

Back-end developer

The Foundation

HTTP/HTTPS basics

DNS, TLS, certificates

Client-server model

request lifecycle

Basic networking: ports, IPs

TCP vs UDP

reverse proxies (NGINX)

JavaScriptTypeScript (Node.js, Deno)

Python

Java / Kotlin

Go

C# (.NET Core)

Rust

Languages & Runtimes

Web Frameworks & API Design

REST principles

GraphQL: schema design

gRPC / Protobuf

Choose framework(s) for your language

Django / FastAPI (Python)

Express / Fastify / NestJS (Node)

Relational: SQL fundamentals

NoSQL: MongoDB, Cassandra

Caching

Storage: file vs blob decisions

Backups and lifecycle policies

Data modeling for scalability

Databases & Storage

Authentication, Authorization & Security

Auth basics: sessions, cookies, token-based auth

OAuth2 / OpenID Connect flows

Secrets management (vaults / cloud KMS)

input validation, parameterized queries to prevent injection, secure headers, rate-limiting, CSP, secure cookie flags

Hardware security modules

Unit testing, integration testing

end-to-end testing strategies

tests for microservices

Test doubles: mocks, fakes, stubs

Automate tests in CI pipelines.

Testing & Quality

DevOps — Build & CI/CD & Packaging

Build systems: Docker images

CI/CD fundamentals: lint → test → build → deploy pipelines (GitHub Actions, GitLab CI, Jenkins)

Immutable infrastructure and reproducible builds

Blue/Green and Canary deployments

Container basics (Dockerfile)

Kubernetes essentials

IaC: Terraform

Alternatives / patterns: AWS Lambda / Cloud Run

Containers, Orchestration & Infrastructure

Observability & Reliability

Logging: structured logs, correlation IDs

log aggregation (ELK / OpenSearch / managed services)

Metrics: Prometheus, client instrumentation

Tracing: OpenTelemetry

Incident response: runbooks, alerts, postmortems, chaos testing

Horizontal vs vertical scaling

load balancing, stateless services

Data partitioning: sharding, CQRS

Backpressure, rate limiting, batching

Cost-aware design: autoscaling

Performance & Scalability

Build your Projects

CRUD REST API (todo app)

Social feed with media uploads

E-commerce backend with microservices

hello Backend developer