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Data Engineering on Google Cloud Platform

Duration

4 Days

Course Description

This four-day instructor-led class provides participants a hands-on introduction to designing and building data processing systems on Google Cloud Platform. Through a combination of presentations, demos, and hand-on labs, participants will learn how to design data processing systems, build end-to-end data pipelines, analyze data and carry out machine learning. The course covers structured, unstructured, and streaming data.

Objectives

This course teaches participants the following skills:

- Design and build data processing systems on Google Cloud Platform
- Process batch and streaming data by implementing autoscaling data pipelines on Cloud Dataflow
- Derive business insights from extremely large datasets using Google BigQuery
- Train, evaluate and predict using machine learning models using Tensorflow and Cloud ML
- Leverage unstructured data using Spark and ML APIs on Cloud Dataproc
- Enable instant insights from streaming data

Audience

This class is intended for experienced developers who are responsible for managing big data transformations including:

- Extracting, Loading, Transforming, cleaning, and validating data
- Designing pipelines and architectures for data processing
- Creating and maintaining machine learning and statistical models
- Querying datasets, visualizing query results and creating reports

Prerequisites

To get the most of out of this course, participants should have:

- Completed Google Cloud Fundamentals: Big Data & Machine Learning course OR have equivalent experience
- Basic proficiency with common query language such as SQL
- Experience with data modeling, extract, transform, load activities
- Developing applications using a common programming language such as Python
- Familiarity with Machine Learning and/or statistics

Course Outline

The course includes presentations, demonstrations, and hands-on labs.

Module 1: Google Cloud Dataproc Overview

- Creating and managing clusters.
- Leveraging custom machine types and preemptible worker nodes.
- Scaling and deleting Clusters.
- Lab: Creating Hadoop Clusters with Google Cloud Dataproc.

Module 2: Running Dataproc Jobs

- Running Pig and Hive jobs.
- Separation of storage and compute.
- Lab: Running Hadoop and Spark Jobs with Dataproc.
- Lab: Submit and monitor jobs.

Module 3: Integrating Dataproc with Google Cloud Platform

- Customize cluster with initialization actions.
- BigQuery Support.
- Lab: Leveraging Google Cloud Platform Services.

Module 4: Making Sense of Unstructured Data with Google's Machine Learning APIs

- Google's Machine Learning APIs.
- Common ML Use Cases.
- Invoking ML APIs.

- Lab: Adding Machine Learning Capabilities to Big Data Analysis.

Module 5: Serverless data analysis with BigQuery

- What is BigQuery.
- Queries and Functions.
- Lab: Writing queries in BigQuery.
- Loading data into BigQuery.
- Exporting data from BigQuery.
- Lab: Loading and exporting data.
- Nested and repeated fields.
- Querying multiple tables.
- Lab: Complex queries.
- Performance and pricing.

Module 6: Serverless, autoscaling data pipelines with Dataflow

- The Beam programming model.
- Data pipelines in Beam Python.
- Data pipelines in Beam Java.
- Lab: Writing a Dataflow pipeline.
- Scalable Big Data processing using Beam.
- Lab: MapReduce in Dataflow.
- Incorporating additional data.
- Lab: Side inputs.
- Handling stream data.
- GCP Reference architecture.

Module 7: Getting started with Machine Learning

- What is machine learning (ML).
- Effective ML: concepts, types.
- ML datasets: generalization.
- Lab: Explore and create ML datasets.

Module 8: Building ML models with Tensorflow

- Getting started with TensorFlow.
- Lab: Using tf.learn.
- TensorFlow graphs and loops + lab.
- Lab: Using low-level TensorFlow + early stopping.
- Monitoring ML training.
- Lab: Charts and graphs of TensorFlow training.

Module 9: Scaling ML models with CloudML

- Why Cloud ML?
- Packaging up a TensorFlow model.
- End-to-end training.
- Lab: Run a ML model locally and on cloud.

Module 10: Feature Engineering

- Creating good features.
- Transforming inputs.
- Synthetic features.
- Preprocessing with Cloud ML.
- Lab: Feature engineering.

Module 11: Architecture of streaming analytics pipelines

- Stream data processing: Challenges.
- Handling variable data volumes.
- Dealing with unordered/late data.
- Lab: Designing streaming pipeline.

Module 12: Ingesting Variable Volumes

- What is Cloud Pub/Sub?
- How it works: Topics and Subscriptions.
- Lab: Simulator.

Module 13: Implementing streaming pipelines

- Challenges in stream processing.
- Handle late data: watermarks, triggers, accumulation.
- Lab: Stream data processing pipeline for live traffic data.

Module 14: Streaming analytics and dashboards

- Streaming analytics: from data to decisions.
- Querying streaming data with BigQuery.
- What is Google Data Studio?
- Lab: build a real-time dashboard to visualize processed data.

Module 15: High throughput and low-latency with Bigtable

- What is Cloud Spanner?
- Designing Bigtable schema.
- Ingesting into Bigtable.
- Lab: streaming into Bigtable.