

Complete Node.js Notes

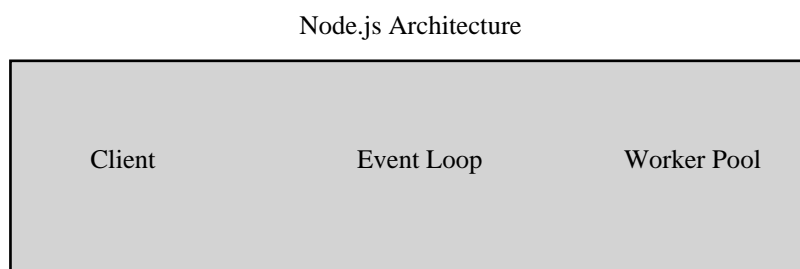
These notes cover Node.js from basics to advanced concepts, suitable for students, interviews, and real-world backend development.

1. Introduction to Node.js

Node.js is a runtime environment that allows JavaScript to run on the server side. It is built on the V8 JavaScript engine and uses an event-driven, non-blocking I/O model.

2. Node.js Architecture

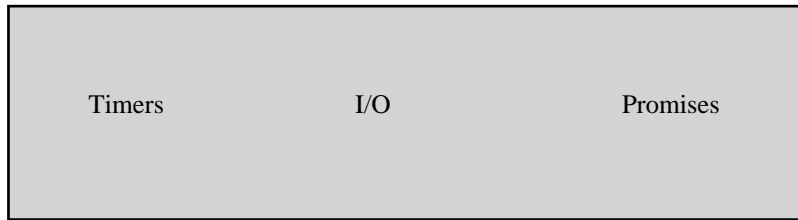
Node.js uses a single-threaded event loop model which can handle multiple concurrent clients efficiently.



3. Event Loop

The event loop handles asynchronous operations such as timers, I/O callbacks, and promises.

Event Loop Phases



4. Modules in Node.js

Modules help split code into reusable parts. CommonJS is the default module system.

5. Core Modules

Some important core modules are fs, http, path, os, events.

6. npm (Node Package Manager)

npm is used to install and manage third-party libraries.

7. Express.js

Express is a minimal web framework for building APIs and web servers.

8. Middleware

Middleware functions execute between request and response cycles.

9. REST API

REST APIs use HTTP methods such as GET, POST, PUT, DELETE to perform CRUD operations.

10. Authentication

JWT and session-based authentication are commonly used in Node.js apps.

11. Database Integration

Node.js works well with MongoDB, MySQL, PostgreSQL.

12. Error Handling

Centralized error handling improves application reliability.

13. File Uploads

Multer is commonly used for handling file uploads.

14. Environment Variables

dotenv is used to manage environment variables securely.

15. Deployment

Node.js applications can be deployed using PM2, Docker, and cloud VPS.

Quick Interview Points

- Node.js is single-threaded but highly scalable.
- Uses non-blocking I/O.
- Built on Chrome V8 engine.
- Best for real-time applications.
- Not suitable for CPU-intensive tasks.