

# Triggered Training of Machine Learning Model in Cloud

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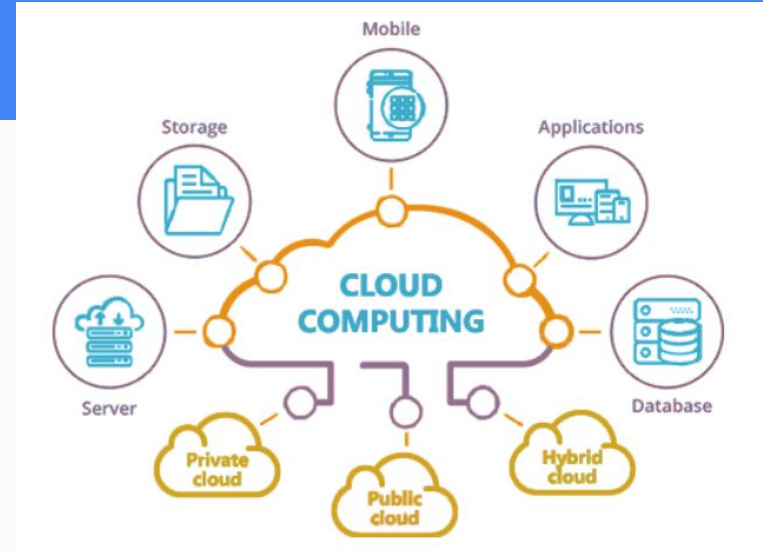
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***“Cloud is about how you do computing ,not where you do computing.”***

***- 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



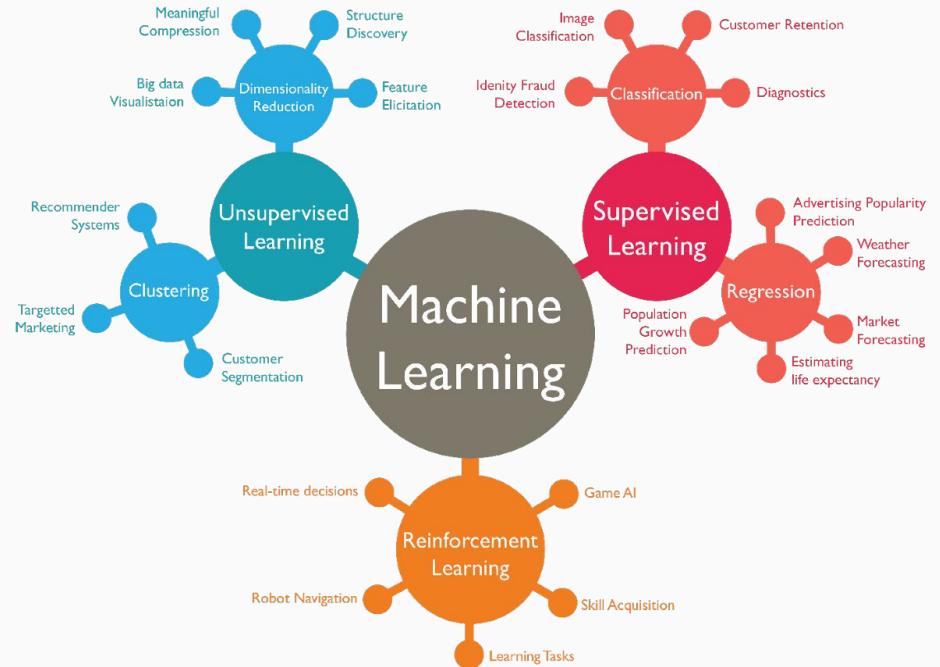
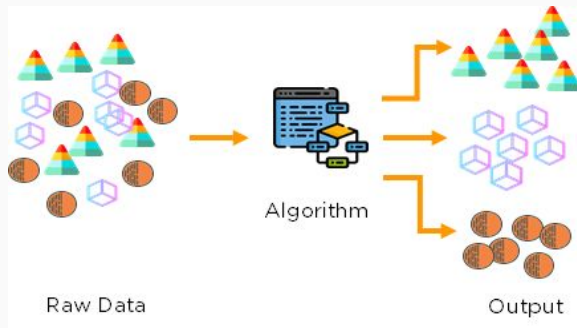
## Services Used in our Project:

