



In the last module, we discussed how to automate the creation of infrastructure. As an alternative to infrastructure automation, you can eliminate the need to create infrastructure by leveraging a managed service.

Managed services are partial or complete solutions offered as a service. They exist on a continuum between platform as a service and software as a service, depending on how much of the internal methods and controls are exposed. Using a managed service allows you to outsource a lot of the administrative and maintenance overhead to Google, if your application requirements fit within the service offering.

Agenda

BigQuery

Cloud Dataflow

Cloud Dataprep

Cloud Dataproc

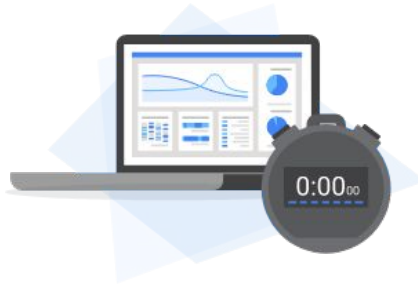


In this module, we give you an overview of BigQuery, Cloud Dataflow, Cloud Dataprep by Trifacta, and Cloud Dataproc. Now all of these services are for data analytics purposes, and since that's not the focus of this course, there won't be any labs in this module. Instead, we'll have a quick demo to illustrate how easy it is to use managed services.

Let's start by talking about BigQuery.

BigQuery is Google Cloud's serverless, highly scalable, and cost-effective cloud data warehouse

- Fully managed
- Petabyte scale
- SQL interface
- Very fast
- Free usage tier



BigQuery is Google Cloud's serverless, highly scalable, and cost-effective cloud data warehouse.

It is a petabyte-scale data warehouse that allows for super-fast queries using the processing power of Google's infrastructure. Because there is no infrastructure for you to manage, you can focus on uncovering meaningful insights using familiar SQL without the need for a database administrator.

BigQuery is used by all types of organizations, and there is a [free usage tier](#) to help you get started.

Query example

```
SELECT language, SUM(views) as views
FROM (
  SELECT title, language, MAX(views) as views
  FROM [bigquery-samples:wikipedia_benchmark.Wiki100B]
  WHERE REGEXP_MATCH(title, "G.*o.*")
  GROUP EACH BY title, language
)
GROUP EACH BY language
ORDER BY views desc
```

Query 100 billion rows in less than 1 minute!



You can access BigQuery by using the Cloud Console, by using a command-line tool, or by making calls to the BigQuery REST API using a variety of client libraries such as Java, .NET, or Python. There are also several third-party tools that you can use to interact with BigQuery, such as visualizing the data or loading the data.

Here is an example of a query on a table with over 100 billion rows. This query processes over 4.1 TB but takes less than a minute to execute. The same query would take hours, if not days, through a serial execution.

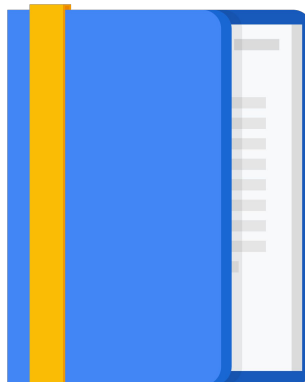
Agenda

BigQuery

Cloud Dataflow


Cloud Dataprep

Cloud Dataproc



Let's learn a little bit about Cloud Dataflow.

Use Cloud Dataflow to execute a wide variety of data processing patterns

- Serverless, fully managed data processing
- Batch and stream processing with autoscale
- Open source programming using  beam
- Intelligently scale to millions of QPS



