# Path

To prepare for a Senior Full-Stack .NET (C#) and Angular Developer interview, you need to master both backend (C#, .NET Core, APIs) and frontend (Angular, TypeScript) technologies, along with key software engineering principles. Below is a comprehensive, topic-wise preparation plan:

## 1. Programming Fundamentals (1-2 weeks)

- **Objective**: Reinforce your programming basics, focusing on advanced topics in C# and JavaScript.

  **C# (Backend)**

  - Object-Oriented Programming (OOP): Classes, Objects, Inheritance, Polymorphism, Encapsulation, Abstraction
  - Design Patterns: Factory, Singleton, Repository, Strategy, Dependency Injection
  - Exception Handling & Custom Exceptions
  - LINQ Queries: Advanced LINQ, Deferred Execution, Grouping, Aggregation
  - Delegates, Events, and Lambda Expressions
  - Multithreading: Tasks, Parallelism, Async/Await, Task Parallel Library (TPL)
  - Garbage Collection and Memory Management
  - C# 9 and 10 Features: Records, Init-only properties, Pattern Matching

  **JavaScript (Frontend)**

  - Asynchronous Programming: Promises, async/await, Callbacks
  - Closures and Scope
  - Prototypal Inheritance
  - JavaScript Execution Context, Event Loop
  - ES6+ Features: Arrow functions, destructuring, spread/rest operators, modules

- TypeScript Basics: Types, Interfaces, Classes, Enums, Generics

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## 2. Advanced C# and .NET Core (1-2 weeks)

- **Objective**: Deepen your knowledge of .NET Core, APIs, and performance optimizations.

  **.NET Core & C# Advanced**

  - Dependency Injection (DI) & Inversion of Control (IoC)
  - Middleware in ASP.NET Core
  - Performance Optimization (async/await, parallelism, threading)
  - Authentication & Authorization: JWT, OAuth, IdentityServer
  - Caching: Distributed Caching (Redis), In-memory Caching
  - Logging: Custom logging, ILogger, NLog, Serilog
  - Microservices: Design, Communication Patterns (REST, gRPC), API Gateway, Service Discovery
  - Docker & Kubernetes: Containerizing .NET Core applications
  - Entity Framework Core: Migrations, Query Optimization, Tracking vs No Tracking, Complex Data Models
  - Web APIs: RESTful design, versioning, routing, filters, error handling
  - Unit Testing: Moq, xUnit, Integration Testing

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## 3. Angular (Frontend) (2-3 weeks)

- **Objective**: Become proficient in building dynamic, responsive, and maintainable Angular applications.

  **Angular Core Concepts**

  - Components: Input/Output, Lifecycle Hooks, Change Detection
  - Directives: Built-in (ngIf, ngFor), Custom Directives
  - Services & Dependency Injection (DI)

- Routing: Lazy Loading, Guards, Child Routes, Query Parameters
- RxJS: Observables, Operators (mergeMap, switchMap, debounceTime, etc.)
- Angular Forms: Template-driven and Reactive forms
- Angular Modules: Feature, Shared, and Core Modules
- Pipes: Built-in and Custom Pipes
- Angular CLI: Build Optimization, AOT Compilation
- Lazy Loading & Code Splitting
- State Management: NgRx or Akita for large-scale state management
- Component Communication: EventEmitter, Subjects, Service-based Communication

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## 4. Database (1-2 weeks)

- **Objective**: Strengthen your understanding of SQL, Entity Framework, and database design.

  **SQL & Entity Framework Core**

  - SQL Advanced Queries: Joins, Subqueries, CTEs, Window Functions
  - Indexing, Query Optimization, and Performance Tuning
  - Transactions and Isolation Levels in SQL
  - Data Modeling and Relationships (One-to-Many, Many-to-Many, Self-referencing)
  - Entity Framework Core: Migrations, Data Seeding, Lazy Loading vs Eager Loading
  - Database Design: Normalization vs Denormalization, Entity Design
  - Stored Procedures, Functions, and Views
  - SQL Server: Performance Tuning, Query Plans, Execution Plans

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## 5. Architecture and Design (2-3 weeks)

- **Objective**: Master software architecture principles and design scalable solutions.

