AI-INTEGRATED MULTI-CLOUD TRAINING PROGRAM

FULL DETAILED SYLLABUS (AWS + GCP + AI + DevOps + MLOps)

TRACK 1: CLOUD FOUNDATIONS (AWS + GCP)

Certifications: AWS Cloud Practitioner (CLF-C02), GCP Digital Leader

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MODULE 1: Cloud & Multi-Cloud Fundamentals

- Cloud computing models (IaaS, PaaS, SaaS)
- Virtualization & containers introduction
- Multi-cloud adoption strategies and benefits
- AWS vs GCP global infrastructure deep dive
- Understanding Shared Responsibility Model

MODULE 2: Compute Services

- AWS EC2: AMIs, instance families, security groups
- GCP Compute Engine: machine types, images, disks
- Auto-healing, snapshots, image creation
- Hands-On: Deploy EC2 & Compute Engine servers

MODULE 3: Storage Systems & Data Management

- AWS S3: buckets, encryption, lifecycle, versioning
- GCP Cloud Storage: classes, retention, lifecycle
- Object storage vs file/block storage concepts
- Hands-On: Host static website on S3 & GCP

MODULE 4: Networking & Connectivity

- AWS VPC: subnets, NACLs, routes, NAT, gateways
- GCP VPC: regional networks, firewalls, routes
- DNS fundamentals, private vs public networks

- Hands-On: Create secure VPC on AWS & GCP

MODULE 5: IAM, Security & Compliance

- Identity & Access Management (AWS & GCP)
- MFA, roles, policies, service accounts
- Encryption standards, KMS, CMEK
- Cloud governance frameworks: SOC2, ISO, HIPAA

MODULE 6: Billing, Cost Optimization & FinOps Intro

- AWS Billing Dashboard, Cost Explorer, Savings Plans
- GCP Billing Profiles, Budgets, committed use discounts
- Cost monitoring, tagging, allocation strategies

MODULE 7: AI Essentials for Cloud Engineers

- What is AI/ML? Use cases in cloud workloads
- AWS Rekognition: image classification, facial analysis
- GCP Vision API: OCR, landmark detection
- Hands-On: Build image-labeling service

MODULE 8: Git & GitHub for Cloud Engineering

- Git basics, version control, branching
- GitHub repo creation, collaboration workflows
- Hands-On: Push cloud lab artifacts to GitHub

TRACK 2: CLOUD DEVELOPER (AWS + GCP)

Certifications: AWS Developer Associate, GCP Associate Cloud Engineer

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MODULE 1: Serverless Application Development

- AWS Lambda architecture, concurrency, packaging
- GCP Cloud Run: deploying containerized apps

- Event-driven design (S3, Pub/Sub triggers)
- Hands-On: Build serverless CRUD app

MODULE 2: API Engineering & Observability
- AWS API Gateway: REST, throttling, CORS
- GCP API Gateway: security & authentication
- Logging & monitoring: CloudWatch & Cloud Logging
- Hands-On: Create scalable API endpoints

MODULE 3: CI/CD Pipelines & DevOps Automation
- AWS CodePipeline, CodeBuild workflows
- GCP Cloud Build automation triggers
- Container registry usage (ECR, GCR)
- Hands-On: Build CI/CD pipeline with GitHub triggers

MODULE 4: AI-Powered Application Development
- AWS Comprehend: NLP, sentiment, entities
- GCP Vertex AI APIs: classification, prediction
- Integrating AI into microservices
- Hands-On: Intelligent sentiment-based application

MODULE 5: Git/GitHub for DevOps Engineering
- GitFlow branching strategies
- GitHub Actions introduction (optional)
- Handling secrets & deployment keys

TRACK 3: CLOUD SOLUTIONS ARCHITECT (AWS + GCP)

Certifications: AWS SAA-C03, GCP ACE

MODULE 1: Enterprise Architecture Foundations

- Architectural principles: scalability, elasticity, HA
- Multi-tier architecture patterns
- Multi-region and DR design strategies
- Hands-On: Architect highly available systems

MODULE 2: Cost-Optimized, Secure & Governed Architectures
- Designing for cost, performance, security
- Resource governance frameworks
- Compliance mapping & workload isolation

MODULE 3: Infrastructure-as-Code (IaC)
- CloudFormation deep dive: templates, stacks
- Terraform multi-cloud modules
- State management, versioning, modules
- Hands-On: Deploy infrastructure with IaC

MODULE 4: AI-Ready Cloud Architectures
- ML workflow architecture patterns
- SageMaker pipelines & integration strategies
- Vertex AI enterprise-scale deployments
- Designing ML inference & training clusters

MODULE 5: Git/GitHub for Architecture Teams
- IaC repository patterns
- PR reviews, code validation steps
- Infrastructure CI/CD basics

TRACK 4: APPLIED ARTIFICIAL INTELLIGENCE ON CLOUD

Certifications: AWS AI Practitioner, AWS ML Associate, GCP Generative AI Leader

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MODULE 1: Machine Learning & Generative AI Foundations

- ML lifecycle: data engineering to deployment
- Supervised & unsupervised algorithms
- Deep learning foundations (ANNs, CNNs, RNNs)
- Generative AI: LLMs, embeddings, vector search
- Ethical AI, bias & responsible AI principles

MODULE 2: AWS SageMaker — Full ML Engineering

- Data wrangling with SageMaker processors
- Training jobs, tuning jobs, model registry
- Deployment strategies: endpoints, autoscaling
- Hands-On: Train & deploy ML model

MODULE 3: GCP Vertex AI — ML + GenAI Platform

- AutoML for NLP, vision, tabular data
- Generative AI Studio for LLM development
- Model hosting, embeddings, feature store
- Hands-On: Build GenAI-powered application

MODULE 4: End-to-End MLOps Engineering

- CI/CD for ML workflows
- Feature store design
- Model monitoring, drift detection
- Automated retraining pipelines
- Hands-On: Full MLOps pipeline with GitHub integration

MODULE 5: AI Application Development

- Chatbots using cloud APIs
- NLP applications (NER, sentiment, summarization)
- Computer vision workflows
- Recommendation system development

MODULE 6: Git/GitHub for ML Engineering

- Git LFS for dataset versioning
- Model lifecycle versioning
- Experiment tracking workflows

BONUS ADD-ON MODULES (Optional for All Tracks)

- FinOps for AI/ML Workloads
- Hybrid Multi-Cloud Deployment & Integration
- AI Security & Responsible Cloud Governance
- Python Automation with AWS Boto3 & GCP SDK
- Certification Exam Prep Workshops
- Retake Support & Coaching

END OF DETAILED SYLLABUS
