

Development of Cloud Applications

Requirements

later

LECTURE STRUCTURE

L1 - Introduction to Cloud Computing

- Cloud service models (IaaS, PaaS, SaaS)
- Deployment models (public, private, hybrid)
- Shared responsibility model
- Overview of Azure ecosystem

L2 - Cloud Architecture Principles

- 12-Factor App methodology
- Stateless vs stateful services
- Horizontal scaling
- REST architecture basics

L3 - Designing Cloud Applications

- Microservices vs monolith
- API-first design
- OpenAPI specification
- Basic system design patterns

L4 - Containers and Virtualization

- Containers vs VMs
- Docker architecture
- Images, containers, volumes, networks
- Multi-stage builds

L5 - Cloud Deployment Models in Azure

- Azure App Service
- Azure Container Apps
- Azure Storage (Blob, Table)
- Azure SQL Database

L6 - DevOps & CI/CD Fundamentals

- Git workflow
- GitHub Actions basics
- Build pipelines
- Infrastructure as Code concept

L7 - Security & Identity in Cloud

- Authentication vs Authorization
- OAuth2 / JWT basics
- Azure Active Directory fundamentals
- Secret management

L8 - Cloud Databases & Storage

- Relational vs NoSQL
- Azure SQL vs Cosmos DB
- Data consistency models
- Migration basics

L9 - Serverless Architectures

- Event-driven systems
- Azure Functions
- Triggers & bindings
- Use cases

L10 - Observability & Monitoring

- Logging principles
- Metrics vs traces
- Azure Monitor & Application Insights
- Health checks

L11 - Scalability & Performance

- Load balancing
- Caching strategies
- CDN basics
- Cost optimization

L12 - Resilience & Reliability

- Retry patterns
- Circuit breaker
- SLA/SLO basics
- Backup strategies

L13 - Cloud-Native Trends & Final Architecture Review

- Kubernetes overview
- Infrastructure as Code (Bicep/Terraform intro)
- Edge computing basics
- Final project architectural consultation

LECTURE STRUCTURE	LAB STRUCTURE
L1 - Introduction to Cloud Computing <ul style="list-style-type: none"> * Cloud service models (IaaS, PaaS, SaaS) * Deployment models (public, private, hybrid) * Shared responsibility model * Overview of Azure ecosystem 	Lab 1 - Environment Setup <ul style="list-style-type: none"> * Azure student subscription activation * Install Azure CLI * GitHub repo creation * CodeSandbox project setup
L2 - Cloud Architecture Principles <ul style="list-style-type: none"> * 12-Factor App methodology * Stateless vs stateful services * Horizontal scaling * REST architecture basics 	Lab 2 - Building a REST API <ul style="list-style-type: none"> * Node.js / Express API * CRUD endpoints * Environment variables * Local testing with Postman
L3 - Designing Cloud Applications <ul style="list-style-type: none"> * Microservices vs monolith * API-first design * OpenAPI specification * Basic system design patterns 	Lab 3 - Containerization <ul style="list-style-type: none"> * Writing Dockerfile * Building images * Running containers locally * Docker Compose basics
L4 - Containers and Virtualization <ul style="list-style-type: none"> * Containers vs VMs * Docker architecture * Images, containers, volumes, networks * Multi-stage builds 	Lab 4 - Azure Deployment (PaaS) <ul style="list-style-type: none"> * Deploy to Azure App Service * Configure environment variables * Connect to Azure SQL (free tier)
L5 - Cloud Deployment Models in Azure <ul style="list-style-type: none"> * Azure App Service * Azure Container Apps * Azure Storage (Blob, Table) * Azure SQL Database 	Lab 5 - Persistent Storage <ul style="list-style-type: none"> * Azure SQL or Azure Storage * Data modeling * Basic migrations
L6 - DevOps & CI/CD Fundamentals <ul style="list-style-type: none"> * Git workflow * GitHub Actions basics * Build pipelines * Infrastructure as Code concept 	Lab 6 - CI/CD <ul style="list-style-type: none"> * GitHub Actions workflow * Automated build & deploy * Versioning strategy
L7 - Security & Identity in Cloud <ul style="list-style-type: none"> * Authentication vs Authorization * OAuth2 / JWT basics * Azure Active Directory fundamentals * Secret management 	Lab 7 - Midterm Project Checkpoint <ul style="list-style-type: none"> * Architecture review * Code review * Deployment validation
L8 - Cloud Databases & Storage <ul style="list-style-type: none"> * Relational vs NoSQL * Azure SQL vs Cosmos DB * Data consistency models * Migration basics 	Lab 8 - Authentication <ul style="list-style-type: none"> * JWT implementation * Role-based authorization * Secure endpoints
L9 - Serverless Architectures <ul style="list-style-type: none"> * Event-driven systems * Azure Functions * Triggers & bindings * Use cases 	Lab 9 - Serverless Extension <ul style="list-style-type: none"> * Azure Function integration * Event-based processing
L10 - Observability & Monitoring <ul style="list-style-type: none"> * Logging principles * Metrics vs traces * Azure Monitor & Application Insights * Health checks 	Lab 10 - Monitoring & Logging <ul style="list-style-type: none"> * Enable Application Insights * Logging middleware * Analyze telemetry

LECTURE STRUCTURE	LAB STRUCTURE
L11 - Scalability & Performance <ul style="list-style-type: none">* <i>Load balancing</i>* <i>Caching strategies</i>* <i>CDN basics</i>* <i>Cost optimization</i>	Lab 11 - Scaling & Performance <ul style="list-style-type: none">* <i>Load testing (basic tools)</i>* <i>Scaling App Service</i>* <i>Caching layer (Redis concept demo)</i>
L12 - Resilience & Reliability <ul style="list-style-type: none">* <i>Retry patterns</i>* <i>Circuit breaker</i>* <i>SLA/SLO basics</i>* <i>Backup strategies</i>	Lab 12 - Infrastructure as Code <ul style="list-style-type: none">* <i>Simple Bicep template</i>* <i>Automated provisioning</i>
L13 - Cloud-Native Trends & Final Architecture Review <ul style="list-style-type: none">* <i>Kubernetes overview</i>* <i>Infrastructure as Code (Bicep/Terraform intro)</i>* <i>Edge computing basics</i>* <i>Final project architectural consultation</i>	Lab 13 - Final Project Presentation <ul style="list-style-type: none">* <i>Live deployment demo</i>* <i>Architecture explanation</i>* <i>Peer review</i>

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