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

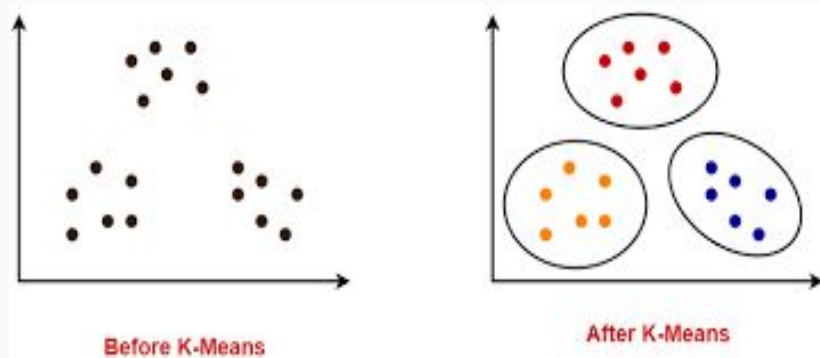
- ❑ Supervised Learning
- ❑ Unsupervised Learning
- ❑ Reinforcement Learning



# Fundamental

Unsupervised Machine Learning:

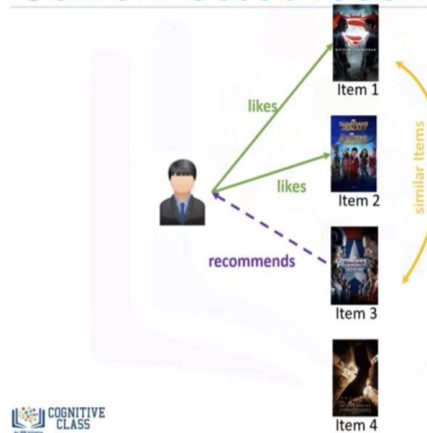
- K Means Clustering



# Fundamental - Recommender Systems

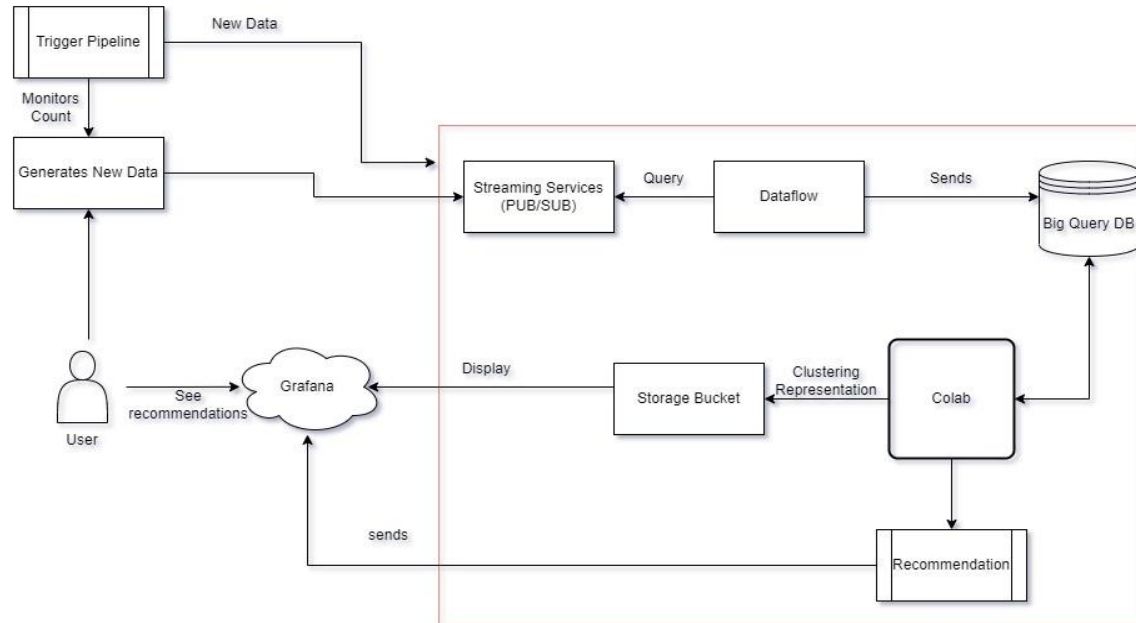
## Content Based Recommender Systems

### Content-based recommender systems





# Implementation - Architecture



# Implementation

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

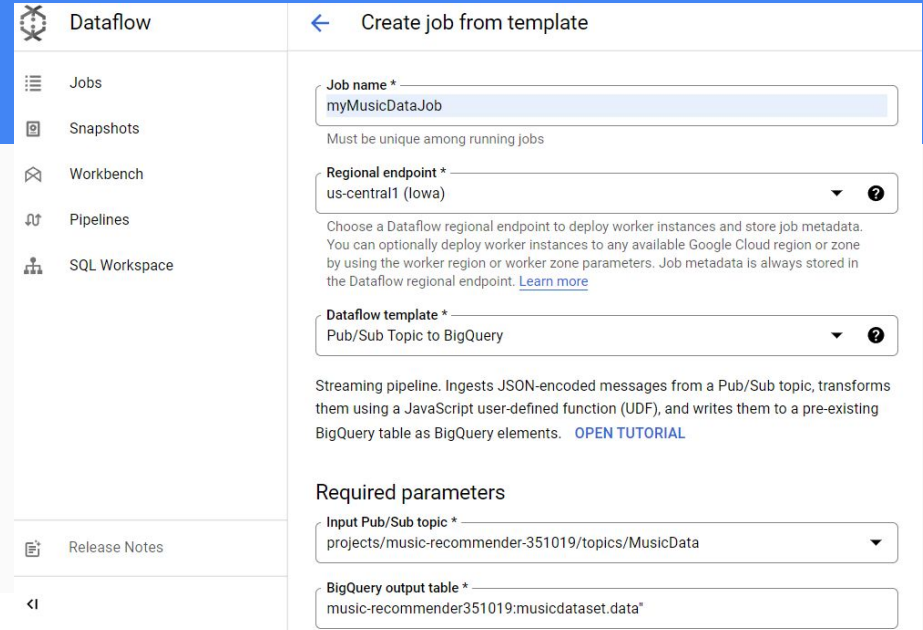


CLOUD SHELL

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
```



The screenshot shows the 'Create job from template' interface in the Google Cloud Dataflow console. On the left is a navigation menu with options: Jobs, Snapshots, Workbench, Pipelines, and SQL Workspace. The main area is titled 'Create job from template' and contains several form fields:

- Job name \***: A text input field containing 'myMusicDataJob'. A note below it says 'Must be unique among running jobs'.
