Training Course on Cloud-Native GIS Applications on AWS

Professional Development Training Course Outline

Category	GIS	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Training Course on Cloud-Native GIS Applications on AWS provides a comprehensive exploration of **Cloud-Native GIS Applications on AWS**, empowering geospatial professionals and developers to leverage the full potential of Amazon Web Services for scalable, resilient, and performant GIS solutions. Participants will delve into core cloud-native principles, mastering containerization with **Docker** and orchestration with **Kubernetes**. The curriculum emphasizes building **microservices architectures** for GIS, implementing robust **CI/CD pipelines**, and optimizing applications for **serverless computing** to ensure efficient resource utilization and reduced operational overhead. This course bridges the gap between traditional GIS and cutting-edge cloud technologies, equipping learners with the skills to design, deploy, and manage next-generation geospatial applications that are inherently scalable, highly available, and cost-effective.

Through hands-on labs and real-world case studies, this training will solidify understanding of key AWS services pertinent to GIS, including **Amazon S3 for cloud-optimized geospatial data storage (COG, GeoParquet, Zarr)**, **Amazon EC2 for scalable processing**, and **AWS Lambda for event-driven geospatial workflows**. The focus will be on practical application, enabling participants to transform existing GIS workflows into cloud-native paradigms, leading to enhanced collaboration, faster data processing, and improved decision-making. By the end of this course, attendees will be proficient in architecting and implementing modern GIS solutions that fully harness the elasticity and global reach of the AWS cloud, driving innovation in diverse geospatial domains.

Programme Curriculum

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Course Duration

5 days

Course Objectives

1. **Architect scalable GIS solutions** on AWS leveraging cloud-native principles.
2. **Containerize geospatial applications** using Docker for portability and efficiency.
3. **Orchestrate GIS microservices** with Kubernetes for high availability and automated management.
4. Implement **CI/CD pipelines for geospatial deployments** on AWS.
5. Design and deploy **serverless GIS functions** using AWS Lambda and API Gateway.
6. Optimize **cloud-optimized geospatial data formats** (COG, GeoParquet, Zarr) on Amazon S3.
7. Utilize **AWS database services** (e.g., Amazon Aurora, Amazon DynamoDB) for spatial data.
8. Implement **geospatial data processing at scale** using AWS services like Amazon EMR or AWS Glue.
9. Monitor and troubleshoot **cloud-native GIS applications** on AWS.
10. Apply **security best practices** for GIS data and applications in the AWS cloud.
11. Integrate **machine learning for geospatial analytics** with AWS AI/ML services.
12. Manage **geospatial workflows** and **infrastructure-as-code** using AWS CloudFormation or Terraform. ?
13. Develop strategies for **cost optimization** in cloud-native GIS environments on AWS.

Organizational Benefits

- **Enhanced Scalability and Performance**: Ability to handle vast geospatial datasets and complex analyses with unprecedented speed and efficiency, eliminating on-premise infrastructure limitations.
- **Reduced Operational Costs**: Optimize resource utilization through serverless and containerized deployments, leading to significant savings on infrastructure and maintenance.

- **Increased Agility and Innovation**: Accelerate development cycles and deploy new GIS capabilities faster through CI/CD and DevOps practices, fostering a culture of rapid innovation.
- **Improved Collaboration and Data Accessibility**: Enable seamless real-time collaboration on geospatial projects across distributed teams, breaking down data silos.
- **Robust Security and Resilience**: Implement industry-leading AWS security features and design highly available, fault-tolerant GIS architectures.
- **Future-Proofing Geospatial Infrastructure**: Adopt modern cloud-native technologies, ensuring adaptability to evolving data volumes and analytical demands.
- **Competitive Advantage**: Leverage advanced geospatial capabilities to derive deeper insights, improve decision-making, and offer innovative location-based services.

Target Audience

1. **GIS Professionals & Analysts**: Seeking to transition existing workflows to the cloud.
2. **Geospatial Developers**: Aiming to build and deploy scalable GIS applications on AWS.
3. **Data Scientists & Engineers**: Working with large spatial datasets and cloud infrastructure.
4. **Solutions Architects**: Designing and implementing cloud-based geospatial solutions.
5. **IT Managers & Project Leads**: Overseeing geospatial infrastructure and projects.
6. **Researchers & Academics**: Utilizing large-scale spatial data for scientific inquiry.
7. **DevOps Engineers**: Interested in automating geospatial deployments on AWS.
8. **Cloud Engineers**: Looking to specialize in geospatial applications.

