Node.js API Mastery

Overview: Master Node's platform primitives to build high-performance, production-grade services.

Prerequisites: Strong JavaScript/TypeScript fundamentals, Basic familiarity with CLI tools.

Outcomes: Streams, workers, crypto, packaging, debugging.

Benefits

Learners will gain a deep understanding of Node.js internals, including the event loop, async patterns, and system-level APIs, enabling them to design services that are both performant and reliable. They will acquire hands-on skills with streams, buffers, and backpressure management, which are essential for building high-throughput systems like media servers or real-time applications. The course also covers concurrency models using worker threads and clustering, ensuring learners can scale applications effectively. With a strong focus on cryptography, debugging, and packaging, students will leave equipped to secure, test, and deploy Node.js services at a production-ready level. Ultimately, this course bridges the gap between basic Node usage and professional system-level mastery, making learners stand out in backend engineering roles.

Training Key Features

• Deep Dive into Node.js Internals – Master the event loop, async phases, and concurrency models.
• Real-World Performance Skills – Work with streams, buffers, and backpressure to handle large-scale data.
• Security-First Practices – Apply hashing, JWT verification, and modern algorithms like argon2.
• Concurrency & Parallelism – Learn Worker Threads, Clustering, and child processes for scaling apps.
• Debugging Confidence – Use --inspect, VSCode tools, heap snapshots, and flamegraphs to solve issues.
• Testing Excellence – Write robust unit and integration tests with Jest, ESM, and supertest.
• System-Level Packaging – Explore npm workspaces, versioning, and publishing strategies.
• Hands-On Projects – Apply each concept through practical labs and build high-performance APIs.
• Future-Proof Skills – Strong foundations transferable to frameworks like Express, Fastify, or NestJS.
• Career-Ready Outcomes – Build production-grade Node.js services that make you stand out in backend roles.

Course Modules

Module 1 – Runtime & Event Loop

Event loop phases && Microtasks vs Macrotasks && Execution order

Module 2 – Filesystem APIs

Async file operations && Streaming reads/writes && Backpressure handling

Module 3 – Streams & Buffers

Readable && Writable && Transform && Pipelines

Module 4 – HTTP/HTTPS Servers

Native HTTP server && Connection keep-alive && Intro to HTTP/2

Module 5 – Asynchronous Patterns

Callbacks to Promises && Async/Await && Task cancellation techniques

Module 6 – Concurrency & Scaling

Worker Threads && Clustering && Child processes

Module 7 – System & Cryptography

Hashing && HMAC && JWT verification && PBKDF2 && Argon2

Module 8 – Debugging & Profiling

Node --inspect && VSCode Debugger && Heap profiles && Flamegraphs

Module 9 – Testing Strategies

Jest with ESM/TS && Integration testing with supertest && Test best practices

Module 10 – Packaging & Distribution

npm workspaces && Package publishing && Semantic versioning (semver)