Marketing Analyst Technical Assignment

Candidate: Minal Pawar
Role: Senior Marketing Analyst (Technical Assignment)
Tools Used: Google BigQuery, Looker Studio
Dashboard Link: https://lookerstudio.google.com/reporting/341564c1-87b8-4181-b2ab-f11942e4f856

1) Objective

The objective of this assignment is to unify multi-channel advertising data from Facebook Ads, Google Ads, and TikTok Ads into a standardized analytics model and build a one-page dashboard for cross-channel performance analysis. The goal is to enable consistent filtering, aggregation, and KPI reporting by platform, campaign, ad group, and date.

2) Data Sources

Datasets used (provided in assignment repository):

- 01_facebook_ads.csv
- 02_google_ads.csv
- 03_tiktok_ads.csv

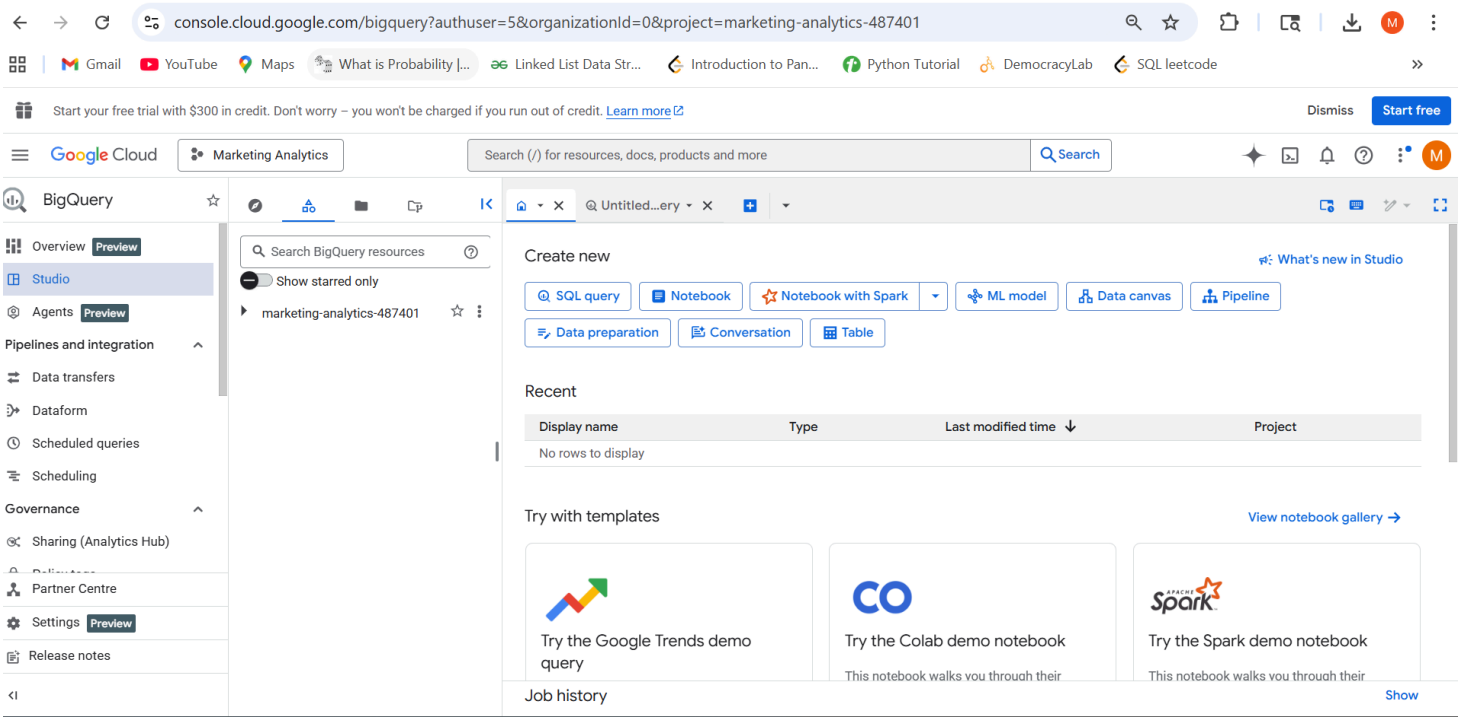
Source: Marketing Analytics Assignments GitHub
https://github.com/ej29-r3d/Marketing-Analytics-Assignments/tree/main/marketing-analyst-assignment

