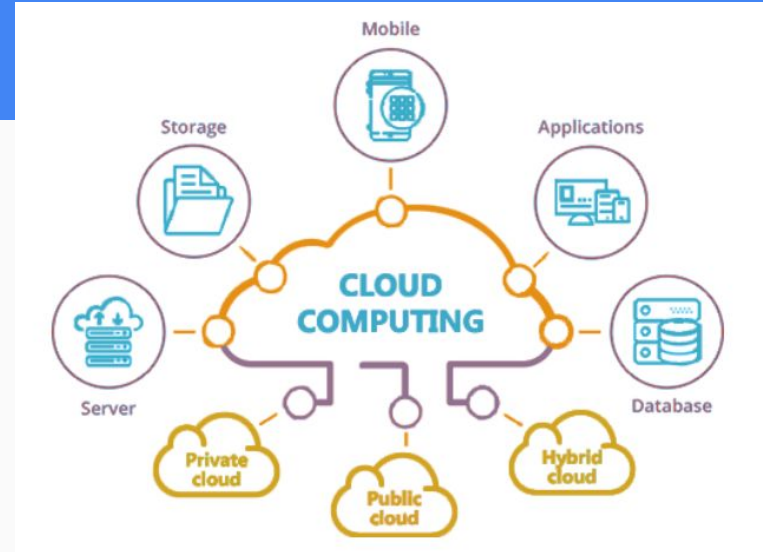


***“Cloud is about how you do computing ,not where you do computing.”***

***- Paul Maritz, Computer Scientist, Microsoft.***

# AGENDA:

- 1.Introduction
- 2.Fundamental
- 3.Implementation
- 4.Results



<https://blog.knoldus.com/know-about-cloud-computing-architecture/>

# Introduction

## Motivation:

- Why ML models might have to be retrained again and again???
- Use cases- Music Recommendation Systems, Product Recommendation Systems.

## About Google Cloud:

- GCP offers a suite of computing services to do everything from GCP cost management to data management to delivering web and video over the web to AI and machine learning tools.
- Established in 2010

# Fundamental



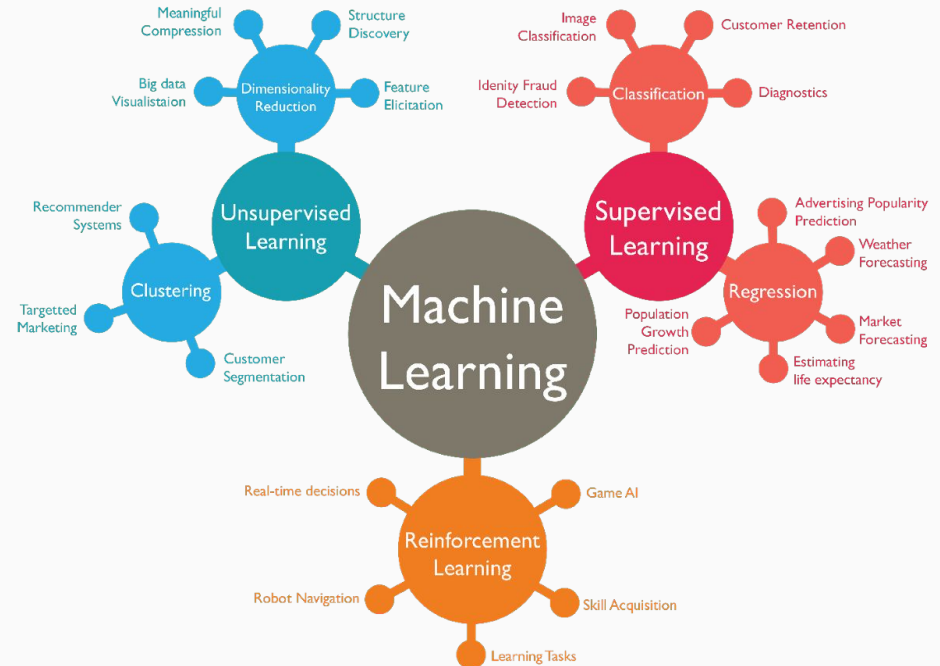
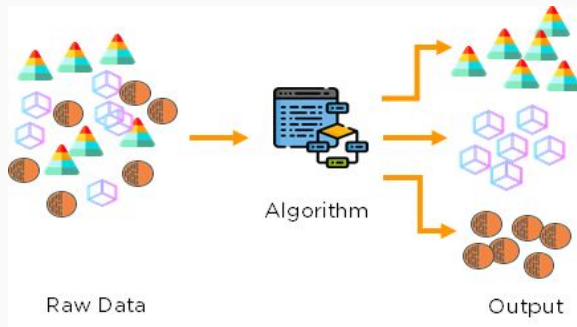
## Services Used in our Project:

