MERN-STACK DEVELOPER ROADMAP

FRONTEND

FOUNDATIONS

1. Computer & Internet Basics
2. Web & Browser Fundamentals (Rendering, DOM, CSSOM)
3. How the Web Works (HTTP, HTTPS, DNS, URL structure)
4. Command Line Basics
5. Git & GitHub

   Git Init, Add, Commit

   Branching & Merging

   Merge Conflicts

   Push & Pull

   Pull Requests

   Hosting Code (GitHub Pages / Vercel)

HTML (Beginner → Advanced)

HTML Fundamentals

1. HTML Basics, Tags, Elements
2. HTML Document Structure
3. Core HTML Elements (text, links, lists, images)
4. Forms, Inputs, Tables
5. Media Tags (audio, video, picture)
6. Attributes & Global Attributes

Semantic & Modern HTML

7. Semantic HTML (header, nav, footer, section, article)

8. Accessibility (ARIA, alt text, keyboard nav)
9. Responsive & Modern HTML Features
10. SEO Basics for HTML
11. HTML Best Practices & Performance
12. Browser Compatibility & Validation
13. HTML + CSS Integration
14. HTML + JavaScript (DOM Basics)
15. Building Projects Using HTML

CSS (Beginner → Advanced)

CSS Basics

1. CSS Fundamentals
2. CSS Syntax & Selectors
3. Box Model (margin, padding, border)
4. Visual Styling (colors, fonts, backgrounds, borders)

Layout & Positioning

5. Display, Positioning (static, relative, absolute, fixed, sticky)
6. Floats
7. Flexbox
8. CSS Grid

Responsive & Advanced Styling

9. Media Queries
10. Responsive Design Techniques
11. Animations, Transitions, Transforms
12. CSS Variables & Custom Properties
13. Pseudo-classes & Pseudo-elements
14. CSS Performance & Accessibility
15. Browser Compatibility

CSS Architecture & Tools

16. Sass / SCSS
17. CSS Methodologies (BEM)
18. CSS in JS (Emotion, Styled Components)
19. Working with Tailwind CSS, Bootstrap, Material UI, Ant Design

    Styling in Real Projects

20. Integrating CSS with HTML
21. Styling in React (Styles, CSS Modules, Styled Components)

JavaScript (Core → ES6 → Advanced)

Core JavaScript

1. Introduction to JavaScript
2. Grammar & Types
3. Variables & Datatypes
4. Expressions & Operators
5. Control Flow (if/else, switch)
6. Loops & Iteration
7. Functions
8. Scope
9. Hoisting
10. Error Handling

Working with Data

11. Arrays & Array Methods (map, filter, reduce)
12. Objects
13. Collections (Map, Set)
14. Numbers & Strings
15. Dates & Times
16. Regular Expressions

ES6+ & Modern JavaScript

17. let / const
18. Arrow Functions
19. Spread & Rest
20. Destructuring
21. Promises
22. async/await
23. Classes
24. Modules
25. Iterators & Generators
26. Typed Arrays

DOM & Browser APIs

27. DOM Manipulation
28. Events & Event Handling
29. Fetch / AJAX / API Handling
30. Resource Management
31. Advanced Browser APIs

Tooling

32. npm / yarn
33. Package.json
34. Bundlers (Webpack, Vite, Parcel, Rollup)

React (Beginner → Advanced)

React Basics

1. Create React App / Vite
2. JSX
3. Components
4. Props & State

5. Conditional Rendering
6. Lists & Keys
7. Events in React
8. CSS in React (Inline, Modules, Styled Components)

React Intermediate

9. Hooks: useState, useEffect, useRef, useContext
10. Custom Hooks
11. Forms & Validation
12. Context API
13. React Router
14. Protected Routes

React Advanced

15. Redux / Redux Toolkit / Zustand
16. Authentication in React
17. Optimization (memo, useCallback, useMemo)
18. API Integration (Axios / Fetch)
19. Component Architecture Patterns

UI Styling Tools

1. Tailwind CSS
2. Bootstrap
3. Material UI
4. Ant Design
5. ShadCN UI (Optional modern choice)

Tooling, Testing & Workflow

Developer Tools

1. Browser DevTools

2. Performance Profiling
3. Debugging Techniques

Testing

4. Jest (Unit Testing)
5. React Testing Library
6. Cypress / Playwright (E2E Testing)

Linting & Formatting

7. ESLint
8. Prettier

Advanced Frontend Concepts

Performance & Optimization

1. Critical Rendering Path
2. Lazy Loading
3. Code Splitting
4. Minification & Tree Shaking

Web Features & Storage

5. LocalStorage, SessionStorage
6. Cookies (Frontend only)
7. IndexDB
8. Service Workers

Application Architecture

9. Progressive Web Apps (PWAs)
10. Server-Side Rendering (SSR)
11. Static Site Generation (SSG)
12. Micro-frontends
13. TypeScript for Frontend

