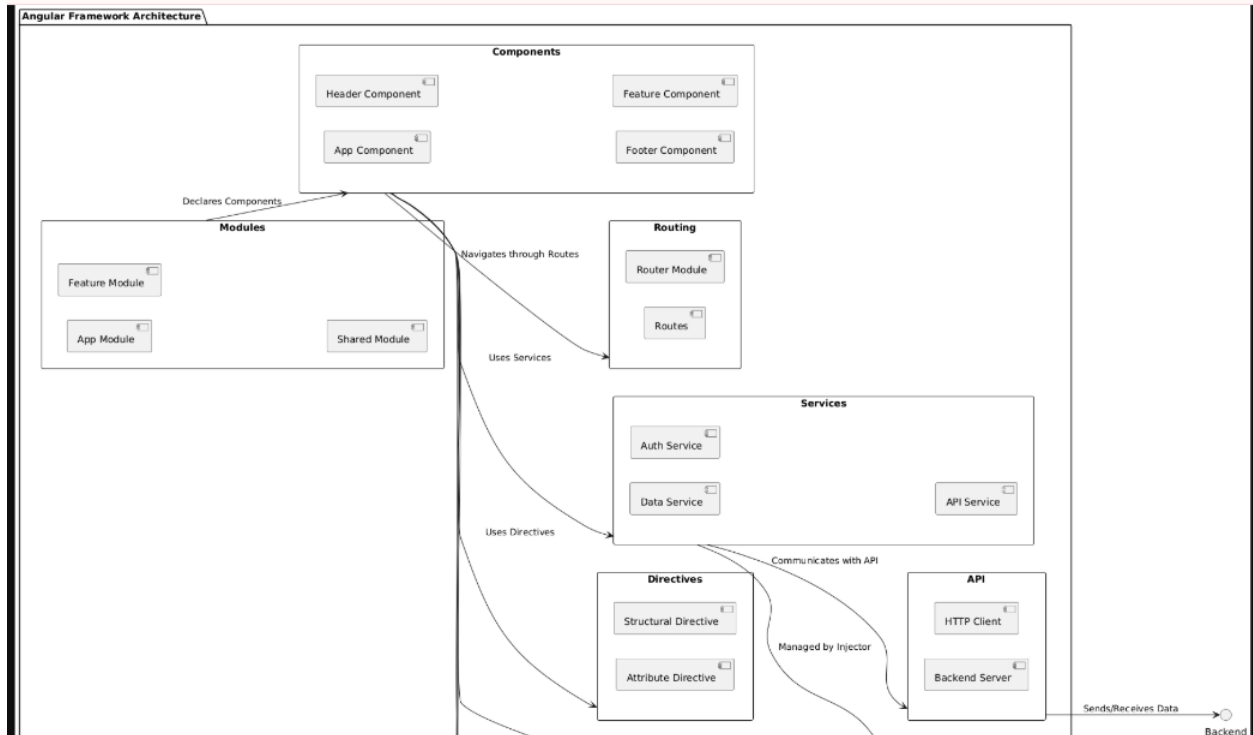
Release 18.0.0 (Angular 18)

- **Release Date:** May 22, 2024
- **Key Features:**
 - **Zoneless Change Detection (Experimental):** Introduced experimental support for zoneless change detection, aiming to improve performance by eliminating the need for Zone.js.
 - **Server-Side Rendering Improvements:** Enhanced server-side rendering capabilities, focusing on performance and scalability.
- **Architecture:**
 - Continued efforts to modernize the framework by exploring alternatives to Zone.js and optimizing rendering processes.

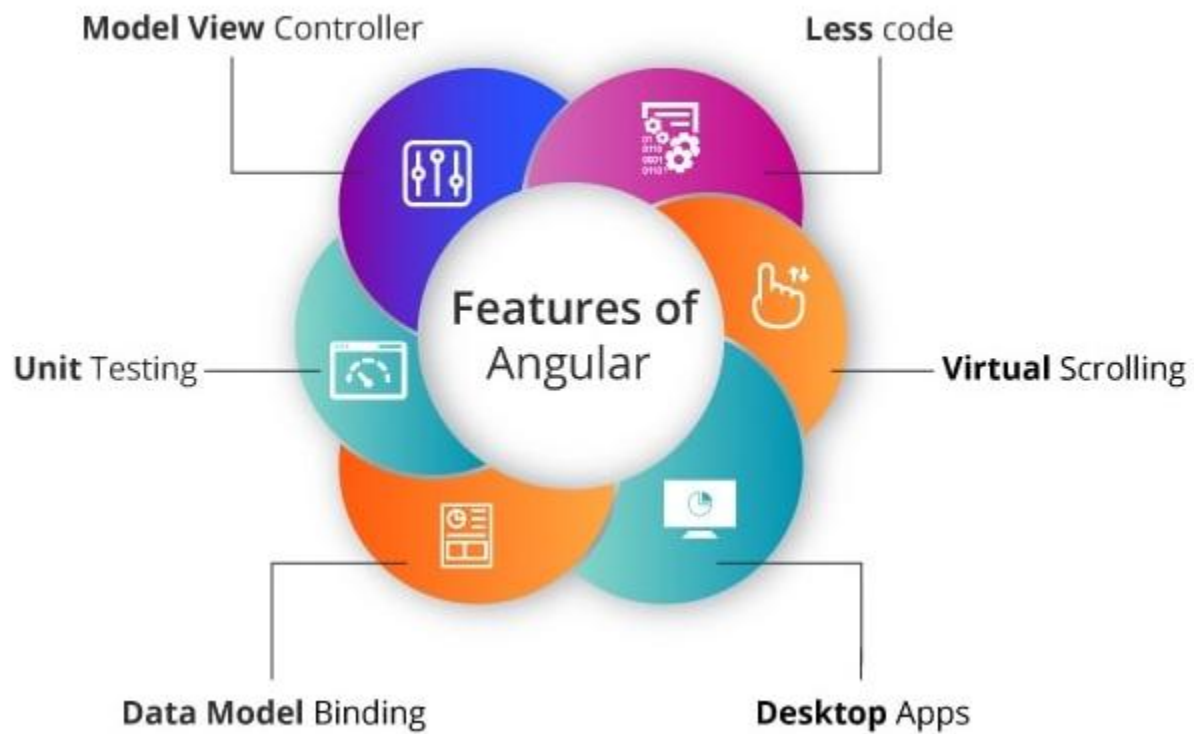
4. Team Contributions

- ***Aiman Shabbir:*** Researched and documented all releases, including features, architectural diagrams, and release notes.

Angular framework diagram:



Features Of Angular:



Angular Architecture:

