# Developing Serverless Solutions on AWS Training

Duration: **3 Day**

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## Overview

The **{*training}** course provides developers with the knowledge and hands-on experience required to design, build, and deploy modern **event-driven** applications using AWS serverless technologies.

Participants will learn how to leverage core AWS services such as**AWS Lambda**, **Amazon API Gateway**, **Amazon EventBridge**, **Amazon SNS**, **Amazon SQS**, and **AWS Step Functions** to create scalable, resilient, and cost-efficient serverless architectures. The course covers key topics including API development, authentication and authorisation, application security, observability, event-driven integrations, scalability, and **CI/CD automation**.

Through a series of real-world labs and practical exercises, learners will gain experience building, monitoring, securing, and automating the deployment of production-ready serverless applications on AWS.

## Prerequisites

Participants should have:

- Familiarity with AWS Cloud architecture fundamentals
- Knowledge equivalent to **Developing on AWS**
- Understanding of:
  - **AWS Lambda Foundations**
  - **Amazon API Gateway for Serverless Applications**
- Experience developing applications on AWS

## Who Should Attend

This course is designed for:

- **Software Developers**
- **Cloud Developers**
- **Backend Developers**
- **Full Stack Developers**
- **DevOps Engineers**
- **Solutions Architects**
- Development teams building serverless applications
- Professionals adopting AWS serverless architectures

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## What You Will Learn

By the end of this {*training}, you will have gained knowledge and skills in the following areas:

- Apply **event-driven architecture** best practices.
- Build scalable serverless applications using AWS services.
- Develop and optimise **AWS Lambda** functions.
- Build APIs using **Amazon API Gateway**.
- Integrate services using **Amazon EventBridge**, **Amazon SNS**, and **Amazon SQS**.
- Orchestrate workflows using **AWS Step Functions**.
- Implement infrastructure as code using AWS frameworks.
- Apply serverless security and monitoring best practices.
- Automate deployments using CI/CD pipelines.
- Design highly scalable and resilient serverless architectures.

## Outline

### Day 1

### Module 0: Introduction

- Introduction to the Application
- Course Resources
- Lab Environment Setup

### Module 1: Thinking Serverless

#### Modern Serverless Architectures

- **Serverless Architecture**
- Event-Driven Systems
- Microservices Patterns
- AWS Serverless Services

#### Event-Driven Design

- Event Producers and Consumers
- Asynchronous Application Design
- Integration Patterns

### Module 2: API-Driven Development

#### Amazon API Gateway

- API-Based Application Development
- REST and HTTP APIs
- Serverless API Integrations

#### API Types

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- REST APIs
- HTTP APIs
- WebSocket APIs
- GraphQL APIs

**Hands-On Exercise**

- Building an HTTP API with Lambda Integration

## Module 3: Authentication and Authorization

**Authentication vs Authorization**

- Authentication Mechanisms
- Access Control Models

**Amazon Cognito**

- **Amazon Cognito User Pools**
- Federated Identities
- User Management

## Module 4: Serverless Deployment Frameworks

**Infrastructure as Code**

- Declarative vs Imperative Approaches
- Infrastructure Automation

**AWS Serverless Frameworks**

- **AWS CloudFormation**
- **AWS SAM**
- **AWS CDK**
- **AWS Amplify**

**AWS SAM**

- AWS SAM CLI
- Local Testing and Development

## Module 5: Amazon EventBridge and Amazon SNS

**Amazon EventBridge**

- Event Routing
- Event Bus Design
- Event-Driven Integrations

**Amazon SNS**

- Publish/Subscribe Architectures

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- Topics and Filtering

#### Hands-On Exercises

- Building EventBridge Event Buses
- Configuring SNS Topics

### Module 6: Event-Driven Development with Queues and Streams

#### Amazon SQS

- Queue-Based Architectures
- Dead-Letter Queues (DLQs)

#### Amazon Kinesis

- Real-Time Data Streaming
- Stream Processing

#### Hands-On Labs

- Deploying a Simple Serverless Application
- Message Fan-Out with EventBridge

## Day 2

### Module 7: Writing Effective Lambda Functions

#### AWS Lambda Best Practices

- Lambda Lifecycle
- Stateless Design
- Idempotency
- Logging and Error Handling

#### Lambda Configuration

- Memory Optimisation
- Concurrency Management
- Lambda Layers

### Module 8: Workflow Orchestration with AWS Step Functions

#### Workflow Design

- **AWS Step Functions**
- Business Process Automation
- Callback Patterns

#### Workflow Types

- Standard Workflows

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- Express Workflows

**Hands-On Lab**

- Building Workflow Orchestration Solutions

## Module 9: Observability and Monitoring

**Observability Fundamentals**

- Logs
- Metrics
- Traces

**Amazon CloudWatch**

- CloudWatch Logs
- CloudWatch Insights
- CloudWatch Alarms

**AWS X-Ray**

- Distributed Tracing
- Performance Analysis

**Hands-On Lab**

- Monitoring with CloudWatch and X-Ray
- Building Operational Dashboards

## Day 3

## Module 10: Serverless Application Security

**Security Best Practices**

- Secure API Development
- IAM Policies
- Data Protection

**Security Layers**

- API Gateway Security
- Lambda Security
- Data Security

**Auditing and Traceability**

- Security Logging
- Compliance Monitoring

## Module 11: Scaling Serverless Applications

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#### Scalability Considerations

- Lambda Concurrency
- API Gateway Scaling
- Event Source Scaling

### Module 12: Automating the Deployment Pipeline

#### Serverless DevOps

- CI/CD Pipelines
- Deployment Automation

#### AWS Developer Tools

- AWS SAM Deployments
- AWS CDK
- Automation Workflows

#### Hands-On Labs

- Securing Serverless Applications
- Serverless CI/CD on AWS

### Course Wrap-Up

- Review of Key Concepts
- AWS Serverless Best Practices
- Additional Learning Resources