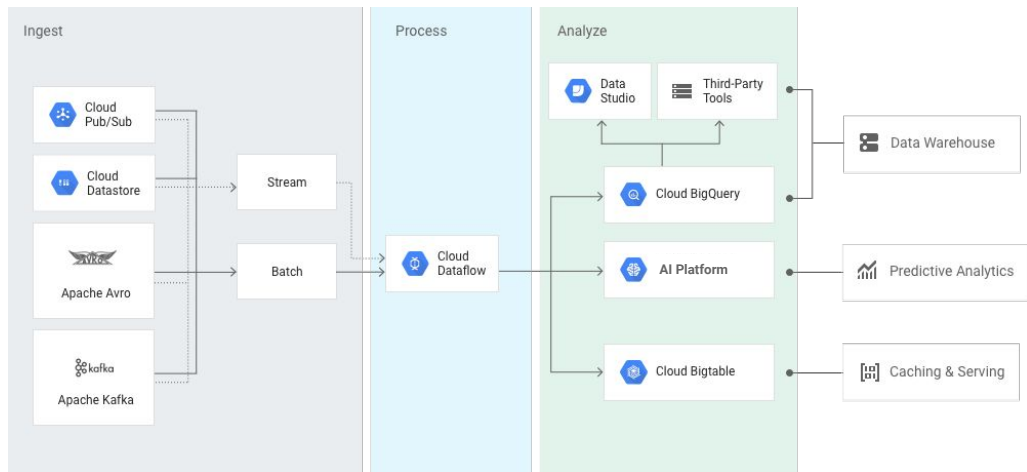
Cloud Dataflow



Cloud Dataflow is a managed service for executing a wide variety of data processing patterns. It's essentially a fully managed service for transforming and enriching data in stream and batch modes with equal reliability and expressiveness. With Cloud Dataflow, a lot of the complexity of infrastructure setup and maintenance is handled for you. It's built on Google Cloud infrastructure and autoscales to meet the demands of your data pipelines, allowing it to intelligently scale to millions of queries per second.

Cloud Dataflow supports fast, simplified pipeline development via expressive SQL, Java, and Python APIs in the Apache Beam SDK, which provides a rich set of windowing and session analysis primitives as well as an ecosystem of source and sink connectors. Cloud Dataflow is also tightly coupled with other Google Cloud services like Stackdriver, so you can set up priority alerts and notifications to monitor your pipeline and the quality of data coming in and out.

Data transformation with Cloud Dataflow



This diagram shows some example uses cases of Cloud Dataflow. As we just mentioned, Cloud Dataflow processes stream and batch data. This data could come from other Google Cloud services like Cloud Datastore or Cloud Pub/Sub, which is Google's messaging and publishing service. The data could also be ingested from third-party services like Apache Avro and Apache Kafka.

After you transform the data with Cloud Dataflow, you can analyze it in BigQuery, AI Platform, or even Cloud Bigtable. Using Data Studio, you can even build real-time dashboards for IoT devices.

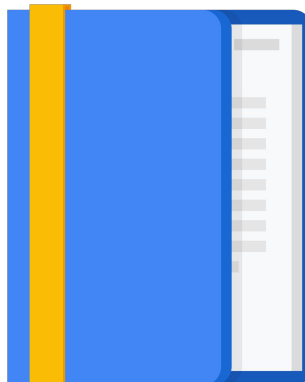
Agenda

BigQuery

Cloud Dataflow

Cloud Dataprep

Cloud Dataproc



Let's learn a little bit about Cloud Dataprep.

Use Cloud Dataprep to visually explore, clean, and prepare data for analysis and machine learning

- Serverless, works at any scale
- Suggests ideal data transformation
- Focus on data analysis
- Integrated partner service operated by Trifacta



Cloud Dataprep



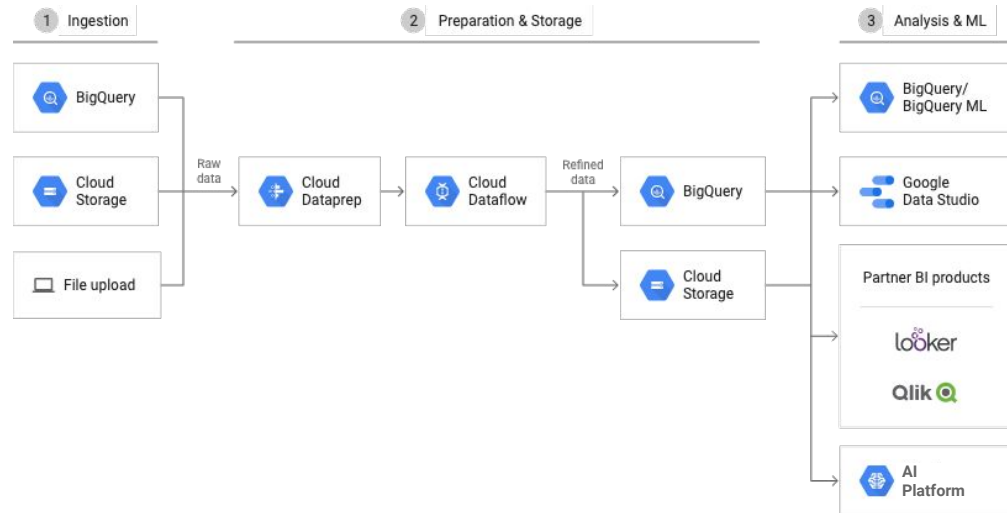
Cloud Dataprep is an intelligent data service for visually exploring, cleaning, and preparing structured and unstructured data for analysis, reporting, and machine learning.

