



# TRAINING TRAINS

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உங்கள் கடை மற்றும் வியாபாரத்திற்கு ஏற்ற **Website & Andriod App** மற்றும் **Software** மிகச்சிறந்த முறையில் செய்து கொடுக்கப்படும்.

Expertise : **AI, Machine Learning & Data Science \ Cybersecurity & Ethical Hacking**  
**IoT, Blockchain & Cloud Computing \ Full Stack Web & Mobile Development**  
**Digital Marketing & SEO**

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# Node.js – 100+ Lab Exercises (Basic, Intermediate, Advanced)

## □ Basic Level (30+ Exercises)

**Objective:** Understand core Node.js features including modules, file systems, and event-driven architecture.

### □ Introduction to Node.js

- Print "Hello from Node.js".
- Display command-line arguments using `process.argv`.
- Create a simple script to add two numbers from CLI.
- Setup and run a basic `package.json`.
- Use `npm` to install and run a package.

### □ Core Modules

- Use the `fs` module to read/write files.
- Create and delete files dynamically.
- Use `path` to join and resolve file paths.
- Log system information using the `os` module.
- Create a basic timer using the `timers` module.

### □ Modules & Exports

- Create a reusable math utility module.
- Export and import functions between files.
- Demonstrate module caching.
- Structure code with CommonJS modules.

### □ Events & EventEmitter

- Create and trigger custom events.
- Build a file watcher using `EventEmitter`.
- Use event listeners for different events.



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## ☐ HTTP Server Basics

- Create a basic HTTP server with `http`.
- Serve HTML content via `res.end()`.
- Send dynamic responses based on URL path.
- Set appropriate headers and status codes.

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## ☐ Intermediate Level (40+ Exercises)

**Objective:** Implement REST APIs, use Express.js, and connect with databases.

### ☐ Express.js Fundamentals

- Setup an Express.js server.
- Define multiple routes (`GET`, `POST`, `PUT`, `DELETE`).
- Use route parameters and query strings.
- Send JSON responses.
- Handle form data with `body-parser`.

### ☐ Routing & Middleware

- Create global and route-specific middleware.
- Implement error-handling middleware.
- Create an authentication middleware.
- Use CORS middleware for cross-origin requests.
- Organize routers using `express.Router()`.

### ☐ File & Directory Operations

- Upload files using `multer`.
- Create an image gallery with uploaded files.
- Handle JSON data and save it to local files.
- Generate logs using a custom logger module.

### ☐ Working with Databases

- Connect Node.js to **MongoDB** using Mongoose.
- Define and use MongoDB schemas.
- Perform CRUD operations (`create`, `read`, `update`, `delete`).



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- Use **PostgreSQL** with `pg` for querying.
- Create REST API with database persistence.

## □ Async Programming

- Use callbacks to manage I/O tasks.
- Rewrite logic using Promises.
- Convert Promises to `async/await`.
- Handle nested async operations with `try/catch`.

## □ Advanced Level (40+ Exercises)

**Objective:** Build production-ready services with security, real-time updates, and scalability.

## □ Advanced Express & REST APIs

- Build a complete CRUD API with route validation.
- Use `Joi` for input validation.
- Integrate Swagger/OpenAPI documentation.
- Use `dotenv` to manage environment variables.
- Implement pagination and filtering.

## □ Authentication & Security

- Create JWT-based user authentication.
- Hash passwords with `bcrypt`.
- Secure routes using authentication middleware.
- Set up role-based access control.
- Sanitize input to prevent injection attacks.

## □ WebSocket & RealTime Apps

- Create a real-time chat app using `socket.io`.
- Emit and listen for socket events.
- Broadcast messages to all clients.
- Maintain a list of active users in real-time.
- Integrate WebSocket with Express server.

## □ Package Ecosystem & Tools



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- Use `nodemon` for auto-restarts.
- Use `morgan` for HTTP request logging.
- Create a CLI tool using `yargs`.
- Bundle code using Webpack or esbuild.

## □ RESTful & MVC Architecture

- Organize code using Model-View-Controller pattern.
- Use services and repositories.
- Separate route, controller, and business logic.
- Implement advanced error handling using a centralized utility.

## □ Deployment & DevOps

- Prepare app for production with `pm2`.
- Create a Dockerfile for containerization.
- Connect app to a remote MongoDB Atlas cluster.
- Deploy on Heroku/Vercel/Render.
- Monitor performance with `New Relic` or `LogRocket`.

## □ Testing & Quality Assurance

- Write unit tests using `Jest`.
- Create integration tests using `Supertest`.
- Mock database operations for isolation.
- Measure test coverage.
- Implement CI/CD pipelines using GitHub Actions.

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## □ Capstone Projects

- **Blogging Platform API** – CRUD articles with JWT auth.
  - **Real-time Chat Application** – Using Socket.io.
  - **File Upload Service** – With validation and storage.
  - **E-commerce Backend** – Product management, cart, orders.
  - **IoT Logger API** – REST API storing sensor data with timestamps.
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## □ TechStack



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- Node.js (v18+)
- Express.js
- MongoDB/Mongoose, PostgreSQL
- Jest, Supertest
- Docker, PM2, Socket.io
- JWT, bcrypt, dotenv