



# TRAINING TRAINS

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உங்கள் கடை மற்றும் வியாபாரத்திற்கு ஏற்ற **Website & Android 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**  
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# Back-End Developer Lab Exercises (100+)

## Basic Level (30+ Exercises)

*Objective: Understand the fundamentals of server-side programming, databases, and basic APIs.*

### Core Programming (Node.js, Python, PHP)

- Create a simple HTTP server using Node.js.
- Build a 'Hello World' API endpoint in Express.js.
- Develop a CLI app for note-taking in Python.
- Write a program that accepts user input and stores it in a text file.
- Create a RESTful route for GET, POST in PHP.
- Implement a basic calculator API in Python Flask.

### Database Fundamentals (MySQL / MongoDB)

- Create a database and tables using SQL.
- Insert, update, delete, and select records in MySQL.
- Create and query collections in MongoDB.
- Connect a Node.js app to MongoDB using Mongoose.
- Write a SQL query to join two tables.
- Build a Python script to import CSV data to MySQL.

### Basic Authentication & Sessions

- Implement user login with session storage in Express.
- Create a registration and login form in PHP.
- Hash passwords using bcrypt in Node.js.
- Validate login credentials against a database.
- Store login sessions using cookies.



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## APIs and HTTP Concepts

- Build a static JSON REST API.
- Use Postman to test CRUD endpoints.
- Log incoming requests to the server.
- Respond with dynamic data based on query parameters.
- Create a basic middleware for request logging.

## Intermediate Level (40+ Exercises)

*Objective: Design RESTful APIs, integrate databases, manage user sessions, and handle asynchronous tasks.*

### Advanced API Development

- Build a CRUD API for blog posts.
- Implement pagination and filtering in APIs.
- Create file upload API using multer (Node.js).
- Handle request validation using Joi.
- Implement rate limiting to prevent API abuse.
- Build an authentication system using JWT.

### Database Operations

- Build relational models and foreign keys in MySQL.
- Use MongoDB aggregation for analytics.
- Create backup and restore operations for a database.
- Manage DB connection pooling in Node.js.
- Write stored procedures and triggers in MySQL.
- Implement indexing and performance optimization.

### Middleware and Error Handling

- Create a custom error handler middleware.
- Catch unhandled exceptions and rejections.
- Log errors to a file using Winston or custom logger.
- Secure APIs with helmet, CORS, and sanitizers.
- Structure Express app using MVC pattern.



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## Session Management

- Implement login/logout flow with JWT tokens.
- Build a session-based shopping cart.
- Implement 'Remember Me' functionality.
- Use Redis to store session data.

## Background Jobs and Task Scheduling

- Schedule a cron job for cleanup tasks.
- Send emails using nodemailer or SMTP.
- Process image uploads in the background.
- Create a worker queue using Bull (Node.js).

## 🔗 Advanced Level (40+ Exercises)

*Objective: Design full-scale applications, microservices, and implement CI/CD, caching, websockets, and performance tuning.*

## Full Stack Backend Projects

- Develop a user management API with roles and permissions.
- Create an e-commerce backend with product, cart, and order services.
- Build a multi-user blog system with comment moderation.
- Develop a forum API with threads and replies.
- Implement a movie booking backend with seat reservation logic.

## Microservices and Architecture

- Split an app into microservices using Docker.
- Implement service-to-service communication using REST.
- Use message brokers like RabbitMQ or Kafka.
- Build a service registry and discovery mechanism.
- Add API gateway using NGINX or Express Gateway.

## Caching & Optimization

- Cache responses using Redis.
- Implement data caching with ETags and headers.



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- Profile and optimize SQL queries.
- Use lazy loading and batching with GraphQL.
- Implement database replication and sharding.

## Real-time and WebSocket

- Create a real-time chat server using Socket.io.
- Build a live notification service.
- Implement WebSocket authentication.
- Broadcast stock ticker updates in real-time.
- Monitor user typing status in chat.

## Security & Testing

- Secure REST API endpoints with RBAC.
- Write unit and integration tests using Jest or Mocha.
- Perform penetration testing using OWASP ZAP.
- Implement CSRF protection for forms.
- Validate user inputs to prevent SQL injection.

## DevOps and Deployment

- Write a Dockerfile for a backend app.
- Create a CI/CD pipeline using GitHub Actions.
- Deploy Node.js app to Heroku or DigitalOcean.
- Configure NGINX as a reverse proxy.
- Set up environment variables securely.