Because Cloud Dataprep is serverless and works at any scale, there is no infrastructure to deploy or manage. Your next ideal data transformation is suggested and predicted with each UI input, so you don't have to write code.

With automatic schema, datatype, possible joins, and anomaly detection, you can skip time-consuming data profiling and focus on data analysis.

Cloud Dataprep is an integrated partner service operated by Trifacta and based on their industry-leading data preparation solution, Trifacta Wrangler. Google works closely with Trifacta to provide a seamless user experience that removes the need for up-front software installation, separate licensing costs, or ongoing operational overhead. Cloud Dataprep is fully managed and scales on demand to meet your growing data preparation needs, so you can stay focused on analysis.

Cloud Dataprep architecture



Here's an example of a Cloud Dataprep architecture. As you can see, Cloud Dataprep can be leveraged to prepare raw data from BigQuery, Cloud Storage, or a file upload before ingesting it onto a transformation pipeline like Cloud Dataflow. The refined data can then be exported to BigQuery or Cloud Storage for analysis and machine learning.

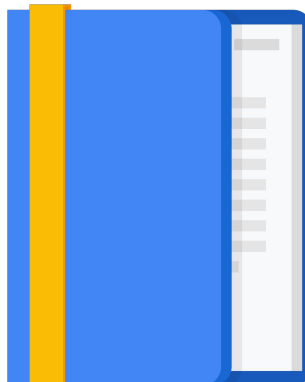
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Let's learn a little bit about Cloud Dataproc.

Cloud Dataproc is a service for running Apache Spark and Apache Hadoop clusters

- Low cost (per-second, preemptible)
- Super fast to start, scale, and shut down
- Integrated with Google Cloud
- Managed service
- Simple and familiar



Cloud Dataproc is a fast, easy-to-use, fully managed cloud service for running Apache Spark and Apache Hadoop clusters in a simpler way. You only pay for the resources you use with per-second billing. If you leverage preemptible instances in your cluster, you can reduce your costs even further.

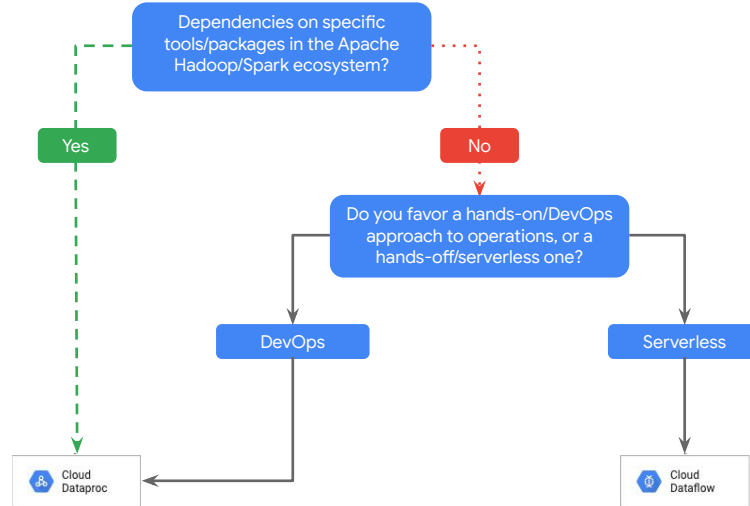
Without using Cloud Dataproc, it can take from five to 30 minutes to create Spark and Hadoop clusters on-premises or through other Infrastructure-as-a-Service providers. Cloud Dataproc clusters are quick to start, scale, and shut down, with each of these operations taking 90 seconds or less, on average. This means you can spend less time waiting for clusters and more hands-on time working with your data.

