# ETL Data Pipeline in GC

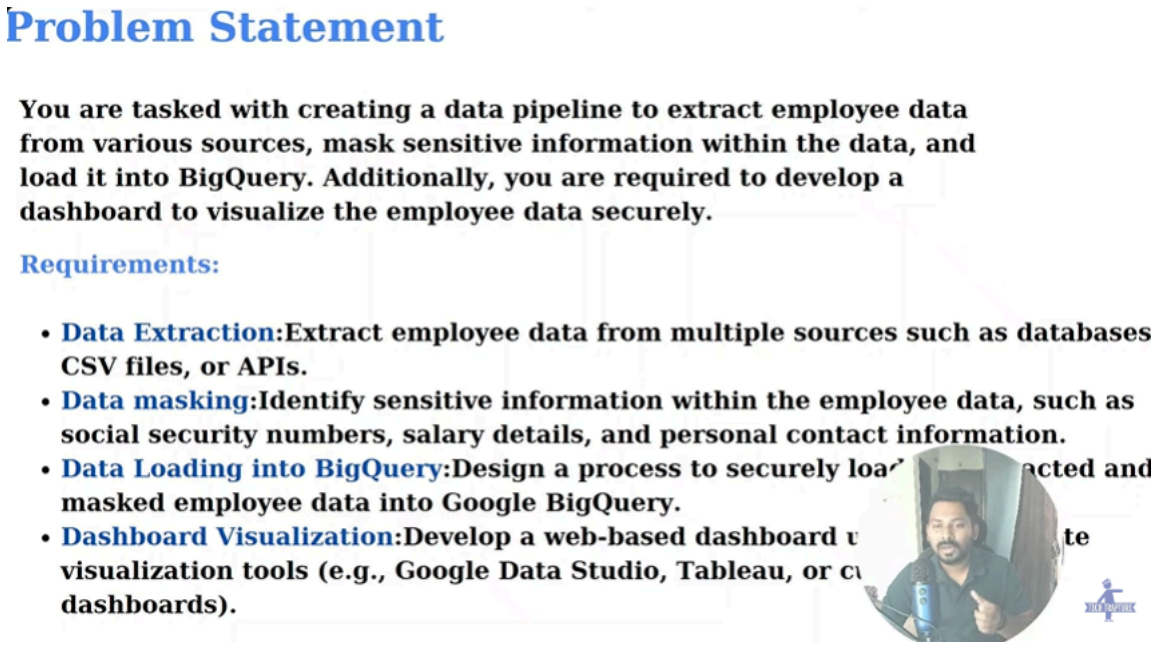
1. Here we'll be doing ETL and Reporting the data
2. We'll learn ETL pipeline and automate it

## Overview

1. Initially we get requirements from client and we create dataflow diagrams and identify the resources needed and implement the small architecture for our project

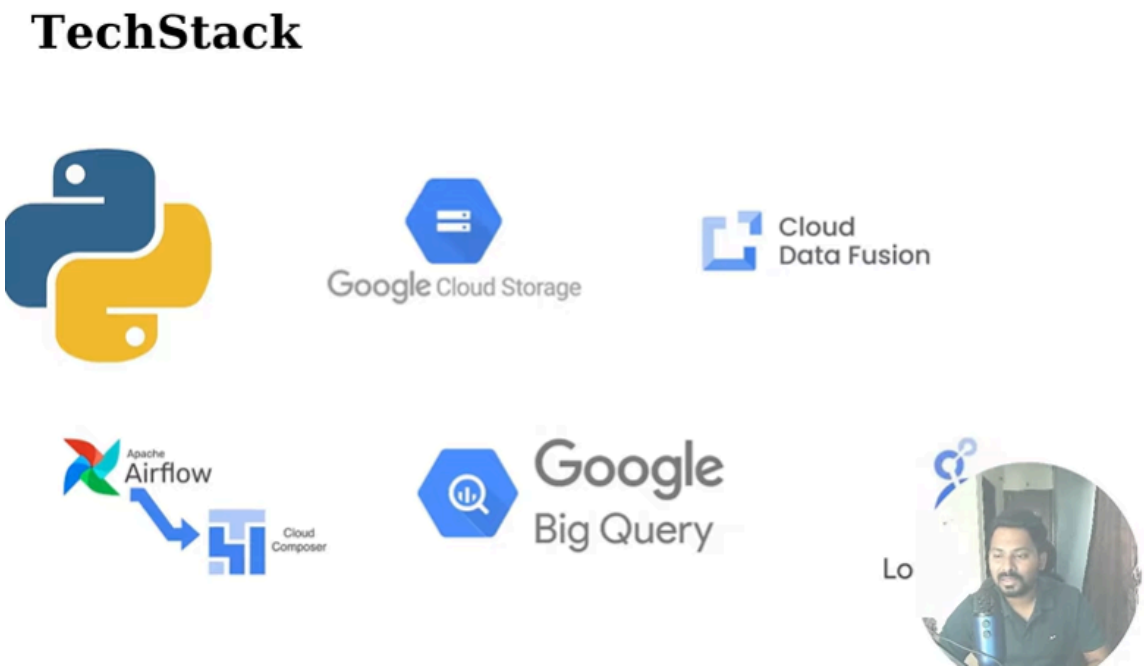
## Client requirements

1. Problem statement




2. These are the client requirements and we'll build these

3. Required GCP services




4. Python for data extraction and we use cloud storage to store the extracted data
5. We use cloud data fusion as data pipeline …it is no code feature in google cloud
6. Practical use case of cloud data fusion

Here's a real-time example of Cloud Data Fusion in action:

Imagine a ride-sharing company like Uber. They constantly receive a stream of data in real-time - new ride requests, driver locations, trip completions, etc. This data flows into a pub/sub topic (a message queue in Google Cloud).