Course Modules

Module 1: Introduction to Cloud-Native & AWS Fundamentals for GIS

- Understanding cloud-native principles and their relevance to GIS.
- Overview of AWS core services for geospatial workloads (EC2, S3, VPC).
- Introduction to **Cloud-Optimized Geospatial (COG)** formats and their benefits.
- Setting up your AWS environment for GIS development.
- Case Study: Analyzing a public COG dataset of satellite imagery on AWS S3.

Module 2: Containerization with Docker for Geospatial Applications

- Deep dive into Docker: creating, managing, and optimizing Docker images for GIS tools.
- Containerizing popular GIS libraries and applications (e.g., GDAL, GeoPandas, QGIS headless).
- Managing containerized geospatial workflows with Docker Compose.
- Best practices for building efficient and secure GIS containers.
- Case Study: Packaging a Python script for spatial data processing into a Docker image for reproducible analysis.

Module 3: Orchestrating GIS Workloads with Kubernetes on AWS (EKS)

- Introduction to Kubernetes architecture and its role in scaling GIS.
- Deploying and managing containerized GIS applications on Amazon Elastic Kubernetes Service (EKS).
- Scaling strategies for geospatial services (e.g., geocoding APIs, tile servers) with Kubernetes.
- Implementing persistent storage for spatial data in EKS.
- Case Study: Deploying a scalable GeoServer instance on EKS to serve web map services.

Module 4: Building Serverless GIS Applications with AWS Lambda

- Understanding serverless computing and its advantages for event-driven GIS.
- Developing and deploying AWS Lambda functions for common geospatial tasks (e.g., image resizing, metadata extraction).
- Integrating Lambda with other AWS services like S3, DynamoDB, and API Gateway for full-stack GIS applications.
- Cost optimization strategies for serverless geospatial workflows.
- Case Study: Creating a serverless pipeline to automatically process newly uploaded drone imagery on S3 using Lambda and rekognition for feature detection.

Module 5: Geospatial Data Management and Storage on AWS

- Leveraging Amazon S3 for storing massive geospatial datasets (COGs, GeoParquet, Zarr).
- Implementing efficient data access patterns for cloud-optimized formats.
- Introduction to spatial databases on AWS (Amazon Aurora PostgreSQL with PostGIS, Amazon DynamoDB for spatial indexing).
- Data ingestion and transformation strategies using AWS Glue and other ETL services.
- Case Study: Migrating a large PostGIS database to Amazon Aurora with PostGIS extension for improved scalability and performance.

Module 6: Advanced Geospatial Processing and Analytics on AWS

- Performing scalable raster and vector processing using AWS services (e.g., Amazon EMR with Spark, AWS Batch).
- Integrating with open-source geospatial libraries and frameworks (e.g., Dask-GeoPandas, xarray).
- Building custom geoprocessing services and exposing them via APIs.
- Leveraging AWS Data Exchange for accessing third-party geospatial data.
- Case Study: Running a large-scale land cover classification analysis on satellite imagery using Spark on Amazon EMR.

Module 7: CI/CD and DevOps for Cloud-Native GIS

- Implementing Continuous Integration and Continuous Delivery (CI/CD) pipelines for GIS applications using AWS CodePipeline and CodeBuild.
- Automating infrastructure provisioning with Infrastructure-as-Code (IaC) using AWS CloudFormation or Terraform.
- Monitoring and logging cloud-native GIS applications with Amazon CloudWatch and AWS X-Ray.
- Troubleshooting and debugging strategies for cloud-based geospatial systems.
- Case Study: Setting up an automated deployment pipeline for a web mapping application, from code commit to production deployment.

Module 8: Security, Optimization, and Future Trends in Cloud GIS

- Implementing robust security measures for GIS data and applications on AWS (IAM, VPC, Security Groups).
- Strategies for cost optimization and resource governance in AWS GIS environments.
- Exploring advanced topics: Machine Learning for Geospatial (Amazon SageMaker), Real-time GIS (Kinesis).
- Emerging trends in cloud-native geospatial (e.g., serverless GIS analytics, edge computing).
- Case Study: Securing sensitive urban planning data in an AWS environment and implementing cost-saving measures for large data storage.

Training Methodology

- Interactive Lectures
- Hands-on Labs.
- Real-World Case Studies.
- Live Demos.
- Q&A and Discussion Forums.
- Project-Based Learning.
- Expert Instructors.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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