Service Name

AWS CloudFormation

Service Overview

AWS CloudFormation is a service that helps model and set up AWS resources using infrastructure as code. It allows users to create templates in JSON or YAML format that describe all desired AWS resources and their properties. CloudFormation provisions and configures these resources automatically, eliminating the need for manual creation and configuration. The service manages resources as collections called stacks, which can be created, updated, and deleted as single units. CloudFormation handles dependencies between resources and provides change sets for previewing modifications before deployment, with automatic rollback capabilities if errors occur during provisioning.

Key Use Cases

- Infrastructure as Code: Define and version control AWS infrastructure using JSON or YAML templates for consistent, repeatable deployments across environments
- Multi-region deployment: Replicate application infrastructure across multiple AWS regions using the same templates for disaster recovery and global availability
- Environment management: Create and manage development, staging, and production environments with consistent configurations while enabling easy cleanup through stack deletion
- DevOps automation: Integrate with CI/CD pipelines to automate infrastructure provisioning and updates as part of application deployment workflows
- Compliance and governance: Implement standardized infrastructure configurations with built-in drift detection and policy enforcement across multiple accounts using StackSets

Features

- **Template-based Infrastructure**: Define infrastructure using JSON or YAML templates with support for parameters, mappings, conditions, and outputs
- **Stack Management**: Deploy and manage resources as cohesive units called stacks with full lifecycle management capabilities
- **Change Sets**: Preview proposed changes before deployment to understand the impact of template modifications
- **Automatic Rollback**: Automatically rollback to previous working state if stack creation or updates fail
- **Drift Detection**: Detect when resources have been modified outside of CloudFormation and remediate configuration drift

- **StackSets**: Deploy stacks across multiple AWS accounts and regions with centralized management and governance
- **Custom Resources**: Extend CloudFormation capabilities with custom provisioning logic for third-party or custom AWS resources
- **Import Existing Resources**: Bring existing AWS resources under CloudFormation management without recreating them

Value Proposition

CloudFormation provides native AWS integration with comprehensive support for all AWS services and deep understanding of resource dependencies and relationships. It offers no additional cost for the service itself, with customers paying only for underlying AWS resources:

- The service includes advanced features like pre-deployment validation, operation tracking, and simplified troubleshooting capabilities
- CloudFormation integrates seamlessly with AWS developer tools, supports Infrastructure Composer for visual template design, and provides extensive sample templates
- It offers enterprise-grade capabilities including StackSets for multi-account deployments, drift detection for compliance, and automatic rollback for reliability, making it the authoritative choice for AWS infrastructure automation

Service Integration

CloudFormation integrates natively with virtually all AWS services including compute services like EC2, Lambda, and ECS; storage services like S3, EBS, and EFS; database services like RDS, DynamoDB, and ElastiCache; networking services like VPC, Route53, and Load Balancers; and security services like IAM, KMS, and Secrets Manager. It works closely with AWS developer tools including CodePipeline, CodeBuild, and CodeDeploy for CI/CD integration:

- CloudFormation supports AWS Config for compliance monitoring, CloudTrail for audit logging, and SNS for event notifications
- The service extends through AWS CDK and SAM for higher-level abstractions, and integrates with AWS Backup for stack-level backup and recovery capabilities

Onboarding and Offboarding

Customers can start with CloudFormation by creating an AWS account and accessing the service through the AWS Management Console, CLI, or SDKs. The Getting Started guide provides step-by-step instructions for creating the first stack using sample templates:

- AWS offers guided learning resources including workshops and sample templates organized by service and use case

- Users can begin with simple templates and progressively adopt advanced features like parameters, conditions, and nested stacks
- For visual learners, AWS Infrastructure Composer provides a drag-and-drop interface for template creation
- The service includes extensive documentation, API references, and best practice guides to accelerate adoption and ensure successful implementation

Getting Started Guide:
https://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/GettingStarted.html

Data Removal

CloudFormation provides straightforward data removal through stack deletion, which automatically removes all resources created by the stack in the correct order while respecting dependencies. Resources with DeletionPolicy set to Retain or Snapshot are preserved during stack deletion. For complete offboarding, customers can delete all CloudFormation stacks, remove saved templates from S3 buckets, and delete any retained resources manually. Stack termination protection prevents accidental deletion of critical stacks, and customers can export stack outputs before deletion for migration purposes.