- Regional endpoint \***: A dropdown menu set to 'us-central1 (Iowa)'. A note below it explains that this endpoint is used for deploying worker instances and storing job metadata.
- Dataflow template \***: A dropdown menu set to 'Pub/Sub Topic to BigQuery'. A note below it describes the pipeline as a streaming pipeline that ingests JSON-encoded messages from a Pub/Sub topic, transforms them using a JavaScript UDF, and writes them to a BigQuery table. It includes a link to an 'OPEN TUTORIAL'.
- Required parameters**: A section containing two more dropdown menus:
  - Input Pub/Sub topic \***: Set to 'projects/music-recommender-351019/topics/MusicData'.
  - BigQuery output table \***: Set to '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

Model Run Counter

# 1

Model Training and Deployment Time

# 104

Count of Songs

# 170653

Clustering

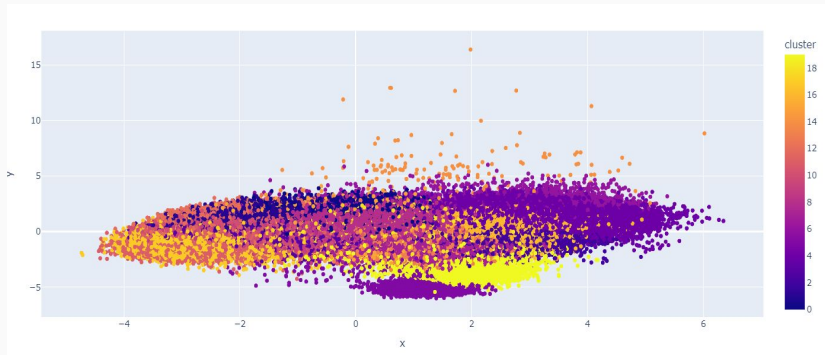


Recommendations

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 ...	2010	[Flo Rida, 'David Guetta']

# 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**