Cloud Data Fusion can be configured to listen to this pub/sub topic continuously. As each new message arrives (e.g., a new ride request), Cloud Data Fusion triggers a real-time data pipeline:

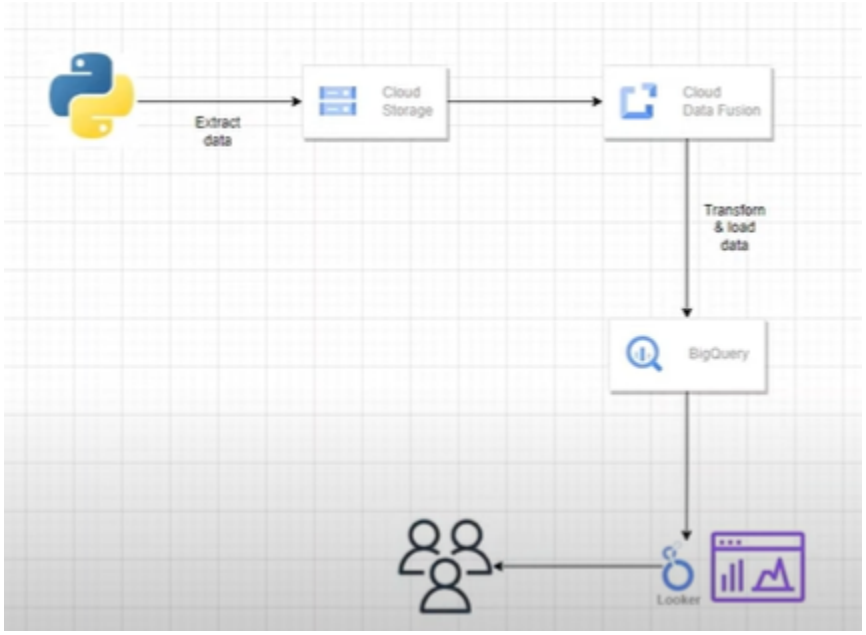
1. **Data Ingestion:** The pipeline reads the new ride request data from the pub/sub topic.
2. **Data Transformation:** The data is transformed to identify the pick-up location, drop-off location, and estimated fare.
3. **Data Enrichment:** Cloud Data Fusion might join this data with another dataset containing real-time traffic information. This enriches the data by predicting the trip duration and suggesting the most efficient route for the driver.
4. **Data Delivery:** Finally, the enriched data is sent to various destinations:
   - A database to store historical ride request information.
   - A dashboard for real-time tracking of ongoing rides.
   - An alert system to notify drivers about new ride requests in their vicinity.

7. We'll load the data into big query ..and we'll orchestrate this by using apache airflow

8. In the end we'll visualize this data in looker studio

Small Architecture

1. We design this architecture in app.diagram website




2. So here initially we store the data in cloud storage…then perform transformation using data fusion…then store this data in bigquery…after that we use looker table to visualize the data
3. Later we give dashboard to our manager's
4. And we use AirFlow/Cloud Composer to orchestrate all this things

## Implementation

1. So first here we create composer environment …and next we create data..refer playlist for composer and dataflow
2.

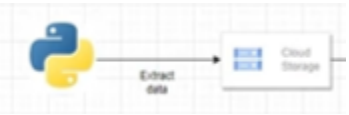
## Extract

1. We'll extract the dummy data from python script

2. Basically we'll integrate our cloud storage in VsCode…and just convert our dummy data into CSV and we'll copy that in cloud storage

```python
# Upload the CSV file to a GCS bucket
def upload_to_gcs(bucket_name, source_file_name, destination_blob_name):
    storage_client = storage.Client()
    bucket = storage_client.bucket(bucket_name)
    blob = bucket.blob(destination_blob_name)

    blob.upload_from_filename(source_file_name)

    print(f'File {source_file_name} uploaded to {destination_blob_name} in {bucket_name}.')

# Set your GCS bucket name and destination file name
bucket_name = 'your_bucket_name'
source_file_name = 'employee_data.csv'
destination_blob_name = 'employee_data.csv'

# Upload the CSV file to GCS
upload_to_gcs(bucket_name, source_file_name, destination_blob_name)
```

