Amazon EC2 Container Service (ECS)

a platform to run production containers

Uttara Sridhar

Software Developer Engineer
Agenda

Why Containers?

Cluster Management

ECS Architecture

Use Cases

Q&A
Why Containers?
What are Containers?

OS virtualization
Process isolation
Images
Automation
Container advantages

- Portable
- Flexible
- Fast
- Efficient
Services evolve to microservices

Monolithic Application

Order UI
User UI
Shipping UI
Order Service
User Service
Shipping Service
Data Access

Host 1
Service A
Service B

Host 2
Service B
Service D

Host 3
Service A
Service C

Host 4
Service B
Service C
Containers are natural for microservices

Simple to model

Any app, any language

Image is the version

Test & deploy same artifact

Stateless servers decrease change risk
Why build Amazon ECS?
Scheduling one resource is straightforward
Scheduling a cluster is hard
Some customer challenges

Cluster management
Availability
Scheduling
Security
Monitoring
Integration with AWS services
Cluster Management
Cluster Management: Resource Management

AZ 1

EC2 Instance

Docker

Task

Container

AZ 2

EC2 Instance

Docker

Task

Container

Task

Container

EC2 Instance

Docker

Task

Container
Cluster Management: Scheduling

AZ 1
EC2 Instance
Docker
Task
Container

AZ 2
EC2 Instance
Docker
Task
Container

EC2 Instance
Docker
Task
Container
Cluster Management: Scheduling Systems

Monolithic
- scheduling logic
- cluster state information
- no concurrency

Two-level
- subset
- pessimistic concurrency (offers)

Shared state
- full state
- optimistic concurrency (transactions)

Amazon ECS
Amazon ECS: Agent Communication

Agent Communication Service

Cluster Management Engine
Amazon ECS: Key/Value Store

AZ 1

Container Instance

Docker

Task

Container

ECS Agent

AZ 2

Container Instance

Docker

Task

Container

ECS Agent

Agent Communication Service

Cluster Management Engine

Key/Value Store
Amazon ECS under the Hood

WRITE

ID_{N+3}

WRITE

ID_{N+6}

READ

ID_{N+2}

READ

ID_{N+5}
Amazon ECS: Scheduling
Amazon ECS: Scheduling
Amazon ECS: Scheduling
Use Cases
Easily Manage Clusters for Any Scale

- Nothing to run
- Complete state
- Control and monitoring
- Scale
Scalable
Flexible Container Placement

Applications

Batch jobs

Multiple schedulers
Designed for use with other AWS services

Amazon Virtual Private Cloud
AWS Identity and Access Management
Amazon Elastic Load Balancing
Amazon Elastic Block Store
Amazon CloudWatch
AWS CloudTrail
Extensible

Comprehensive APIs

Custom schedulers

Open source agent and CLI
Common Use Cases

Applications and services
  • Configuration and deployment
  • Microservices

Batch processing
Case Study: Shippable

With Amazon ECS, we've practically eliminated the time our developers spent on ops-related tasks. Our senior developers used to spend 80% of their time on back-end infrastructure management features, whereas now they spend 80% of their time on customer features.

Avi Cavale
CEO & Cofounder

Shippable is a platform providing hosted continuous integration, testing, and deployment from repositories. The Shippable platform consists of two parts: Continuous Integration (CI), and Continuous Delivery (CD) pipelines.

Built a CICD platform with microservices architecture using Docker containers on Amazon but their service discovery solution and monitoring infrastructure was really hard to scale and manage.

Evaluated many open source options, but wanted a solution that was simple and would integrate with the AWS ecosystem. Started using Amazon ECS as a way to offload cluster management and container orchestration to a service.

Amazon ECS service scheduler manages multiple copies of each microservice across the ECS cluster, use Amazon ELB for load-balancing, Amazon Cloudwatch for telemetry and infrastructure logging, Amazon ECR for storing Docker images.
Case Study: Segment

Switching to Amazon ECS has greatly simplified running a service without needing to worry about provisioning or availability.

Calvin French-Owen
Cofounder and Chief Technology Officer

Segment provides a service used by businesses to collect customer data in a single hub for later use in analytics, marketing, and for other purposes.

Moved from Amazon EC2 instances to Docker containers and needed a way to manage and schedule containers at scale for their production environment.

Evaluated many open source options, but wanted a solution that was simple and would integrate with the AWS ecosystem. Started using Amazon EC2 Container Service (Amazon ECS) as a way to offload cluster management and container orchestration to a service.

Amazon ECS manages placement of containers on different Amazon EC2 instances across multiple Availability Zones, providing the Segment service with better availability.
Amazon ECS

Cluster Management Engine

Key/Value Store

Agent Communication Service

API

Internet

User / Scheduler

ELB

AZ 1

Container Instance

Docker

Task

Container

ECS Agent

AZ 2

Container Instance

Docker

Task

Container

ECS Agent

AZ 1

Container Instance

Docker

Task

Container

ECS Agent

AZ 2

Container Instance

Docker

Task

Container

ECS Agent
Thank you!
Questions?