Deployment & Maintenance

1. Deploying React Apps (Vercel, Netlify, AWS S3)
2. CI/CD Basics for Frontend
3. CORS, CSP, XSS, HTTPS
4. Monitoring & Analytics
5. Versioning & Release Workflow
6. Maintaining & Refactoring Code

BACKEND

Backend Fundamentals

1. Client–Server Architecture
2. HTTP / HTTPS
3. REST API Basics
4. JSON & XML
5. Request–Response Cycle
6. Authentication vs Authorization
7. Sessions, Cookies, Tokens (JWT)
8. CRUD Operations (Logic level only, no DB)
9. Environment Variables
10. Error Handling & Logging
11. Git & GitHub
12. Deployment & Hosting Basics
13. Security Fundamentals

Node.js

A. Node.js Basics

1. Introduction to Node.js
2. Node Installation
3. Node REPL
4. Modules (fs, http, path, os, url)
5. NPM / package.json
6. File System Operations
7. Events & EventEmitter
8. Streams & Buffers
9. Async Programming (callbacks, promises, async/await)

B. Node.js Server Development

10. Create a Basic HTTP Server
11. Routing in Node
12. Handling Requests & Responses
13. Working with Third-party Packages
14. Environment Variables
15. Node Project Structure
16. Error Handling in Node

Express.js

1. Introduction to Express.js
2. Creating an Express Server
3. Express Routing
4. Express Middleware
5. Handling JSON & Forms
6. Serving Static Files
7. Template Engines (EJS optional)

8. File Uploads (Multer)
9. Sessions & Cookies
10. JWT Authentication + bcrypt
11. Role-based Access Control
12. Error Handling in Express
13. REST API Development
14. Express Folder Structure & Best Practices

MERN

1. Node.js fundamentals
2. Express.js fundamentals
3. REST API creation
4. API architecture & folder structure
5. JWT Authentication full flow
6. Token-based Protected Routes
7. Role-based Access Control
8. File upload (Multer)
9. Connecting React Frontend with Node
10. Axios API calls
11. State-based token management (Frontend + Backend)
12. Deployment of Node APIs (with no DB)

Java

A. Core Java

1. Java Basics (Syntax, Data Types)
2. OOP (Class, Object, Inheritance, Polymorphism, Encapsulation, Abstraction)
3. Collections Framework
4. Generics

5. Exception Handling
6. File Handling
7. Java 8 (Streams, Lambdas, Functional Interfaces)
8. Multithreading
9. Java I/O & NIO

B. Java Servlets

1. Servlet Basics
2. Servlet Lifecycle
3. Handling Requests & Responses
4. Session Tracking
5. URL Rewriting
6. Filters
7. File Upload & Download

C. Spring Boot

Spring Core

1. IoC (Inversion of Control)
2. Dependency Injection
3. Bean Lifecycle

Spring Boot Basics

4. Spring Boot Structure
5. Auto Configuration
6. Application Properties

Spring Boot REST API

7. REST Controllers
8. Service Layer
9. DTO (Data Transfer Objects)

10. Validation
11. Exception Handling
12. ResponseEntity & Status Codes

Spring Security

13. Authentication Basics
14. Authorization Basics
15. JWT Token Flow (Generate / Validate)
16. Protecting Endpoints

Advanced Java Backend

17. Microservices Basics (Eureka, API Gateway, Feign)
18. Messaging Concepts (Kafka / RabbitMQ – optional)
19. Docker for Java Apps
20. CI/CD

API Development

1. REST Architecture
2. Routing & Controllers
3. HTTP Methods (GET, POST, PUT, DELETE)
4. Status Codes
5. Data Validation
6. Error Handling Patterns
7. JWT Authentication
8. OAuth (optional)
9. Rate Limiting
10. API Versioning
11. Testing with Postman / Thunder Client

Deployment & DevOps Fundamentals

1. Hosting Backends (Render / Railway / Vercel)
2. Linux / SSH Basics

3. Domain & DNS
4. PM2 for Node.js
5. Environment Variables in Production
6. Docker Basics
7. CI/CD with GitHub Actions
8. Logging & Monitoring