3. So here we have extracted the data and loaded into cloud storage



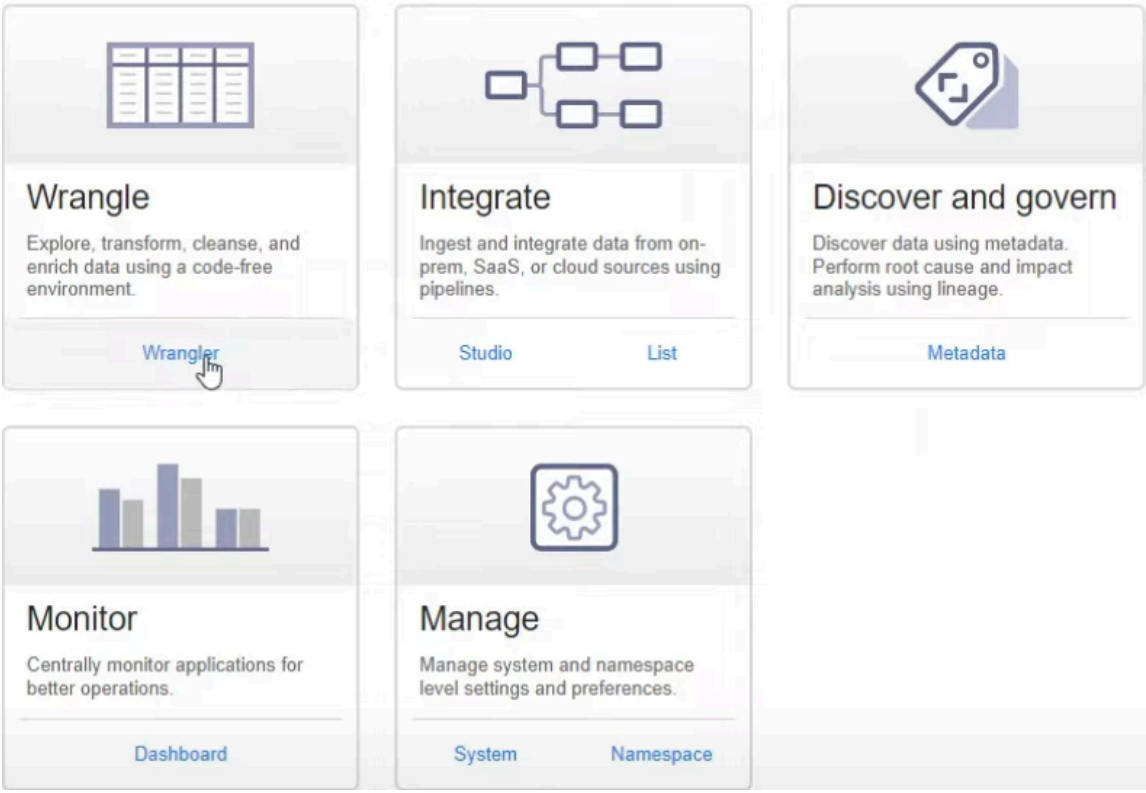

```
first_name,last_name,job_title,department,email,address,phone_number,salary,password
Jessica,Morrison,Electronics engineer,"Surveyor, planning and development",hunter03@example.net,"52328 Clay Highway
Allenfort, WA 62108",5903479394,97422,jFa7DL4N
Joshua,Farmer,Community arts worker,Amenity horticulturist,christina16@example.com,"6344 Montoya Isle
North Anthony, KY 35147",+1-479-415-8897,71116,nEX5u0C9
Sharon,Pratt,Forensic psychologist,Public affairs consultant,blake34@example.net,"Unit 6028 Box 1117
DPO AE 72949",001-834-393-8336x6881,82175,pFASD91P
Jermaine,Bates,Press photographer,Aid worker,butlerstephanie@example.org,"Unit 5840 Box 0230
DPO AP 10736",787-339-3205x01614,86594,rWe8TsXC
Jodi,Brown,"Production designer, theatre/television/film","Editor, commissioning",sgreen@example.com,"Unit 0221 Box 8880
DPO AA 86442",001-381-643-9020x998,4555,qVb4VRxV
Debra,Patel,Art gallery manager,"Psychotherapist, dance movement",qturner@example.org,"51830 Schroeder Drive Apt. 274
Kristinberg, CA 57804",001-898-474-7179,33644,Oshr0EQQ
Glenn,May,Curator,Barrister's clerk,anthony62@example.org,"55667 Howard Road
Weaverbury, DC 11019",001-847-606-0692x5982,53104,JAGOmwlr
Kathryn,Huber,"Programmer, systems",Museum/gallery curator,alexandrawilson@example.com,"PSC 2976, Box 0639
APO AP 96589",334-324-3756x22515,55314,Fj4PVFZi
Deborah,Suarez,Intelligence analyst,Educational psychologist,breanna67@example.org,"23183 Benjamin Rest Suite 612
Adamview, AS 82023",+1-463-639-0759x017,65327,7AvAnl10
Caleb,Evans,Commissioning editor,Politician's assistant,curtisalyssa@example.com,"193 Mckee Parks Suite 440
West Brittany, CA 41629",(843)752-0511x5877,75813,eXVMqlFT
Derek,Kent,Management consultant,"Pilot, airline",bfox@example.net,"USNV Casey
FPO AE 42552",582-809-6350x554,99503,1ydivbG3
Melissa,Mason,"Teacher, primary school",Gaffer,kayla15@example.net,"410 Brian Forge Apt. 836
North Tyler, MI 64175",312.997.8234x2691,95337,MYms3Hll
Amber,Mccarty,Outdoor activities/education manager,Hydrographic surveyor,williamsrichard@example.com,"50275 Palmer Extension
New Spencer, MH 44615",2905146712,22925,tCgXNupu
Brandon,Pena,Dispensing optician,Diagnostic radiographer,theresa28@example.com,"42331 Morgan Branch Suite 540
MS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS
```

