Google Cloud

Architecting with Google Kubernetes Engine

Learn how to deploy and manage containerized applications on Google Kubernetes Engine (GKE). Learn how to use other tools on Google Cloud that interact with GKE deployments. This course features a combination of lectures, demos, and hands-on labs to help you explore and deploy solution elements—including infrastructure components like pods, containers, deployments, and services—along with networks and application services. You'll also learn how to deploy practical solutions, including security and access management, resource management, and resource monitoring.

DURATION
2 days

LEVEL
Intermediate

FORMAT
ILT or On Demand

What you'll learn

- Create and manage workloads in Google Kubernetes Engine.
- Explain how pod networking works in Google Kubernetes Engine.
- Define and work with different Kubernetes storage abstractions.
- Describe and manage authentication, authorization, and security in Google Kubernetes Engine.
- Monitor applications running in Google Kubernetes Engine.
- Explore Google Cloud managed storage services options.
- Configure CI/CD pipelines for Google Kubernetes Engine.

Overview	7 modules · 6 labs · 14 classroom activities
Who this course is for	• Cloud architects, administrators, and SysOps/DevOps personnel. • Individuals using Google Cloud to create new solutions or to integrate existing systems, application environments, and infrastructure with Google Cloud.
Products	• Google Kubernetes Engine • Google Cloud networking • Google Cloud Storage • Cloud IAM • Cloud Observability • Cloud SQL • Cloud Deploy
Prerequisite	Completed "Getting Started with Google Kubernetes Engine" or have equivalent experience

Module 0 Course Introduction

Topics	Course introduction
Objectives	Introduce the course goals and preview each section of the course.

Module 01 Workloads: Deployments and Jobs

Topics	• Creating deployments. • Inspecting deployments. • Updating deployments. • Adopting other deployment strategies. • Using Jobs and Cronjobs • Cluster scaling. • Controlling Pod placement with labels and affinity rules. • Controlling Pod placement with taints and tolerations. • Getting software into your cluster.
Objectives	• Define, configure, inspect, manage, and update Deployments. • Define what Jobs and CronJobs are in GKE, and explore relevant use cases. Create and run Jobs.

Objectives
- Explain how to scale clusters manually and automatically.
- Configure node and pod affinity.

Activities
- Quiz
- (Lab) Creating Google Kubernetes Engine Deployments

Module 02 Google Kubernetes Engine Networking

Topics
- Pod networking
- Kubernetes Services
- Service type and load balancers
- Ingress
- Container-native load balancing
- Network policies

Objectives
- Explore Kubernetes networking, including Pod and cluster networking.
- Create services to expose to applications running within Pods.
- Configure load balancers to expose services to external clients. Explore container-native load balancing in GKE.
- Configure Google Kubernetes Engine networking.

Activities
- Quiz
- (Lab) Configuring Google Kubernetes Engine (GKE) Networking

Module 03 Persistent Data and Storage

Topics
- Volumes
- Ephemeral volumes
- Durable volumes
- Statefulsets
- Configmaps
- Secrets

Objectives
- Define and work with Kubernetes storage abstractions.
- Run and maintain sets of pods using StatefulSets.
- Use ConfigMaps to decouple configuration from Pods.
- Manage and store sensitive access and authentication data.
- Configure persistent storage for Google Kubernetes Engine.

Activities
- Quiz
- (Lab) Configuring Persistent Storage for Google Kubernetes Engine

Module 04 Access Control and Security in Kubernetes and Google Kubernetes Engine

Topics

- Explore Kubernetes authentication and authorization.
- Define Kubernetes RBAC and how it works with IAM to secure GKE clusters.
- Configure Workload Identity to access Google Cloud services from within GKE.
- Secure GKE with Pod Security Standards and Pod Security Admission.
- Implement Role-Based Access Control with GKE.

Objectives

- Authentication and authorization
- Kubernetes role-based access control
- Workload Identity
- Kubernetes control plane security
- Pod security

Activities

- Quiz
- (Lab) Securing Google Kubernetes Engine with Cloud IAM and Pod Security Admission

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Module 05 Google Kubernetes Engine Logging and Monitoring

Topics

- Cloud Observability
- Cloud Logging
- Cloud Monitoring
- Inspecting logs with the kubectl command
- Inspecting logs with Cloud Logging and logging agents

Objectives

- Identify the tools included in the Google Cloud Observability .
- Configure the Google Cloud operations suite to monitor and manage the availability and performance.
- Inspect logs using the kubectl command.
- Inspect Kubernetes logs using Google Cloud Observability.
- Configure GKE-native Monitoring and Logging.

Activities

- Quiz
- Lab: Configuring GKE-Native Monitoring and Logging

Module 06 Using Google Cloud Managed Storage Services with Google Kubernetes Engine

Topics

- Using Google Cloud services.
- Using Cloud Storage.

Topics
- Using Google Cloud databases
- Using Cloud SQL and SQL Auth Proxy.
- Comparing storage options.

Objectives
- Contrast managed storage services with self-managed storage.
- Identify use cases for Cloud Storage for Kubernetes applications.
- Compare the range of Google Cloud managed database services.
- Explore Cloud SQL Auth Proxy and how it connects to Cloud SQL from within GKE.
- Use Cloud SQL with Google Kubernetes Engine.

Activities
- Quiz
- (Lab) Using Cloud SQL with Google Kubernetes Engine and Workload Identity

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Module 07 Using CI/CD with Google Kubernetes Engine

Topics
- What is CI/CD?
- CI/CD pipeline construction
- CI/CD tools available in Google Cloud
- Best practices for using CI/CD on Google Cloud

Objectives
- Define continuous integration and continuous delivery and identify why it is important.
- Examine CI/CD pipelines and how they can optimize app releases.
- Explore first-party and third-party CI/CD tools supported by Google Cloud.
- Explore Google's best practices for a GKE CI/CD pipeline.

Activities
Quiz

Module 08 Course Summary

Topics
Course Summary

Objectives
Review the main objectives from each section of the course.