Cloud Dataproc has built-in integration with other Google Cloud services, such as BigQuery, Cloud Storage, Cloud Bigtable, Stackdriver Logging, and Stackdriver Monitoring. This provides you with a complete data platform rather than just a Spark or Hadoop cluster.

As a managed service, you can create clusters quickly, manage them easily, and save money by turning clusters off when you don't need them. With less time and money spent on administration, you can focus on your jobs and your data.

If you're already using Spark, Hadoop, Pig, or Hive, you don't even need to learn new tools or APIs to use Cloud Dataproc. This makes it easy to move existing projects into Cloud Dataproc without redevelopment

Cloud Dataflow vs. Cloud Dataproc



Now, Cloud Dataproc and Cloud Dataflow can both be used for data processing, and there's overlap in their batch and streaming capabilities. So, how do you decide which product is a better fit for your environment?

Well, first, ask yourself whether you have dependencies on specific tools or packages in the Apache Hadoop or Spark ecosystem. If that's the case, you'll obviously want to use Cloud Dataproc.

If not, ask yourself whether you prefer a hands-on or DevOps approach to operations, or a hands-off or serverless approach. If you opt for the DevOps approach, you want to use Cloud Dataproc; otherwise, use Cloud Dataflow.

For quick walkthrough on how to create a Cloud Dataproc cluster, modify the number of workers in the cluster, and submit a simple Apache Spark job, refer to this [video](#).

Quiz

How are Managed Services useful?

- A. Managed Services are more customizable than infrastructure solutions
- B. Managed Services may be an alternative to creating and managing infrastructure solutions
- C. If you have an existing infrastructure service, Google will manage it for you if you purchase a Managed Services contract
- D. Managed Services are pay services offered by 3rd party vendors

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Explanation:

Managed Services in this class are presented as a possible alternative to building your own infrastructure data processing solution.

Quiz

Which of the following is a feature of Dataproc?

- A. It typically takes less than 90 seconds to start a cluster
- B. Dataproc allows full control over HDFS advanced settings
- C. Dataproc billing occurs in 10-hour intervals
- D. It doesn't integrate with Stackdriver, but it has its own monitoring system

Quiz

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Explanation:

Fast to start a cluster.

Review

Managed Services



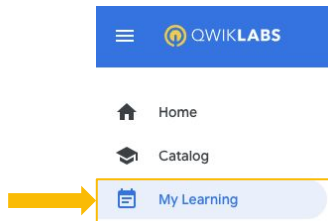
In this module, we provided you with an overview of managed services for data processing in Google Cloud, namely BigQuery, Cloud Dataflow, Cloud Dataprep, and Cloud Dataproc.

Managed services allow you to outsource a lot of the administrative and maintenance overhead to Google, so you can focus on your workloads, instead of the infrastructure. Speaking of infrastructure, most of the services that we covered are serverless. Now, this doesn't mean that there aren't any actual servers processing your data. Serverless means that servers or Compute Engine instances are obfuscated so that you don't have to worry about the infrastructure.

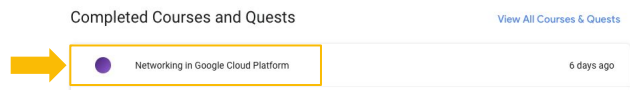
Cloud Dataproc isn't a serverless service, because you are able to view and manages the underlying master and worker instances.