this is our data

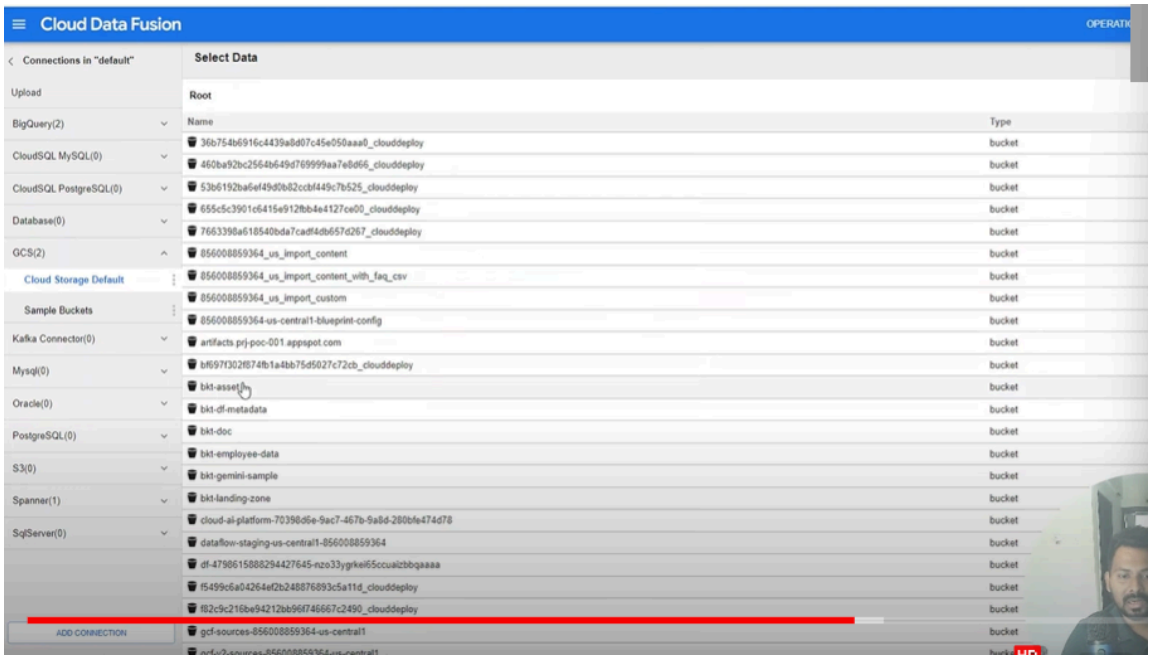
## Cloud storage to Data fusion

1. Data fusion is a no code ETL tool provided by google cloud
2. In data flow we have to do our own coding

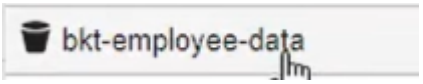
3. So in data fusion we have diff options




