# Development of Cloud Applications

## Requirements

later

## LECTURES

| LECTURE STRUCTURE | LAB STRUCTURE |
|---|---|
| **L1 – Introduction to Cloud Computing**<br><br>**** Cloud service models (IaaS, PaaS, SaaS)***<br>**** Deployment models (public, private, hybrid)***<br>**** Shared responsibility model***<br>**** Overview of Azure ecosystem*** | **Lab 1 – Environment Setup**<br>** Azure student subscription activation*<br>** Install Azure CLI*<br>** GitHub repo creation*<br>** CodeSandbox project setup* |
| **L2 – Cloud Architecture Principles**<br><br>**** 12-Factor App methodology***<br>**** Stateless vs stateful services***<br>**** Horizontal scaling***<br>**** REST architecture basics*** | **Lab 2 – Building a REST API**<br>** Node.js / Express API*<br>** CRUD endpoints*<br>** Environment variables*<br>** Local testing with Postman* |
| **L3 – Designing Cloud Applications**<br><br>**** Microservices vs monolith***<br>**** API-first design***<br>**** OpenAPI specification***<br>**** Basic system design patterns*** | **Lab 3 – Containerization**<br>** Writing Dockerfile*<br>** Building images*<br>** Running containers locally*<br>** Docker Compose basics* |
| **L4 – Containers and Virtualization**<br><br>**** Containers vs VMs***<br>**** Docker architecture***<br>**** Images, containers, volumes, networks***<br>**** Multi-stage builds*** | **Lab 4 – Azure Deployment (PaaS)**<br>** Deploy to Azure App Service*<br>** Configure environment variables*<br>** Connect to Azure SQL (free tier)* |
| **L5 – Cloud Deployment Models in Azure**<br><br>**** Azure App Service***<br>**** Azure Container Apps***<br>**** Azure Storage (Blob, Table)***<br>**** Azure SQL Database*** | **Lab 5 – Persistent Storage**<br>** Azure SQL or Azure Storage*<br>** Data modeling*<br>** Basic migrations* |
| **L6 – DevOps & CI/CD Fundamentals**<br><br>**** Git workflow***<br>**** GitHub Actions basics***<br>**** Build pipelines***<br>**** Infrastructure as Code concept*** | **Lab 6 – CI/CD**<br>** GitHub Actions workflow*<br>** Automated build & deploy*<br>** Versioning strategy* |

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| **L7 – Security & Identity in Cloud**<br><br>**** Authentication vs Authorization***<br>**** OAuth2 / JWT basics***<br>**** Azure Active Directory fundamentals***<br>**** Secret management*** | **Lab 7 – Midterm Project Checkpoint**<br>** Architecture review*<br>** Code review*<br>** Deployment validation* |
| **L8 – Cloud Databases & Storage**<br>** Relational vs NoSQL*<br>** Azure SQL vs Cosmos DB*<br>** Data consistency models*<br>** Migration basics* | **Lab 8 – Authentication**<br>** JWT implementation*<br>** Role-based authorization*<br>** Secure endpoints* |
| **L9 – Serverless Architectures**<br>** Event-driven systems*<br>** Azure Functions*<br>** Triggers & bindings*<br>** Use cases* | **Lab 9 – Serverless Extension**<br>** Azure Function integration*<br>** Event-based processing* |
| **L10 – Observability & Monitoring**<br>** Logging principles*<br>** Metrics vs traces*<br>** Azure Monitor & Application Insights*<br>** Health checks* | **Lab 10 – Monitoring & Logging**<br>** Enable Application Insights*<br>** Logging middleware*<br>** Analyze telemetry* |