

Development of Cloud Applications

Requirements

later

LECTURES

LECTURE STRUCTURE	LAB STRUCTURE
L1 - Introduction to Cloud Computing // * Cloud service models (IaaS, PaaS, SaaS) * Deployment models (public, private, hybrid) * Shared responsibility model * Overview of Azure ecosystem//	Lab 1 - Environment Setup * Azure student subscription activation * Install Azure CLI * GitHub repo creation * CodeSandbox project setup
L2 - Cloud Architecture Principles // * 12-Factor App methodology * Stateless vs stateful services * Horizontal scaling * REST architecture basics//	Lab 2 - Building a REST API * Node.js / Express API * CRUD endpoints * Environment variables * Local testing with Postman
L3 - Designing Cloud Applications // * Microservices vs monolith * API-first design * OpenAPI specification * Basic system design patterns //	Lab 3 - Containerization * Writing Dockerfile * Building images * Running containers locally * Docker Compose basics
L4 - Containers and Virtualization // * Containers vs VMs * Docker architecture * Images, containers, volumes, networks * Multi-stage builds //	Lab 4 - Azure Deployment (PaaS) * Deploy to Azure App Service * Configure environment variables * Connect to Azure SQL (free tier)
L5 - Cloud Deployment Models in Azure // * Azure App Service * Azure Container Apps * Azure Storage (Blob, Table) * Azure SQL Database//	Lab 5 - Persistent Storage * Azure SQL or Azure Storage * Data modeling * Basic migrations
L6 - DevOps & CI/CD Fundamentals // * Git workflow * GitHub Actions basics * Build pipelines * Infrastructure as Code concept//	Lab 6 - CI/CD * GitHub Actions workflow * Automated build & deploy * Versioning strategy
L7 - Security & Identity in Cloud // * Authentication vs Authorization * OAuth2 / JWT basics * Azure Active Directory fundamentals * Secret management//	Lab 7 - Midterm Project Checkpoint * Architecture review * Code review * Deployment validation

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L8 - Cloud Databases & Storage // * Relational vs NoSQL * Azure SQL vs Cosmos DB * Data consistency models * Migration basics//	Lab 8 - Authentication * <i>JWT implementation</i> * <i>Role-based authorization</i> * <i>Secure endpoints</i>
L9 - Serverless Architectures // * Event-driven systems * Azure Functions * Triggers & bindings * Use cases//	Lab 9 - Serverless Extension * <i>Azure Function integration</i> * <i>Event-based processing</i>
L10 - Observability & Monitoring // * Logging principles * Metrics vs traces * Azure Monitor & Application Insights * Health checks//	Lab 10 - Monitoring & Logging * <i>Enable Application Insights</i> * <i>Logging middleware</i> * <i>Analyze telemetry</i>
L11 - Scalability & Performance // * Load balancing * Caching strategies * CDN basics * Cost optimization//	Lab 11 - Scaling & Performance * <i>Load testing (basic tools)</i> * <i>Scaling App Service</i> * <i>Caching layer (Redis concept demo)</i>
L12 - Resilience & Reliability // * Retry patterns * Circuit breaker * SLA/SLO basics * Backup strategies//	Lab 12 - Infrastructure as Code * <i>Simple Bicep template</i> * <i>Automated provisioning</i>
L13 - Cloud-Native Trends & Final Architecture Review // * Kubernetes overview * Infrastructure as Code (Bicep/Terraform intro) * Edge computing basics * Final project architectural consultation//	Lab 13 - Final Project Presentation * <i>Live deployment demo</i> * <i>Architecture explanation</i> * <i>Peer review</i>

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