4. Here we'll go ahead with wrangler
5. Inside the wrangler the default connection is with Cloud storage

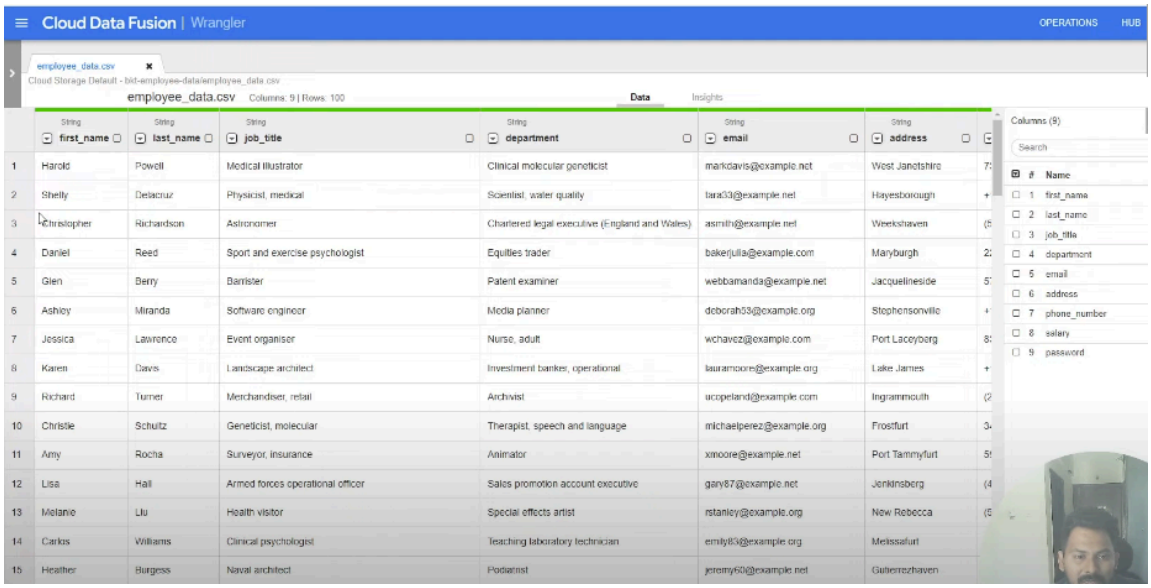



here we can see all the buckets that are in our GCS

6. We'll go ahead with our 

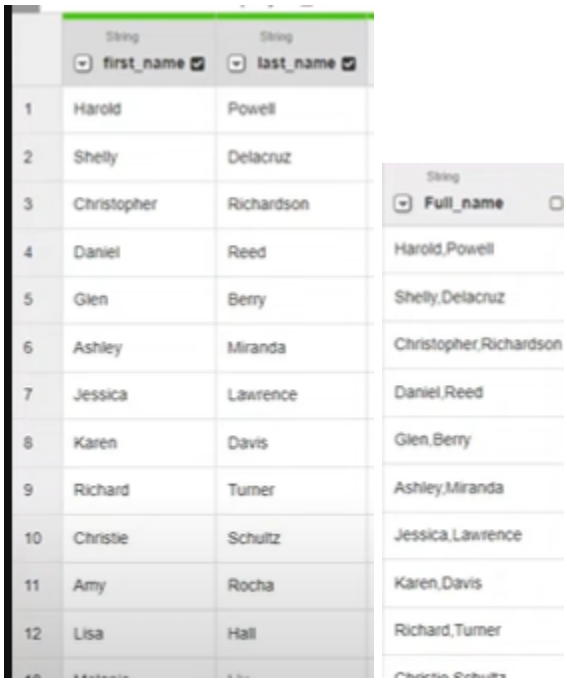
and parse this data

7. Here is our data




| | first_name | last_name | job_title | department | email | address |
|---|---|---|---|---|---|---|
| 1 | Harold | Powell | Medical illustrator | Clinical molecular geneticist | markdavis@example.net | West Janetshire |
| 2 | Shelly | Delacruz | Physicist, medical | Scientist, water quality | tara33@example.net | Hayesborough |
| 3 | Christopher | Richardson | Astronomer | Chartered legal executive (England and Wales) | asmith@example.net | Weekshaven |
| 4 | Daniel | Reed | Sport and exercise psychologist | Equities trader | bakerjulia@example.com | Maryburgh |
| 5 | Glen | Berry | Barrister | Patent examiner | webbamanda@example.net | Jacquelineside |
| 6 | Ashley | Miranda | Software engineer | Media planner | deborah53@example.org | Stephensonville |
| 7 | Jessica | Lawrence | Event organiser | Nurse, adult | wchavez@example.com | Port Laceyberg |
| 8 | Karen | Davis | Landscape architect | Investment banker, operational | lauramoore@example.org | Lake James |
| 9 | Richard | Turner | Merchandiser, retail | Archivist | ucopeland@example.com | Ingrammouth |
| 10 | Christie | Schultz | Geneticist, molecular | Therapist, speech and language | michaelperez@example.org | Frostfurt |
| 11 | Amy | Rocha | Surveyor, insurance | Animator | xmoore@example.net | Port Tammyfurt |
| 12 | Lisa | Hall | Armed forces operational officer | Sales promotion account executive | gary87@example.net | Jenkinsberg |
| 13 | Melanie | Liu | Health visitor | Special effects artist | rstanley@example.org | New Rebecca |
| 14 | Carlos | Williams | Clinical psychologist | Teaching laboratory technician | emily83@example.org | Melissafurt |
| 15 | Heather | Burgess | Naval architect | Podiatrist | jeremy60@example.net | Gutierrezhaven |

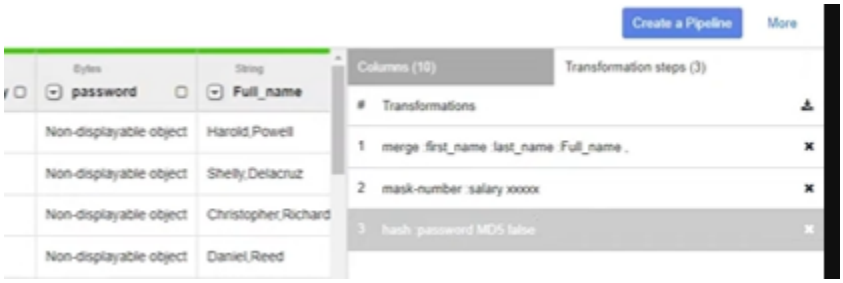
8. Now we have to perform some transformation
9. Here we first join first and last name and create full name column by using joins



