

AWS CloudFormation Masterclass

Duration-4 days

Course Summary

The AWS CloudFormation Masterclass is a hands-on, advanced course designed to build strong expertise in Infrastructure as Code (IaC) using AWS CloudFormation. Participants will progress from CloudFormation fundamentals and template development to advanced stack management, modular infrastructure, multi-account and multi-region deployments, governance, and CI/CD automation.

The course also introduces AWS SAM and AWS CDK and compares them with CloudFormation and Terraform, helping participants understand where each IaC approach fits. Practical labs and a capstone project provide experience designing, deploying, updating, governing, and automating AWS infrastructure using CloudFormation.

Course Objectives

By the end of this course, participants will be able to:

- Understand Infrastructure as Code principles and the role of AWS CloudFormation.
- Create and deploy infrastructure using YAML and JSON CloudFormation templates.
- Understand the CloudFormation stack lifecycle, including creation, updates, change sets, and deletion.
- Build templates using Resources, Parameters, Mappings, Conditions, Rules, Outputs, and Metadata.
- Use CloudFormation intrinsic functions to create dynamic and reusable templates.
- Implement cross-stack references, nested stacks, and modular infrastructure.
- Bootstrap EC2 instances using CloudFormation helper scripts.
- Detect and manage infrastructure changes using CloudFormation Drift Detection.
- Use StackSets for automated multi-account and multi-region deployments.
- Implement reusable infrastructure patterns using CloudFormation Modules and the Registry.

- Understand and use CloudFormation Macros and Lambda-based transformations.
- Integrate CloudFormation with AWS CodePipeline for automated infrastructure delivery.
- Use AWS SAM for serverless application infrastructure.
- Use AWS CDK to define infrastructure using programming languages.
- Compare CloudFormation, SAM, CDK, and Terraform and select an appropriate IaC approach.
- Apply CloudFormation governance, standardization, testing, deployment, and rollback best practices.
- Design an automated enterprise-grade infrastructure deployment pipeline.

Course Outline:

Module 1: Foundations of Infrastructure as Code & AWS CloudFormation

- What is Infrastructure as Code (IaC)?
- Introduction to CloudFormation (Benefits, core concepts, stack lifecycle)
- AWS CloudFormation vs. Manual Management
- JSON and YAML Basics for CloudFormation (Key-value pairs, lists, mappings, syntax rules)
- First AWS CloudFormation Template: Hands-on walkthrough
- **Lab 1:** Hand-Coding Your First Infrastructure Template

Module 2: The Core Lifecycle – Creating, Updating & Deleting Stacks

- Deploying CloudFormation Templates (AWS Management Console & AWS CLI)
- Updating Stacks & Change Sets: Updating an S3 Bucket safely
- Deleting Stacks: Cleanly tearing down resources
- Cost Estimation: Estimating template costs before deployment
- Visual Authoring: Using AWS Application Composer
- Testing tools- Linter, StackCat, Validate template command
- **Lab 2:** Updating Live Stacks Safely using Application Composer & Change Sets

Module 3: CloudFormation Building Blocks (Deep Dive)

- Template Anatomy Overview
- Resources: The mandatory section
- Parameters: Passing dynamic inputs to templates
- Mappings: Static lookups (e.g., Region-to-AMI mapping)
- Outputs & Cross-Stack References: Sharing values across stacks (Fn::ImportValue & Export)
- Conditions & Rules: Dynamic resource creation based on environment or constraints
- Metadata & Template Options: Formatting UI controls, documentation, and stack settings
- Intrinsic Functions: Complete guide (Fn::Ref, Fn::GetAtt, Fn::Join, Fn::Sub, Fn::FindInMap, Fn::Select)
- **Lab 3:** Multi-Environment Web Server Setup

Module 4: Advanced Stack Management & Operations

- EC2 Bootstrapping with Helper Scripts: cfn-init, cfn-signal, cfn-get-metadata, cfn-hup
- Detecting & Managing Drift: Tracking manual changes outside of CloudFormation
- Nested Stacks: Modularizing complex infrastructure architectures
- StackSets: Multi-account and multi-region automated deployments
- **Lab 4:** Automated EC2 Bootstrapping, Drift Auditing

Module 5: Modularity, Extensions & CI/CD

- Imports & Exports: Reusing outputs across independent stacks
- CloudFormation Registry: Managing custom extensions and resource types
- CloudFormation Modules: Creating reusable, standardized resource patterns
- Macros: Transforming templates dynamically using AWS Lambda
- Continuous Delivery for CloudFormation: Integrating with CodePipeline
- **Lab 5:** Enterprise Governance Pipeline & Infrastructure Standardization

Module 6: Beyond Native CloudFormation – SAM, CDK & Modern IaC

- AWS Serverless Application Model (SAM): Extending CloudFormation for serverless architectures
- AWS Cloud Development Kit (CDK): Defining infrastructure using modern programming languages
- Choosing the Right Tool: CloudFormation vs. SAM vs. CDK vs. Terraform
- **Lab 6:** Modernizing IaC: Serverless API using SAM & Code-First Infrastructure using CDK.

Capstone Projects

- DevOps Pipeline with Custom Drift Detection and Automated Rollbacks using AWS CodePipeline.