Compute	App Engine - Infrastructure as a Service to run Microsoft Windows and Linux virtual machines.
Big Data (Big Query)	Big Query - Scalable, managed enterprise data warehouse for analytics. Cloud Pub/Sub - Scalable event ingestion service based on message queues. Cloud Dataflow - Managed service based on Apache Beam for stream and batch data processing.
Management Tools	Cloud Console - Web interface to manage Google Cloud Platform resources.
Storage and Databases	Cloud Storage - Object storage with integrated edge caching to store unstructured data.

# Fundamental - Machine Learning

## Types of ML

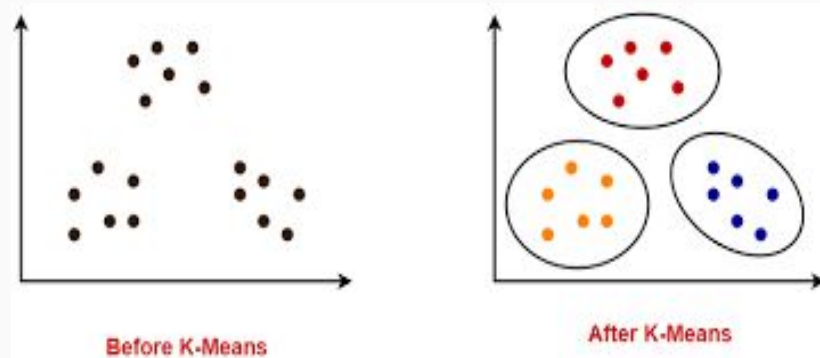
- ❑ Supervised Learning
- ❑ Unsupervised Learning
- ❑ Reinforcement Learning