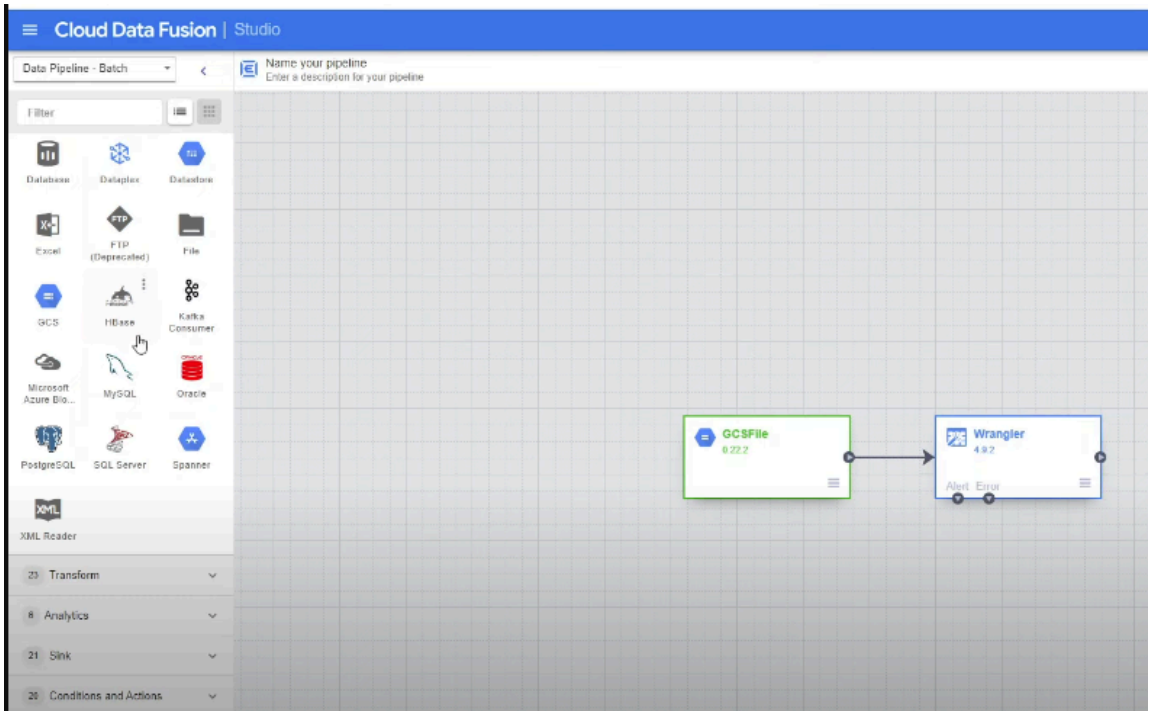
| | first_name | last_name | Full_name |
|---|---|---|---|
| 1 | Harold | Powell | Harold,Powell |
| 2 | Shelly | Delacruz | Shelly,Delacruz |
| 3 | Christopher | Richardson | Christopher,Richardson |
| 4 | Daniel | Reed | Daniel,Reed |
| 5 | Glen | Berry | Glen,Berry |
| 6 | Ashley | Miranda | Ashley,Miranda |
| 7 | Jessica | Lawrence | Jessica,Lawrence |
| 8 | Karen | Davis | Karen,Davis |
| 9 | Richard | Turner | Richard,Turner |
| 10 | Christie | Schultz | |
| 11 | Amy | Rocha | |
| 12 | Lisa | Hall | |

10. Next transformation is to mask sensitive data…like salary,phone number etc

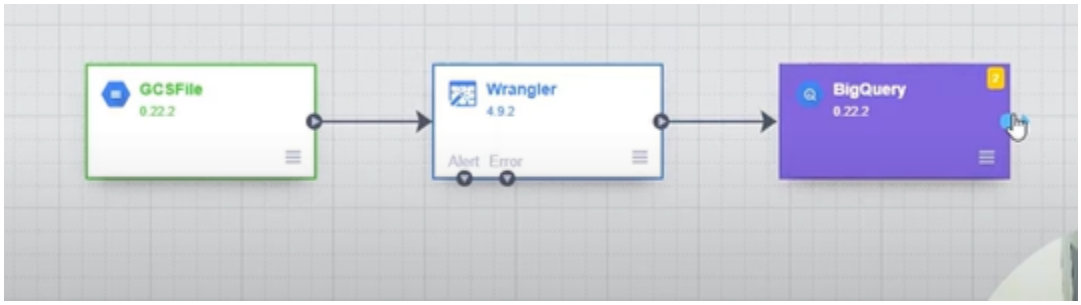

11. For password column ..we apply some encoding or some hashing to mask this
12. We can do what ever transformation we want by right clicking a column
13. And here we have made 3 transformation



14. Next we click on create pipeline ..and create a batch pipeline

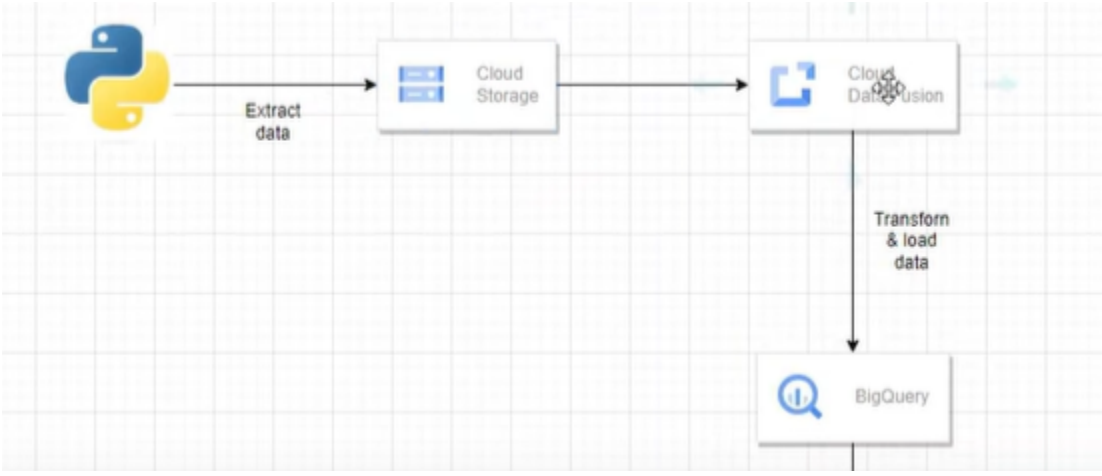



15. And next we have to choose a sink..and we select big query as our sink




16. Next we create the big query dataset..in which we load our data
17. Next we give our pipeline name and dploy the pipeline..and run it
18. If there are any errors in our pipeline execution ..then we can go to logs and debug the errors
19. If the pipelines successfully runs…then we can our table inside the dataset that we have created in the big query

