Architecting with Google Kubernetes Engine

Course code: GCPAGKE

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.

Who is the course 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.

What we teach you

- Understand how software containers work.
- Understand the architecture of Kubernetes.
- Understand the architecture of Google Cloud.
- Understand how pod networking works in Google Kubernetes Engine.
- Create and manage Kubernetes Engine clusters using the Google Cloud Console and gcloud/kubectl commands.
- Launch, roll back, and expose jobs in Kubernetes.
- Manage access control using Kubernetes RBAC and IAM.
- Manage pod security policies and network policies.
- Use Secrets and ConfigMaps to isolate security credentials and configuration artifacts.
- Understand Google Cloud choices for managed storage services.
- Monitor applications running in Google Kubernetes Engine.

Required skills

Completed "Google Cloud Fundamentals: Core Infrastructure" or have equivalent experience

Course outline

Module 1: Introduction to Google Cloud

- Use the Google Cloud Console
- Use Cloud Shell
- Define Cloud Computing
- Identify Google Cloud Compute Services
- Understand Regions and Zones
- Understand the Cloud Resource Hierarchy
- Administer your Google Cloud Resources

Module 2: Containers and Kubernetes in Google Cloud

- Create a Container Using Cloud Build
- Store a Container in Container Registry
- Understand the Relationship Between Kubernetes and Google Kubernetes Engine (GKE)
- Understand how to Choose Among Google Cloud Compute Platforms

Module 3: Kubernetes Architecture

- Understand the Architecture of Kubernetes: Pods, Namespaces
- Understand the Control-plane Components of Kubernetes
- Create Container Images using Cloud Build
- Store Container Images in Container Registry
- Create a Kubernetes Engine Cluster

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Module 4: Kubernetes Operations
- The Kubectl Command

Module 5: Deployment, Jobs, and Scaling
- Deployments
- Ways to Create Deployments
- Services and Scaling
- Updating Deployments
- Rolling Updates
- Blue/Green Deployments
- Canary Deployments
- Managing Deployments
- Jobs and CronJobs
- Parallel Jobs
- CronJobs
- Cluster Scaling
- Downscaling
- Node Pools
- Controlling Pod Placement
- Affinity and Anti-Affinity
- Pod Placement Example
- Taints and Tolerations
- Getting Software into your Cluster

Module 6: GKE Networking
- Introduction
- Pod Networking
- Services
- Finding Services
- Service Types and Load Balancers
- How Load Balancers Work
- Ingress Resource
- Container-Native Load Balancing
- Network Security

Module 7: Persistent Data and Storage
- Volumes
- Volume Types
- The PersistentVolume Abstraction
- More on PersistentVolumes
- StatefulSets
- ConfigMaps
- Secrets

Module 8: Access Control and Security in Kubernetes and Kubernetes Engine
- Understand Kubernetes Authentication and Authorization
- Define Kubernetes RBAC Roles and Role Bindings for Accessing Resources in Namespaces
- Define Kubernetes RBAC Cluster Roles and ClusterRole Bindings for
- Accessing Cluster-scoped Resources
- Define Kubernetes Pod Security Policies
- Understand the Structure of IAM

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- Define IAM roles and Policies for Kubernetes Engine Cluster Administration

Module 9: Logging and Monitoring

- Use Cloud Monitoring to monitor and manage availability and performance
- Locate and inspect Kubernetes logs
- Create probes for wellness checks on live applications

Module 10: Using Google Cloud Managed Storage Services from Kubernetes Applications

- Understand Pros and Cons for Using a Managed Storage Service Versus Self-managed Containerized Storage
- Enable Applications Running in GKE to Access Google Cloud Storage Services
- Understand Use Cases for Cloud Storage, Cloud SQL, Cloud Spanner, Cloud Bigtable, Cloud Firestore, and BigQuery from within a Kubernetes Application

Module 11: Logging and Monitoring

- CI/CD overview
- CI/CD for Google Kubernetes Engine
- CI/CD Examples
- Manage application code in a source repository that can trigger code changes to a continuous delivery pipeline.

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