

# Development of Cloud Applications

## Requirements

later

## LECTURES

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

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<b>L9 - Serverless Architectures</b> <ul style="list-style-type: none"><li>* Event-driven systems</li><li>* Azure Functions</li><li>* Triggers &amp; bindings</li><li>* Use cases</li></ul>	<b>Lab 9 - Serverless Extension</b> <ul style="list-style-type: none"><li>* Azure Function integration</li><li>* Event-based processing</li></ul>
<b>L10 - Observability &amp; Monitoring</b> <ul style="list-style-type: none"><li>* Logging principles</li><li>* Metrics vs traces</li><li>* Azure Monitor &amp; Application Insights</li><li>* Health checks</li></ul>	<b>Lab 10 - Monitoring &amp; Logging</b> <ul style="list-style-type: none"><li>* Enable Application Insights</li><li>* Logging middleware</li><li>* Analyze telemetry</li></ul>
<b>L11 - Scalability &amp; Performance</b> <ul style="list-style-type: none"><li>* Load balancing</li><li>* Caching strategies</li><li>* CDN basics</li><li>* Cost optimization</li></ul>	<b>Lab 11 - Scaling &amp; Performance</b> <ul style="list-style-type: none"><li>* Load testing (basic tools)</li><li>* Scaling App Service</li><li>* Caching layer (Redis concept demo)</li></ul>
<b>L12 - Resilience &amp; Reliability</b> <ul style="list-style-type: none"><li>* Retry patterns</li><li>* Circuit breaker</li><li>* SLA/SLO basics</li><li>* Backup strategies</li></ul>	<b>Lab 12 - Infrastructure as Code</b> <ul style="list-style-type: none"><li>* Simple Bicep template</li><li>* Automated provisioning</li></ul>
<b>L13 - Cloud-Native Trends &amp; Final Architecture Review</b> <ul style="list-style-type: none"><li>* Kubernetes overview</li><li>* Infrastructure as Code (Bicep/Terraform intro)</li><li>* Edge computing basics</li><li>* Final project architectural consultation</li></ul>	<b>Lab 13 - Final Project Presentation</b> <ul style="list-style-type: none"><li>* Live deployment demo</li><li>* Architecture explanation</li><li>* Peer review</li></ul>

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