20. We have completed transformation and loaded the data in big query




## Visualizations

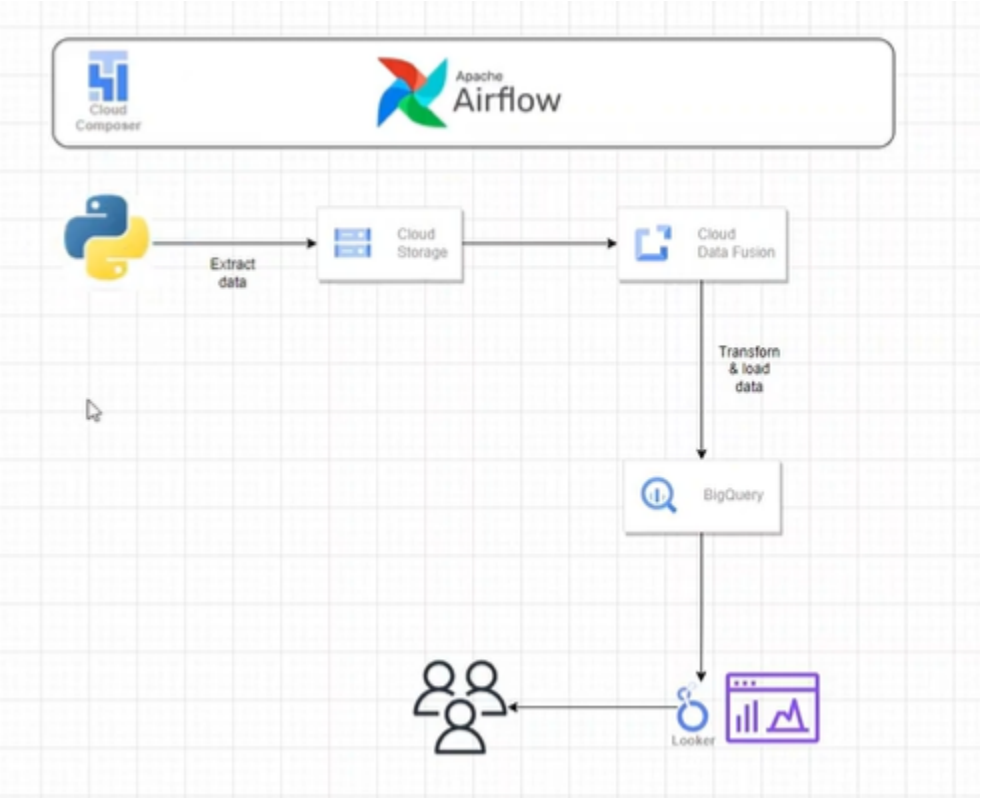
1. Now from the data which is in bigquery…we will create lookup tables

2. 


here we have created a basic chart

## Airflow Orchestration

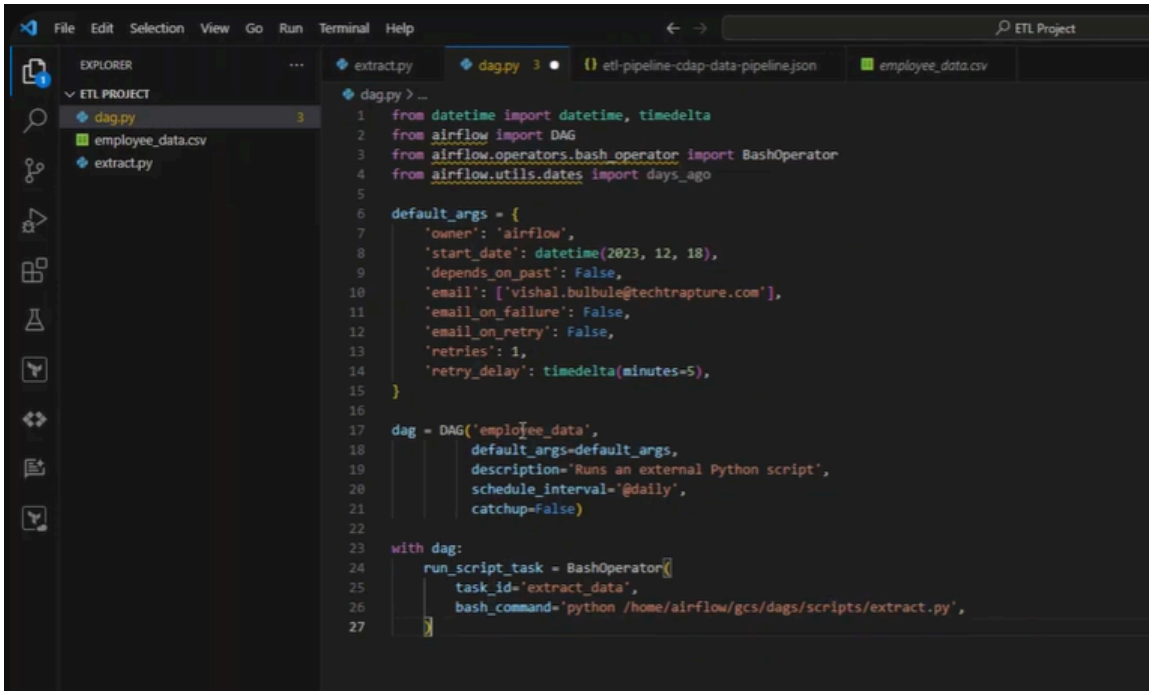
1. Now we want to automate this architecture using Airflow