End of class - Materials

- 1 Click on **My Learning** in the left-hand navigation bar



- 2 Select the class from the **Completed Courses** list



Materials are available for 2 years

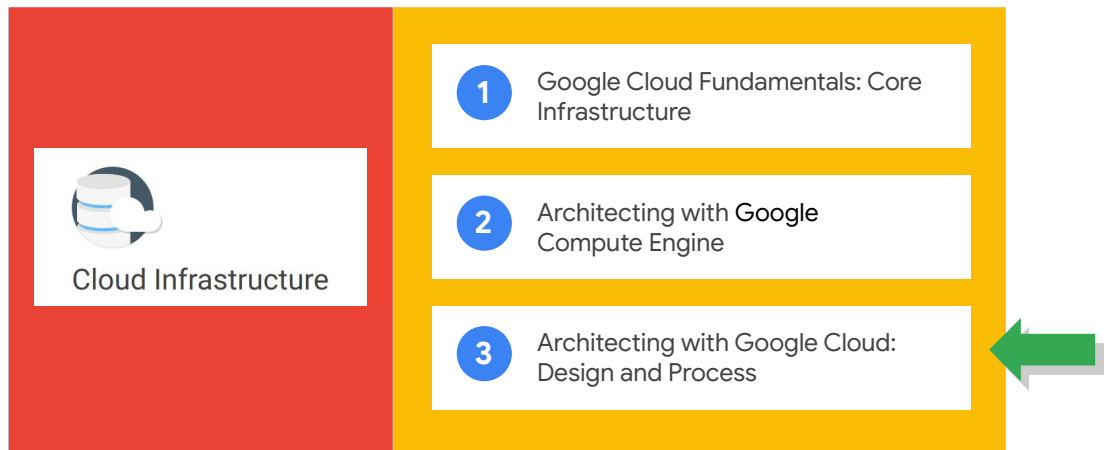


You can view the course materials within Qwiklabs as follows:

1. Click on **My Learning** in the left-hand navigation bar.
2. Select the class from the **Completed Courses** list.

Materials are available for 2 years following the completion of a course.

Cloud Infrastructure learning path



The “Architecting with Google Compute Engine” course is part of the Cloud Infrastructure learning path. This path is designed for IT professionals who are responsible for implementing, deploying, migrating, and maintaining applications in the cloud. Next, we recommend taking the [Architecting with Google Cloud: Design and Process course](#), which is part of the learning path for the [Professional Cloud Architect Certification](#).

Associate Cloud Engineer Certification



Speaking of certification, we recommend to validate your hands-on Google Cloud skills and advance your career with the **Associate Cloud Engineer** certification. Certification can help you gain credibility and give you an advantage in today's highly competitive market. The Associate Cloud Engineer certification is for individuals who want to demonstrate their ability to deploy applications, monitor operations, and maintain cloud projects on Google Cloud. It is recommended that you have at least 6 months of hands-on experience working with Google Cloud. The exam will assess your ability to:

- Set up a cloud solution environment
- Plan and configure a cloud solution
- Deploy and implement a cloud solution
- Ensure successful operation of a cloud solution
- Configure access and security

Other learning resources for Associate Cloud Engineer Certification

Quests:

- [Kubernetes in the Google Cloud](#)
- [Google Kubernetes Engine Best Practices](#)

Self-Paced Labs:

- [Cloud Functions - Qwik Start](#)
- [Deploying the Application into App Engine Flexible Environment - Java OR Python](#)

Course:

- [Preparing for the Associate Cloud Engineer Examination](#)

Book:

- [Official Google Cloud Certified Associate Cloud Engineer Study Guide](#)



We recommend broadening your knowledge by completing the following Qwiklabs Self-Paced Labs, which are single-topic hands-on activities; and Qwiklabs Quests, which are groups of self-paced labs on a focused theme:

- Quests:
 - a. [Kubernetes in the Google Cloud](#)
 - b. [Google Kubernetes Engine Best Practices](#)
- Self-Paced Labs:
 - a. [Cloud Functions - Qwik Start](#)
 - b. [Deploying the Application into App Engine Flexible Environment - Java](#)
OR [Deploying the Application into App Engine Flexible Environment - Python](#)

To help you structure your preparation for the Associate Cloud Engineer exam, we recommend the [Preparing for the Associate Cloud Engineer Examination](#) course.

You can also prepare using the [Official Google Cloud Certified Associate Cloud Engineer Study Guide](#), published by Wiley. Visit the [Google Cloud Certification website](#) for more information and to register.

Good luck!



Thank you for taking the “Architecting with Google Compute Engine” course!

We hope you have a better understanding of the comprehensive and flexible infrastructure and platform services provided by Google Cloud. We also hope that the demos and labs made you feel more comfortable with using the different Google Cloud services that we covered.

Now it’s your turn. Go ahead and apply what you have learned by architecting your own infrastructure in Google Cloud.

See you next time!