# Fundamental

## Unsupervised Machine Learning:

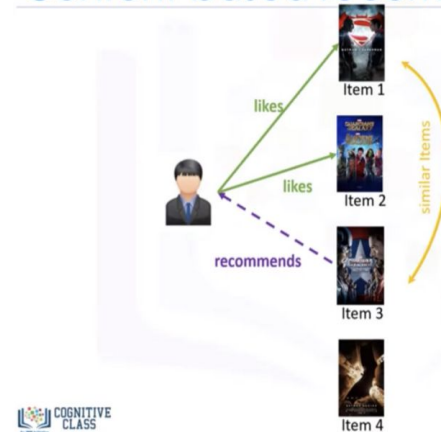
- K Means Clustering



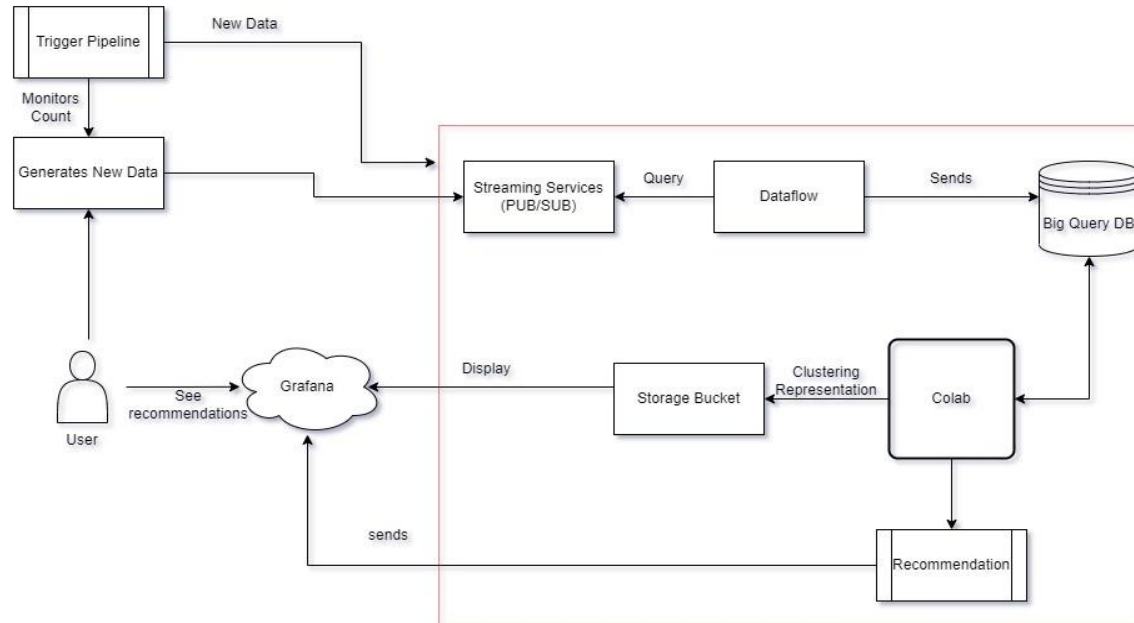
# Fundamental - Recommender Systems

## Content Based Recommender Systems

### Content-based recommender systems



# Implementation - Architecture





# Implementation

- ★ Collect or Gather Data
- ★ Create BigQuery table
- ★ Create Storage bucket
- ★ Setup ETL Pipeline using PubSub and DataFlow