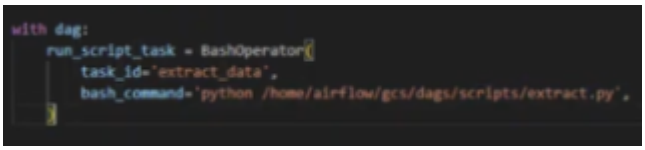



using cloud composer environment

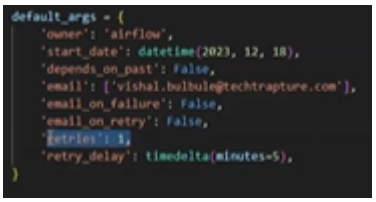
2. Here we created a cloud composer with no autoscaling and with default configs..and airflow will be hosted on this cloud composer environment
3. Next we create DAG in airflow to automate this
4. Follow his videos to create DAG

5. This is our DAG.py file

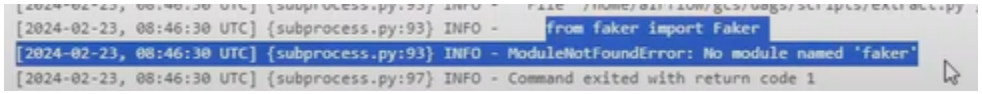



6. Dag will get triggered by this 

and it runs extract.py file

7. Default args 

8. Our Dag is getting failed due to

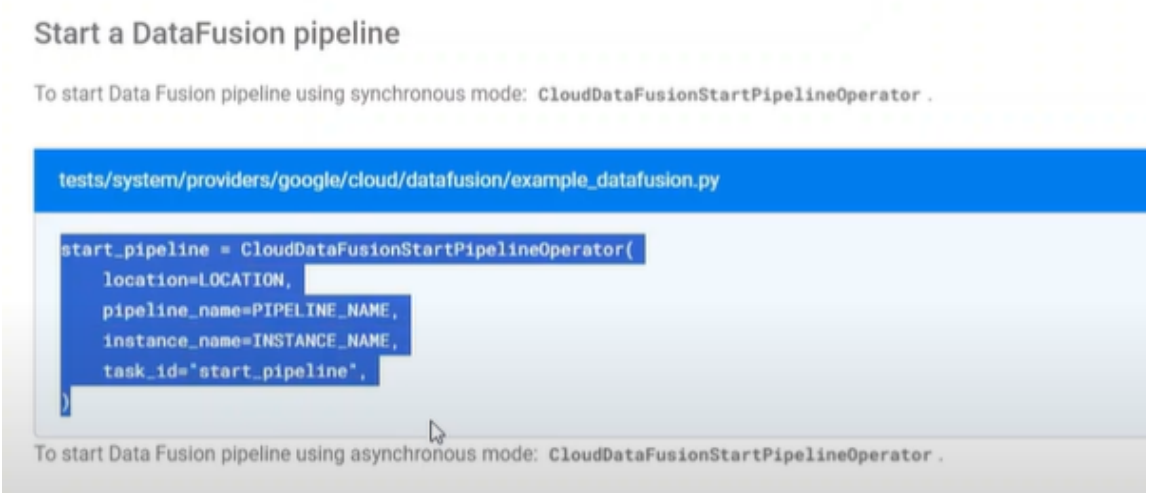


module import errors

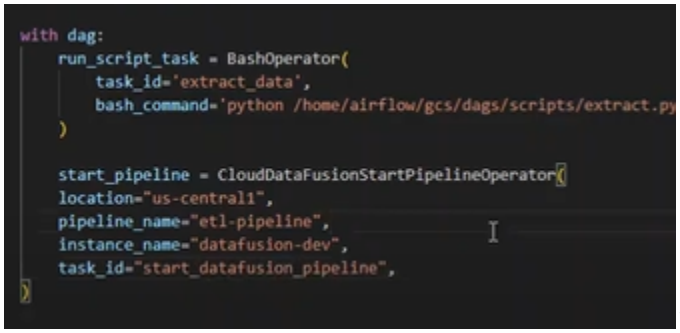
9. Best way is to deploy this modules/dependencies in composer env


10. Now here we have completed this part in our DAG
11. Now we have to trigger the data fusion pipeline

12. To start the existing pipeline we use




13. Find more on airflow providers google documentation
14. And here we have added our 2nd task




which starts the datafusion pipeline after com

15. We'll add the dependencies

```
run_script_task >> start_pipeline
```

and Next we'll update our DAG.py file inside airflow

16. We can see the status and identify the pipeline status here