  **Design Patterns & Software Architecture**

  - Microservices Architecture: Design, Benefits, Challenges
  - API Design Patterns: RESTful APIs, HATEOAS, GraphQL
  - CQRS (Command Query Responsibility Segregation)
  - Event Sourcing and Messaging (Kafka, RabbitMQ)
  - SOLID Principles: Single Responsibility, Open/Closed, Liskov Substitution, Interface Segregation, Dependency Inversion
  - Clean Architecture (onion, hexagonal)
  - Domain-Driven Design (DDD) and its principles
  - Service-Oriented Architecture (SOA)
  - CI/CD and DevOps Practices: Build Automation, Testing, Docker, Kubernetes

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## 6. Web Performance and Optimization (1-2 weeks)

- **Objective**: Understand how to build high-performance applications that scale under load.

  **Frontend Performance**

  - Lazy Loading & Code Splitting
  - Change Detection Strategies (OnPush vs Default)
  - Performance profiling in Angular using Chrome DevTools
  - Webpack: Bundling, Tree Shaking, and Minification
  - Service Workers, PWA (Progressive Web Apps)
  - Browser Caching and HTTP2/3
  - Image Optimization (Responsive Images, WebP)

  **Backend Performance**

- Caching Strategies: In-memory, Distributed, Cache Invalidations
- Optimizing API Response Times: Response Compression, Pagination, Filtering
- Load Balancing and Horizontal Scaling
- Redis for Performance: Caching, Rate Limiting
- Database Performance: Query Optimization, Connection Pooling

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## 7. Advanced Topics in Microservices & Cloud (1-2 weeks)

- **Objective**: Prepare for cloud-based solutions and advanced distributed systems.

  **Microservices Architecture**

  - Designing Robust Microservices
  - Communication Between Services: REST, gRPC, Message Brokers (Kafka, RabbitMQ)
  - Distributed Transactions and Saga Pattern
  - API Gateway: Design, Routing, Load Balancing
  - Service Discovery and Circuit Breakers
  - Event-Driven Architecture & Event Sourcing
  - Containerization with Docker & Kubernetes
  - Cloud Platforms: Azure (App Services, Functions, Kubernetes), AWS (EC2, Lambda, ECS)

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## 8. Interview Preparation and Soft Skills (1 week)

- **Objective**: Prepare for the behavioral and technical interview rounds.

  **Behavioral Questions**

  - Describe a challenging technical problem you faced and how you solved it.
  - How do you ensure the quality of your code? Describe your testing approach.

  - How do you manage project timelines and coordinate with teams?
  - Can you explain a time when you had to make a trade-off between performance and maintainability?

  **Technical Deep Dive Questions**

  - Be ready to explain your thought process in solving complex problems (system design, algorithms).
  - Be prepared for live coding or whiteboard interviews for algorithms, data structures, and system design.
  - Practice coding problems on platforms like LeetCode, HackerRank, or CodeSignal.

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## 9. Mock Interviews (1 week)

- **Objective**: Practice answering both technical and behavioral questions under time pressure.
  - Participate in mock interviews with peers or mentors.
  - Review feedback and work on areas of improvement (communication, problem-solving approach).

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## 10. Continuous Learning and Keeping Up to Date

- Stay current with new trends in .NET, Angular, and general software development by:
  - Reading blogs (e.g., Medium, Dev.to).
  - Watching relevant videos on platforms like YouTube and Pluralsight.
  - Following industry leaders on LinkedIn, Twitter.
  - Contributing to open-source projects to apply what you've learned.

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## Final Advice

- **Focus on fundamentals**: Review key concepts, design patterns, and system-level thinking.

- **Prioritize problem-solving**: Practice coding interviews and problem-solving regularly.
- **Prepare for deep technical discussions**: Be prepared to justify your architectural decisions and explain your approach to solving technical challenges in past projects.

This structured approach should give you a clear path toward mastering the necessary skills to excel in a Senior Full-Stack .NET (Angular) Developer interview.