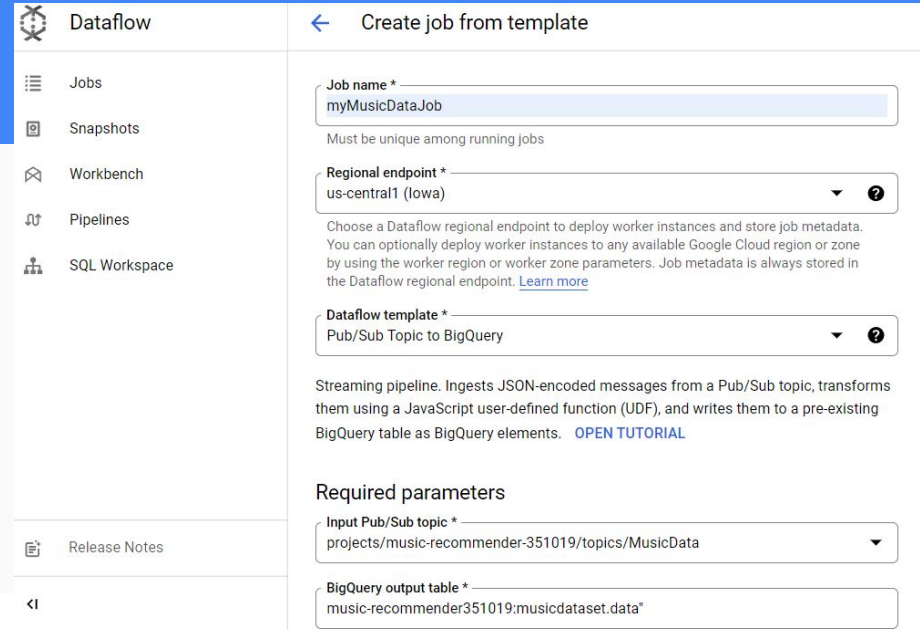


CLOUD SHELL

Terminal

(music-recommender-351019) x + ▾

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to music-recommender-351019.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
vedant_asawale@cloudshell:~ (music-recommender-351019) $ gcloud pubsub topics create MusicData
```



**Dataflow**

- Jobs
- Snapshots
- Workbench
- Pipelines
- SQL Workspace

Release Notes

<1

← Create job from template

Job name \*  
myMusicDataJob  
Must be unique among running jobs

Regional endpoint \*  
us-central1 (Iowa) ?  
Choose a Dataflow regional endpoint to deploy worker instances and store job metadata. You can optionally deploy worker instances to any available Google Cloud region or zone by using the worker region or worker zone parameters. Job metadata is always stored in the Dataflow regional endpoint. [Learn more](#)

Dataflow template \*  
Pub/Sub Topic to BigQuery ?  
Streaming pipeline. Ingests JSON-encoded messages from a Pub/Sub topic, transforms them using a JavaScript user-defined function (UDF), and writes them to a pre-existing BigQuery table as BigQuery elements. [OPEN TUTORIAL](#)

Required parameters

Input Pub/Sub topic \*  
projects/music-recommender-351019/topics/MusicData

BigQuery output table \*  
music-recommender351019:musicdataset.data\*

# Implementation Contd.

- ★ Train ML Model using KMeans Clustering
- ★ Recommendations
- ★ Setup Grafana and link data source
- ★ Create Dashboards and display data