DATABASES

Database Foundations

1. What is a Database?
2. Types of Databases (Relational vs NoSQL)
3. Relational Database Concepts (Tables, Rows, Columns)
4. NoSQL Concepts (Documents, Key-Value, Graph, Column)
5. CAP Theorem
6. ACID Properties vs BASE Properties
7. ER Diagrams
8. Normalization (1NF, 2NF, 3NF, BCNF)

SQL Database (MySQL / PostgreSQL / SQL Server)

A. SQL Basics

1. What is SQL?
2. Tables, Rows, Columns
3. Data Types

B. Core SQL Commands

4. SELECT
5. INSERT

6. UPDATE
7. DELETE

C. Filtering & Sorting

8. WHERE
9. AND / OR / NOT
10. ORDER BY
11. LIMIT / TOP

D. SQL Functions

12. COUNT, SUM, AVG, MIN, MAX
13. String Functions (UPPER, LOWER, CONCAT)
14. Date Functions

E. Pattern Matching

15. LIKE
16. IN
17. BETWEEN
18. Wildcards

F. Joins (Relational Logic)

19. INNER JOIN
20. LEFT JOIN
21. RIGHT JOIN
22. FULL JOIN
23. SELF JOIN

G. Constraints

24. PRIMARY KEY
25. FOREIGN KEY
26. UNIQUE
27. CHECK
28. DEFAULT

H. Advanced SQL

29. Subqueries
30. Views
31. Indexes
32. Triggers
33. Transactions (COMMIT, ROLLBACK)
34. Stored Procedures & Functions

NoSQL Database

A. NoSQL Basics

1. What is NoSQL?
2. SQL vs NoSQL Differences
3. Schema-less Architecture
4. Replication
5. Sharding
6. Horizontal Scaling

B. Types of NoSQL

7. Key-Value Stores (Redis)
8. Document Databases (MongoDB, CouchDB)
9. Column Databases (Cassandra)
10. Graph Databases (Neo4j)

C. NoSQL Data Modeling

11. Collections
12. Documents / Key-Value Pairs
13. Embedded Documents
14. Denormalization
15. Partitioning

MongoDB

A. MongoDB Basics

1. What is MongoDB?
2. BSON vs JSON
3. Collections & Documents

B. CRUD in MongoDB

4. insertOne / insertMany
5. find / findOne
6. updateOne / updateMany
7. deleteOne / deleteMany

C. Querying

8. Filters ($eq, $gt, $lt, $ne)
9. Logical Operators ($and, $or, $not)
10. Array Operators ($in, $all)

D. Data Modeling

11. Embedded Documents
12. Referenced Documents
13. Schema Design Patterns

E. Update Operators

14. $set
15. $push
16. $pull
17. $inc

F. Aggregation Framework

18. Aggregation Pipeline
19. $match
20. $group
21. $sort

22. $project

G. Performance

23. Indexing
24. Explain Plans
25. Sharding Basics

H. MongoDB Tools

26. MongoDB Compass
27. MongoDB Atlas
28. Mongoose ORM
29. Schemas & Models
30. Validation
31. Queries
32. Relationships (ref, populate)

PL/SQL (Oracle Database)

A. Basics

1. Introduction to PL/SQL
2. Block Structure (DECLARE, BEGIN, EXCEPTION, END)
3. Variables & Data Types
4. Control Statements (IF, LOOP, WHILE, FOR)

B. Cursors

5. Implicit Cursors
6. Explicit Cursors
7. Cursor FOR Loop

C. Exception Handling

8. Predefined Exceptions
9. User-defined Exceptions

D. Procedures & Functions

10. Creating Procedures
11. Creating Functions
12. IN, OUT, IN OUT Parameters
13. Procedure Overloading

E. Packages

14. Creating Packages
15. Package Specification
16. Package Body

F. Triggers

17. BEFORE / AFTER Triggers
18. Row-level / Statement-level Triggers

G. Advanced PL/SQL

19. Collections (VARRAY, Nested Table)
20. Bulk Collect
21. Dynamic SQL (EXECUTE IMMEDIATE)

Database Design

1. ER Diagrams
2. Entity, Attributes, Relationships
3. Primary & Foreign Keys
4. Normalization (1NF → BCNF)
5. Schema Design
6. Relationship Mapping (1–1, 1–M, M–M)