Building Microservices with Node.js Course

Course Duration: 40 Hours **Course code: NODE-MS-101**

1. Course Overview

This course provides a comprehensive understanding of designing and building scalable microservices using Node.js. It covers core concepts of microservices architecture, API design, inter-service communication, containerization, and deployment. Learners will gain hands-on experience in developing, testing, and deploying microservices for modern cloud-based applications.

2. What you'll learn?

By the end of the course, you will be able to:

- Understand microservices architecture and its benefits
- Build RESTful APIs using Node.js and Express
- Design scalable and loosely coupled services
- Implement inter-service communication patterns
- Use databases effectively in microservices
- Containerize applications using Docker
- Deploy microservices to cloud platforms
- Implement logging, monitoring, and security

3. Target Audience

- Backend Developers
- Full Stack Developers
- Node.js Developers
- Software Engineers
- DevOps Engineers

4. Pre-Requisites

Before taking this course, you should have:

- Basic knowledge of JavaScript and Node.js
- Understanding of REST APIs
- Familiarity with databases (SQL/NoSQL)
- Basic knowledge of Git and command line

5. Course content

Module 1: Course Introduction

- Course overview and objectives
- Introduction to microservices architecture
- Monolithic vs microservices comparison

Module 2: Node.js Fundamentals for Microservices

- Node.js runtime and event loop
- Express.js framework
- Middleware concepts
- Structuring Node.js applications

Module 3: Designing Microservices Architecture

- Service decomposition strategies
- Domain-driven design basics
- API gateway pattern
- Service boundaries and responsibilities

Module 4: Building RESTful APIs

- Designing REST APIs
- CRUD operations
- Request validation
- Error handling

Module 5: Database Integration

- Choosing databases (SQL vs NoSQL)
- Connecting Node.js with databases
- ORM/ODM tools
- Data consistency patterns

Module 6: Inter-Service Communication

- Synchronous communication (HTTP/REST)
- Asynchronous communication (message queues)
- Event-driven architecture
- Using tools like RabbitMQ or Kafka

Module 7: API Gateway and Service Discovery

- API gateway implementation
- Routing and aggregation
- Service discovery concepts
- Load balancing

Module 8: Authentication and Authorization

- JWT-based authentication
- OAuth basics
- Securing APIs
- Role-based access control

Module 9: Containerization with Docker

- Docker fundamentals
- Creating Dockerfiles
- Containerizing Node.js services
- Managing containers

Module 10: Orchestration with Kubernetes

- Introduction to Kubernetes
- Deploying microservices on Kubernetes
- Managing pods and services
- Scaling applications

Module 11: Logging and Monitoring

- Centralized logging
- Monitoring tools and practices
- Health checks
- Debugging distributed systems

Module 12: Testing Microservices

- Unit testing
- Integration testing
- API testing
- Testing strategies

Module 13: CI/CD for Microservices

- Setting up CI/CD pipelines
- Automated testing and deployment
- Version control integration
- Continuous delivery practices

Module 14: Performance and Scalability

- Scaling microservices
- Caching strategies
- Load testing
- Performance optimization

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Module 15: Real-World Project and Capstone

- Building an end-to-end microservices application
- Implementing API gateway and communication
- Deployment to cloud environment
- Final project and evaluation

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