```
predictions=recommend_songs([{'name': 'Put Your Records On', 'year':2020},  
    {'name': 'you broke me first', 'year': 2020},  
    {'name': 'Forever After All', 'year': 2020},  
    {'name': 'Colors of the Wind', 'year': 2019},  
    {'name': 'Comforting You', 'year': 2019}  
], read_data.data)
```

### JWT Key Details

Project ID

music-recommender-351019

Client email

music-recommender-service-acco@music-recommender-351019.iam.gser

Token URI

https://oauth2.googleapis.com/token

Private key

Private key configured [Reset token](#)

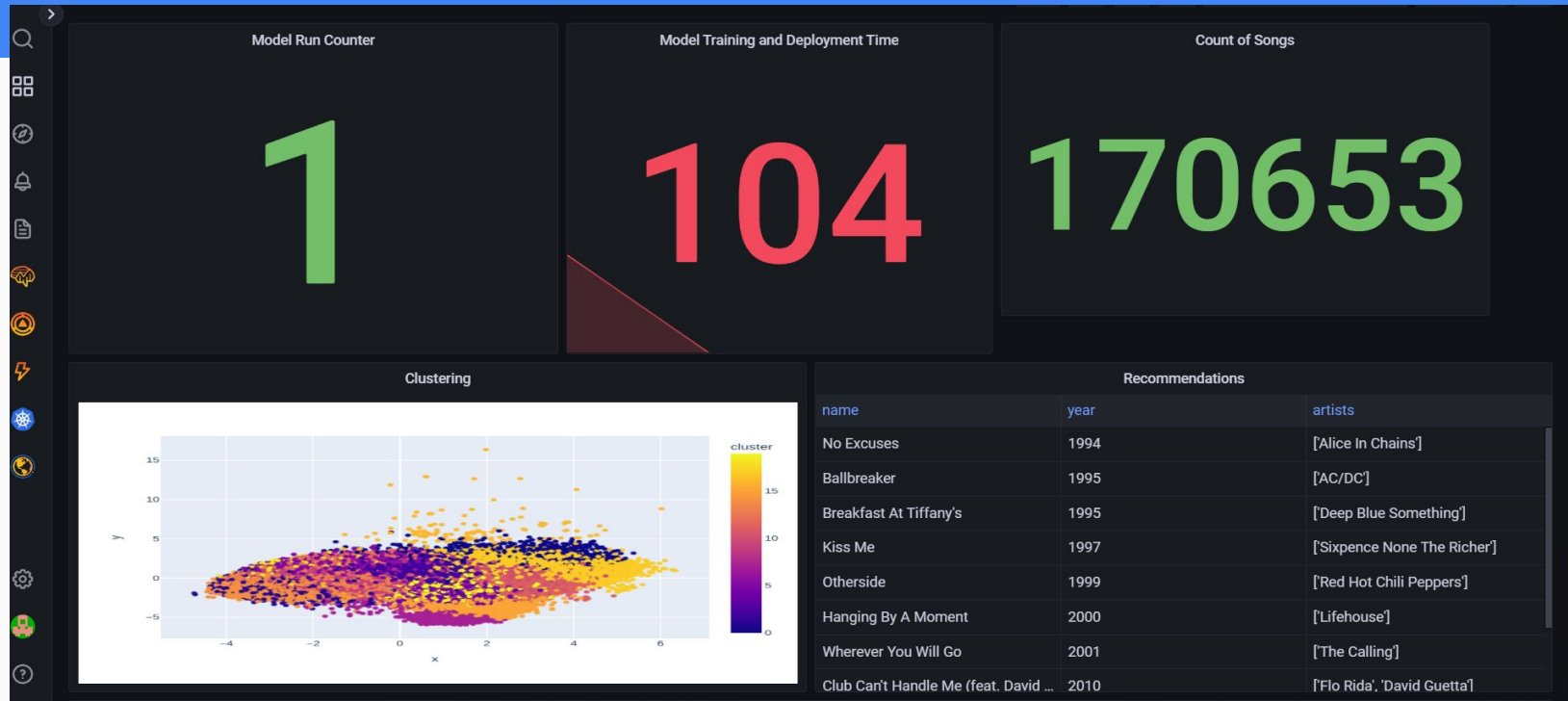
### Other settings

Processing location

Read more about processing location [here](#)

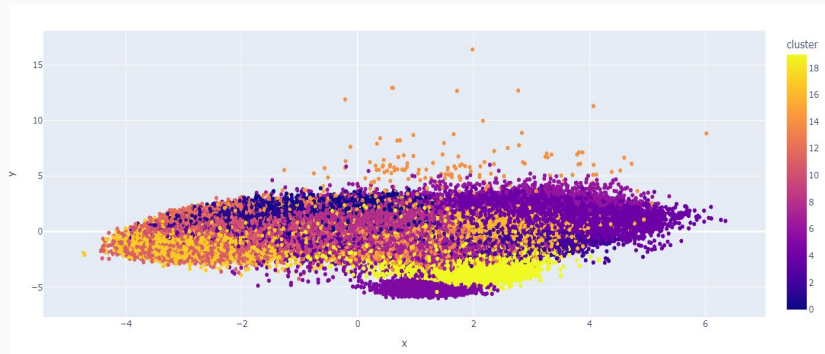
Default US

# Live Demo



# Results

- Created ML Pipeline
- Added Trigger to pipeline
- Generated Clusters
- Recommend Songs



Recommendations		
name	year	artists
No Excuses	1994	[Alice In Chains]
Ballbreaker	1995	[AC/DC]
Breakfast At Tiffany's	1995	[Deep Blue Something]
Kiss Me	1997	[Sixpence None The Richer]
Otherside	1999	[Red Hot Chili Peppers]
Hanging By A Moment	2000	[Lifehouse]
Wherever You Will Go	2001	[The Calling]
Club Can't Handle Me (feat. David Guetta)	2010	[Flo Rida, 'David Guetta]
Runaway (U & I)	2015	[Galantis]
It's Not Living (If It's Not With You)	2018	[The 1975]



**THANK YOU**