NODE-JS: Node.js Development

Course Overview

This industry-standard Node.js Development Course Outline covers essential concepts from beginner installation to building scalable, production-ready backend applications.

Course Description

Master the power of server-side JavaScript with this comprehensive, hands-on Node.js Development course. Designed to bridge the gap between frontend design and robust backend engineering, this program takes you from fundamental runtime concepts to building highly scalable, production-ready enterprise applications.You will dive deep into the asynchronous, event-driven architecture that makes Node.js the top choice for tech giants like Netflix, Uber, and PayPal. Throughout the course, you will learn to manage data streams, build secure RESTful APIs using Express.js, connect seamlessly to databases, and implement real-time communication protocols. By working through realistic capstone projects, you will gain practical experience in user authentication, data encryption, and microservices architecture. By the conclusion of this course, you will possess the specialized backend skills required to engineer fast, resilient, and secure modern web applications

Learning Curriculum

Module 1

Course Prerequisites

JavaScript Basics: Variables, ES6+ syntax, Array methods.Async JS: Promises, Arrow functions, Async/Await.Basic Web Concepts: HTTP request/response cycle, JSON.

Module 2

Introduction & Environment Setup

What is Node.js?: V8 Engine architecture, runtime environment basics.Installation: Installing Node.js LTS versions and NPM.Executing Code: Running scripts from terminal, using REPL.Local Tools: Working with nodemon for auto-restarting applications

Module 3

Node.js Core Modules & File System

Global Objects: __dirname, __filename, and process object.Path Module: Handling cross-platform file paths securely.File System (fs): Synchronous vs Asynchronous file operations (Read, Write, Delete).Buffers & Streams: Handling large datasets efficiently without overloading memory

Module 4

Package Management with NPM

Initializing Projects: Creating and understanding package.json.Dependency Management: Standard vs Development dependencies (devDependencies).Semantic Versioning: Tracking package updates safely with

Module 5

Asynchronous & Event-Driven Programming

The Event Loop: Single-threaded execution, blocking vs non-blocking code.Event Emitters: Building custom event-driven workflows with the events module.Error Handling: Graceful error catching using try-catch blocks and error middleware

Module 6

Web Servers & REST APIs with Express.js

HTTP Fundamentals: Creating a server natively using the http module.Express.js Setup: Routing basics, handling route parameters, query strings.Middleware: Global, route-specific, and built-in Express middleware.RESTful Architecture: Implementing full CRUD operations (GET, POST, PUT, DELETE)

Module 7

Database Integration

SQL vs NoSQL: Choosing between relational and non-relational storage.MongoDB & Mongoose: Designing schemas, validating fields, and indexing data.Data Persistence: Querying, updating, and modeling relationships between collections.

Module 8

Security & Authentication

Data Hiding: Managing production environment variables with dotenv.Password Hashing: Storing passwords securely via bcrypt.User Sessions: Token-based authentication using JSON Web Tokens (JWT).Security Headers: Injecting basic protection layers against attacks with helmet.js

Module 9

Advanced Concepts & Real-Time Communication

File Uploads: Parsing multi-part form data with multer.WebSockets: Building real-time features like chat engines using Socket.io.Optimization: Multi-core scaling via the Cluster Module and PM2 process manager

Module 10

Testing & Debugging

Unit Testing: Writing backend test scripts using frameworks like Jest or Mocha.API Testing: Simulating server endpoints directly via supertest.Debugger Tools: Monitoring active processes via Node Inspector or VS Code tools

Module 11

Deployment & CI/CD

Containerization: Packaging applications safely into isolated Docker containers.Cloud Hosting: Moving code to live platforms such as AWS, Render, or Heroku.

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