Backup/Restore and Disaster Recovery

CloudFormation provides backup capabilities through integration with AWS Backup, which can create composite recovery points for entire CloudFormation stacks including templates and associated resources. Templates themselves serve as infrastructure blueprints that can be stored in version control systems and S3 for disaster recovery. The service supports cross-region template replication for disaster recovery scenarios and enables quick infrastructure recreation in alternate regions using the same templates, providing infrastructure-level disaster recovery capabilities.

Backup Capabilities

CloudFormation integrates with AWS Backup to create composite backups of entire stacks, including both the CloudFormation template and recovery points for supported resources within the stack. These composite recovery points group related backup data together, enabling restoration of complete application environments. Templates can be versioned and stored in S3 with cross-region replication, and the service maintains stack event history for operational insights and troubleshooting purposes.

Disaster Recovery

CloudFormation supports disaster recovery through template-based infrastructure recreation in alternate regions, enabling rapid recovery of complete environments. The service works with AWS Backup for stack-level recovery and supports cross-region

StackSets for deploying identical infrastructure across multiple regions. While CloudFormation doesn't directly integrate with AWS Elastic Disaster Recovery, it provides the foundation for disaster recovery strategies by enabling consistent infrastructure deployment across regions and availability zones.

Recovery Objectives

CloudFormation helps meet RPO objectives by enabling point-in-time infrastructure snapshots through templates and integration with AWS Backup for application data. For RTO objectives, the service enables rapid infrastructure recreation through automated template deployment, with stack creation times typically measured in minutes depending on resource complexity. Pre-validated templates and change sets reduce deployment failures, while cross-region template replication enables quick disaster recovery site activation, supporting both conservative and aggressive RTO/RPO targets based on architecture design.

Service Constraints

Service Quotas: https://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/cloudformation-limits.html

FAQ: https://aws.amazon.com/cloudformation/faqs/

Technical Requirements

Service Documentation: https://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/default.html

User Guide: https://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/Welcome.html

API Reference: https://docs.aws.amazon.com/AWSCloudFormation/latest/APIReference/

Pricing Overview

Please see the AWS UK G Cloud 15 Pricing Document accompanying this service in the Digital Marketplace.

Public Pricing: https://aws.amazon.com/cloudformation/pricing/

Cost Optimization

CloudFormation itself is free, with customers paying only for underlying AWS resources, making it inherently cost-effective. The service enables cost optimization through infrastructure automation, eliminating manual provisioning errors that can lead to resource waste:

- Templates can include cost-optimized resource configurations like right-sized instances, appropriate storage classes, and scheduled resource shutdown
- Stack-level resource management enables easy cleanup of entire environments when no longer needed
- Integration with AWS Cost Explorer and Budgets allows for cost monitoring at the stack level, while parameterized templates enable cost-conscious resource selection based on environment requirements

Savings Considerations

Primary cost savings come from infrastructure standardization and automation, reducing operational overhead and preventing resource sprawl. CloudFormation enables environment-specific resource sizing through parameters, allowing development environments to use smaller, less expensive resources:

- Automated stack deletion prevents forgotten resources from incurring ongoing costs, while drift detection helps identify unauthorized resource modifications that may impact costs
- Template reuse across environments reduces development time and ensures consistent, cost-optimized configurations
- The service supports implementation of cost governance policies through standardized templates and enables integration with AWS cost management tools for ongoing optimization and monitoring