



Workflow Orchestration with Cloud Composer

Course description

In this course, you will delve into the world of workflow orchestration, specifically focusing on Google Cloud Composer, Google's fully managed Apache Airflow service. You will learn the fundamental concepts of Apache Airflow, including DAGs, operators, and sensors, and understand how Cloud Composer simplifies the deployment, management, and scaling of Airflow environments on Google Cloud. This course provides practical insights into designing, developing, deploying, and monitoring complex data pipelines and automated workflows. By the end of the course, you will be equipped to orchestrate sophisticated data processing tasks, integrate with various Google Cloud services, and manage your workflows efficiently in a production environment.

- Course level: Intermediate
- Duration: 2 days

Activities

This course includes presentations, hands-on labs, demonstrations, and group exercises.

Course objectives

In this course, you will learn to:

- Summarize the role of workflow orchestration and the benefits of Apache Airflow
- Describe the architecture and components of Google Cloud Composer
- Design and develop Directed Acyclic Graphs (DAGs) using various Airflow operators and sensors
- Deploy and manage Cloud Composer environments and DAGs effectively
- Implement best practices for DAG development, version control, and testing
- Monitor, troubleshoot, and optimize workflows running on Cloud Composer
- Secure Cloud Composer environments using Google Cloud IAM and network configurations
- Integrate Cloud Composer with other Google Cloud services for end-to-end data pipelines

Intended audience

This course is intended for those involved in data engineering, DevOps, or system administration:

- Data Engineers
- ETL Developers
- DevOps Engineers
- Cloud Architects
- Data Scientists
- Solutions Architects
- BI Developers

Prerequisites

We recommend that attendees of this course have:

- Basic understanding of Python programming
- Familiarity with Google Cloud Platform (GCP) fundamentals (e.g., Cloud Storage, Compute Engine)
- Basic knowledge of command-line tools and Linux environments

Course outline

Module 1: Introduction to Workflow Orchestration and Cloud Composer

- The need for workflow orchestration in modern data platforms
- Introduction to Apache Airflow: Core concepts and advantages
- Google Cloud Composer: A managed Apache Airflow service
- Cloud Composer architecture overview and key components
- Benefits and common use cases of Cloud Composer
- Demo: Exploring the Cloud Composer Environment and Airflow UI

Module 2: Apache Airflow Fundamentals for DAG Development

- Directed Acyclic Graphs (DAGs): Structure and execution
- Airflow Operators: Common types and functionality
- Airflow Sensors: Triggering tasks based on external events
- Understanding task dependencies and task groups
- Inter-task communication using XComs
- Hands-on Lab: Building Your First Simple Data Pipeline DAG

Module 3: Managing Cloud Composer Environments

- Creating and configuring Cloud Composer environments
- Environment versions, sizing, and scaling considerations
- Upgrading and maintaining Cloud Composer environments
- Networking options: Private IP and shared VPC configurations
- Best practices for environment configuration and resource management
- Hands-on Lab: Deploying and Configuring a Secure Cloud Composer Environment

Module 4: Developing, Deploying, and Versioning DAGs

- Advanced DAG authoring techniques and best practices
- Using Airflow variables and connections for parameterization
- Custom operators, hooks, and plugins in Cloud Composer
- Deployment strategies for DAGs: Cloud Storage bucket and Git Sync
- Version control and CI/CD pipelines for DAGs
- Hands-on Lab: Implementing a Parameterized and Version-Controlled DAG

Module 5: Advanced Airflow Concepts and Integrations

- Branching, SubDAGs, and TaskGroups for complex logic
- Airflow Executors: Celery, Kubernetes, and their use cases in Composer
- Dynamic DAG generation and programmatic DAGs
- Integrating with other GCP services: BigQuery, Dataflow, Cloud Storage, Cloud Functions

- Using different authentication mechanisms within DAGs (Service Accounts)
- Hands-on Lab: Orchestrating a BigQuery ETL Pipeline with Dataflow

Module 6: Monitoring, Logging, and Troubleshooting Cloud Composer

- Cloud Monitoring and Cloud Logging for Composer environments
- Using the Airflow UI for task status, logs, and graphs
- Setting up alerts and notifications for workflow failures
- Common troubleshooting scenarios for DAGs and Composer environments
- Debugging best practices for Airflow tasks and custom code
- Hands-on Lab: Monitoring a Failed Workflow and Diagnosing Issues

Module 7: Security, Governance, and Cost Optimization

- Google Cloud IAM for Cloud Composer: Roles and permissions
- Securing access to the Airflow UI and environment
- Data lineage and governance considerations for orchestrated workflows
- Compliance standards and best practices for regulated workloads
- Cost management and optimization strategies for Cloud Composer
- Hands-on Lab: Implementing Granular IAM Permissions and Cost Controls

Module 8: Course Wrap-up

- Key takeaways and best practices for production deployments
- Next steps and advanced resources for continued learning
- Overview of recent Cloud Composer and Airflow features
- Course summary and Q&A session

Your course overview ends here.
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About CloudThat

Established in 2012, CloudThat is an award-winning company and the first in India to offer cloud training and consulting services for individuals and enterprises worldwide. Recently, it won Google Cloud's New Training Partner of the Year Award for 2025, becoming the first company in the world in 2025 to hold awards from all three major cloud giants: AWS, Microsoft, and Google. CloudThat notably won consecutive AWS Training Partner of the Year (APJ) awards in 2023 and 2024 and the Microsoft Training Services Partner of the Year Award in 2024, bringing its total award count to an impressive 12 awards in the last 8 years.

CloudThat specializes in Cloud Migration, Data Platforms, DevOps, IoT, and cutting-edge technologies like Gen AI & AI/ML. As a Microsoft Solutions Partner, AWS Premier Tier Training Partner, Google Cloud Platform Partner, and collaborator with leading organizations like HPE, Oracle, Nvidia and Databricks, CloudThat has trained over 850,000 professionals across 600+ cloud certifications, empowering students and professionals worldwide to advance their skills and careers.

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