

# Running Containers on Amazon Elastic Kubernetes Service (Amazon EKS)

## AWS Classroom Training

### Course description

Amazon EKS makes it easy for you to run Kubernetes on AWS without needing to install, operate, and maintain your own Kubernetes control plane. In this course, you will learn container management and orchestration for Kubernetes using Amazon EKS.

You will build an Amazon EKS cluster, configure the environment, deploy the cluster, and then add applications to your cluster. You will manage container images using Amazon Elastic Container Registry (ECR) and learn how to automate application deployment. You will deploy applications using CI/CD tools. You will learn how to monitor and scale your environment by using metrics, logging, tracing, and horizontal/vertical scaling. You will learn how to design and manage a large container environment by designing for efficiency, cost, and resiliency. You will configure AWS networking services to support the cluster and learn how to secure your Amazon EKS environment.

- Course level: Intermediate
- Duration: 3 days

### Activities

This course includes instructor lecture, presentations, hands-on labs, demonstrations, and group exercises/discussions.

### Course objectives

In this course, you will learn to:

- Review and examine containers, Kubernetes and Amazon EKS fundamentals and the impact of containers on workflows.
- Build an Amazon EKS cluster by selecting the correct compute resources to support worker nodes.
- Secure your environment with AWS Identity and Access Management (IAM) authentication by creating an Amazon EKS service role for your cluster
- Deploy an application on the cluster. Publish container images to ECR and secure access via IAM policy.
- Automate and deploy applications, examine automation tools and pipelines. Create a GitOps pipeline using WeaveFlux.
- Collect monitoring data through metrics, logs, tracing with AWS X-Ray and identify metrics for performance tuning. Review scenarios where bottlenecks require the best scaling approach using horizontal or vertical scaling.
- Assess the tradeoffs between efficiency, resiliency, and cost and impact for tuning one over the other. Describe and outline a holistic, iterative approach to optimizing your environment. Design for cost, efficiency, and resiliency.

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- Configure the AWS networking services to support the cluster. Describe how EKS/Amazon Virtual Private Cloud (VPC) functions and simplifies inter-node communications. Describe the function of VPC Container Network Interface (CNI). Review the benefits of a service mesh.
- Upgrade your Kubernetes, Amazon EKS, and third party tools.

## Intended audience

This course is intended for:

- Those who will provide container orchestration management in the AWS Cloud including:
- DevOps engineers
- Systems administrators

## Prerequisites

We recommend that attendees of this course have:

- Completed *Amazon Elastic Kubernetes Service (EKS) Primer*
- Completed *AWS Cloud Practitioner Essentials* (or equivalent real-world experience)
- Basic Linux administration experience
- Basic network administration experience
- Basic knowledge of containers and microservices

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### Course outline

#### Day 1

##### Module 0: Course Introduction

- Course preparation activities and agenda

##### Module 1: Container Fundamentals

- Best practices for building applications
- Container fundamentals
- Components of a container

##### Module 2: Kubernetes Fundamentals

- Container orchestration
- Kubernetes objects
- Kubernetes internals
- Preparing for Lab 1: Deploying Kubernetes Pods

##### Module 3: Amazon EKS Fundamentals

- Introduction to Amazon EKS
- Amazon EKS control plane
- Amazon EKS data plane
- Fundamentals of Amazon EKS security
- Amazon EKS API

##### Module 4: Building an Amazon EKS Cluster

- Configuring your environment
- Creating an Amazon EKS cluster
- Demo: Configuring and deploying clusters in the AWS Management Console
- Working with eksctl
- Preparing for Lab 2: Building an Amazon EKS Cluster

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### Day 2

#### Module 5: Deploying Applications to Your Amazon EKS Cluster

- Configuring Amazon Elastic Container Registry (Amazon ECR)
- Demo: Configuring Amazon ECR
- Deploying applications with Helm
- Demo: Deploying applications with Helm
- Continuous deployment in Amazon EKS
- GitOps and Amazon EKS
- Preparing for Lab 3: Deploying App

#### Module 6: Configuring Observability in Amazon EKS

- Configuring observability in an Amazon EKS cluster
- Collecting metrics
- Using metrics for automatic scaling
- Managing logs
- Application tracing in Amazon EKS
- Gaining and applying insight from observability
- Preparing for Lab 4: Monitoring Amazon EKS

#### Module 7: Balancing Efficiency, Resilience, and Cost Optimization in Amazon EKS

- The high level overview
- Designing for resilience
- Designing for cost optimization
- Designing for efficiency

### Day 3

#### Module 8: Managing Networking in Amazon EKS

- Review: Networking in AWS
- Communicating in Amazon EKS
- Managing your IP space
- Deploying a service mesh
- Preparing for Lab 5: Exploring Amazon EKS Communication

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### Module 9: Managing Authentication and Authorization in Amazon EKS

- Understanding the AWS shared responsibility model
- Authentication and authorization
- Managing IAM and RBAC
- Demo: Customizing RBAC roles
- Managing pod permissions using RBAC service accounts

### Module 10: Implementing Secure Workflows

- Securing cluster endpoint access
- Improving the security of your workflows
- Improving host and network security
- Managing secrets
- Preparing for Lab 6: Securing Amazon EKS

### Module 11: Managing Upgrades in Amazon EKS

- Planning for an upgrade
- Upgrading your Kubernetes version
- Amazon EKS platform versions