Ad-Flow SCTE-35 Automated Insertion

CloudFormation Deployment Documentation

Architecture Overview

The deployment consists of two CloudFormation templates:

1. Cluster Template (`ecsClusterTemplate-adFlow.json`): Creates the ECS cluster infrastructure
2. Task Template (`ecsTaskTemplate-adFlow.json`): Deploys the application containers and monitoring stack

- Download the two CloudFormation templates for Ad-Flow:
  https://alcflow-config.s3.us-east-2.amazonaws.com/1.0/CloudFormation/ecsClusterTemplate-adFlow.json
  https://alcflow-config.s3.us-east-2.amazonaws.com/1.0/CloudFormation/ecsTaskTemplate-adFlow.json

IAM Roles and Policies

Cluster Template IAM Roles

1. ECS Instance Role (`IAMRoleForECS`)
    - Purpose: Enables EC2 instances to join ECS cluster and access required AWS services
    - Managed Policies:
        - `AmazonEC2ContainerServiceforEC2Role`: Core ECS functionality
        - `AmazonSSMManagedInstanceCore`: Systems Manager access for management

Task Template IAM Roles

1. Monitoring Task Role (`MonitoringTaskRole`)
    - Purpose: Enables containers to access CloudWatch and marketplace metering
    - Key Permissions:
        - CloudWatch Logs access
        - ECR repository access
        - AWS Marketplace metering
        - SSM Parameter Store access
2. Task Execution Role (`TaskExecutionRole`)
    - Purpose: Enables ECS to pull container images and send logs
    - Key Permissions:
        - ECR authentication
        - CloudWatch Logs access

- Marketplace image pull access

Security Configuration

Network Security

1. Security Group Configuration:
    - SSH access (Port 22)
    - Grafana web interface (Port 3000)
    - RTP video input (Port 5004/UDP)
    - SRT video output (Port 5005/UDP)
    - All ports restricted to necessary CIDR ranges (as set by user)

Encryption Configuration

1. Grafana HTTPS:
    - Self-signed certificates generated during deployment
    - Certificate location: `/etc/grafana/certs/`
    - Key rotation: keys are generated at instance boot-up
2. Data Storage:
    - Prometheus data retention: 7 days, 1GB limit
    - CloudWatch Logs retention: 30 days

Network Architecture

1. VPC Requirements:
    - Public subnet required for video input/output
    - Elastic IP assigned for stable addressing
    - Host networking mode for optimal video performance
2. Container Communication:
    - Prometheus (Port 9090)
    - Prometheus Pushgateway (Port 9091)
    - Grafana (Port 3000)
    - Video streams (Ports 5004-5005)

AWS Service Quotas and Costs

Service Quotas

1. ECS Service Limits:
    - Tasks per service: 1
    - CPU units: 2048 (2 vCPU)
    - Memory: 4GB total
        - Grafana: 500MB
        - Prometheus: 800MB
        - Pushgateway: 500MB

        - Ad-Flow: 2000MB
2. EC2 Instance Limits:
    - Default t4g.medium specifications
    - 2 vCPU, 4GB RAM
    - EBS storage: 30GB

Cost Breakdown

1. EC2 Instance (t4g.medium):
    - On-demand pricing varies by region
    - ~$30-40/month
2. EBS Storage:
    - 30GB gp2 volume
    - ~$3/month
3. CloudWatch Logs:
    - 4 log groups with 30-day retention
    - Estimated ~$5-10/month depending on log volume
4. Network Transfer:
    - Video streaming bandwidth costs
    - $0.09/GB for outbound traffic

Monitoring Configuration

CloudWatch Logs

Four log groups with 30-day retention:

- `/ecs/prometheus`
- `/ecs/pushgateway`
- `/ecs/grafana`
- `/ecs/alchemy-flow`

Certificate Rotation

To rotate Grafana certificates:

Reboot the EC2 instance

Template Customization

Key environment variables to modify in task template. See the ‘Container Configuration’ document for more information:

```
{ "Name": "INPUT_IP", "Value": "127.0.0.1" },
{ "Name": "INPUT_PORT", "Value": "5004" },
{ "Name": "OUTPUT_IP", "Value": "127.0.0.1" },
```

```
{ "Name": "OUTPUT_PORT", "Value": "5005" },
{ "Name": "DELAY_SECONDS", "Value": "135" },
{ "Name": "STREAM_PROTOCOL", "Value": "rtp" }
```

Upgrade information

Because the Ad-Flow container is configurable inside of `ecsTaskTemplate-adFlow.json`, you can modify that script to point to a new version of Ad-Flow. Delete the CloudFormation task template task, and create a new one using the updated `ecsTaskTemplate-adFlow.json.`

Please test individually on each channel and monitor the new version. Then, deploy it to more of your channels.

Troubleshooting Guide

1. Container Startup Issues:
    - Check CloudWatch Logs for each container
    - Verify ECS instance has sufficient resources
    - Confirm IAM roles have correct permissions
2. Network Connectivity:
    - Verify security group allows required ports
    - Check Elastic IP association
    - Confirm VPC routing configuration
3. Video Stream Issues:
    - Verify input/output ports match configuration
    - Check network bandwidth utilization
    - Monitor CloudWatch metrics for packet loss