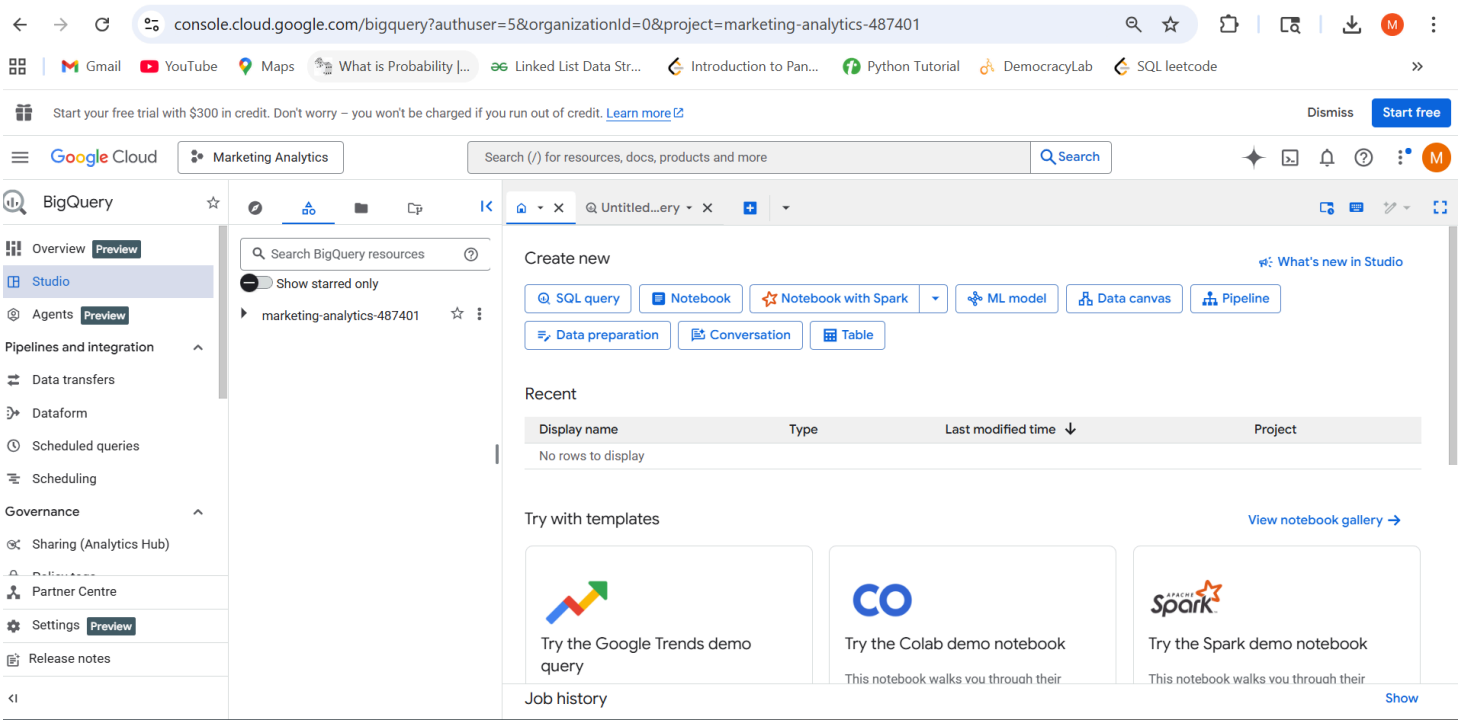
3) BigQuery Setup

Step 1 — Access BigQuery

To access BigQuery:

1. Open: https://console.cloud.google.com/bigquery
2. Sign in using the Google account used for the assignment.
3. If prompted, select an existing project or create a new project.
4. If BigQuery isn't visible, navigate: ☰ Menu → BigQuery → Studio
5. If prompted, enable:
    - BigQuery API (required)
    - Billing account (if required by your GCP configuration)





Step 2 — Create Dataset

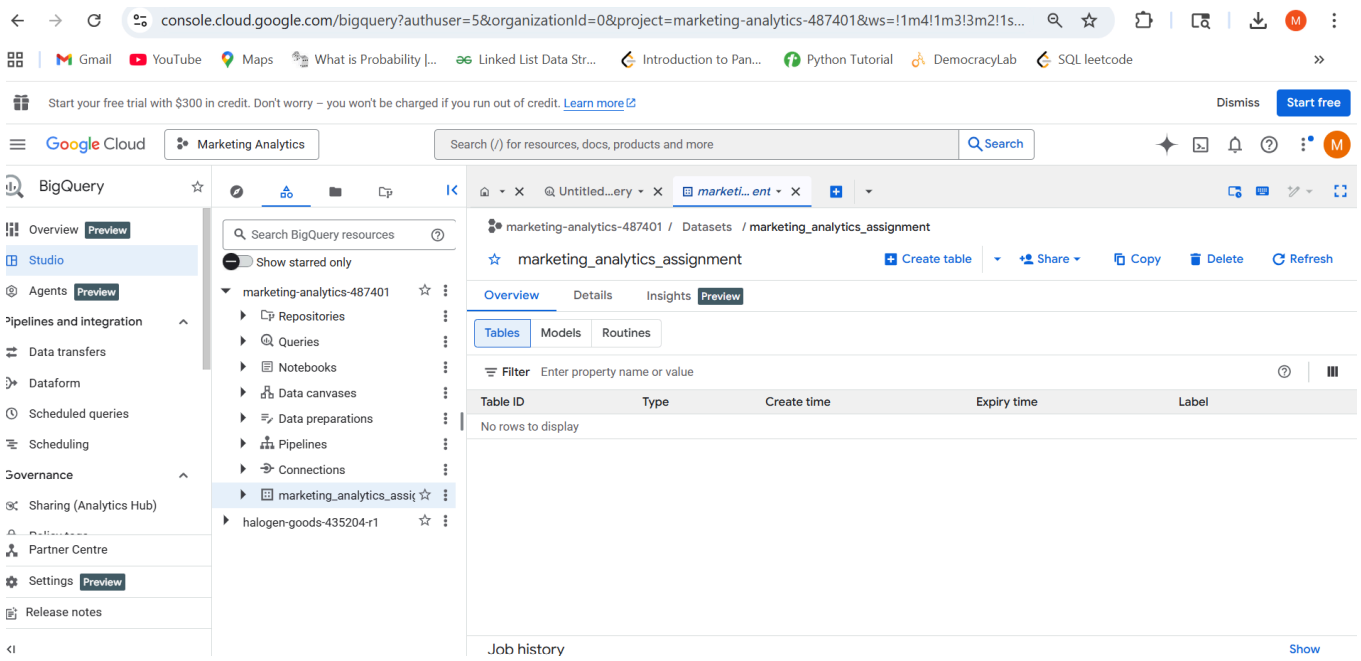
Created dataset inside the project:

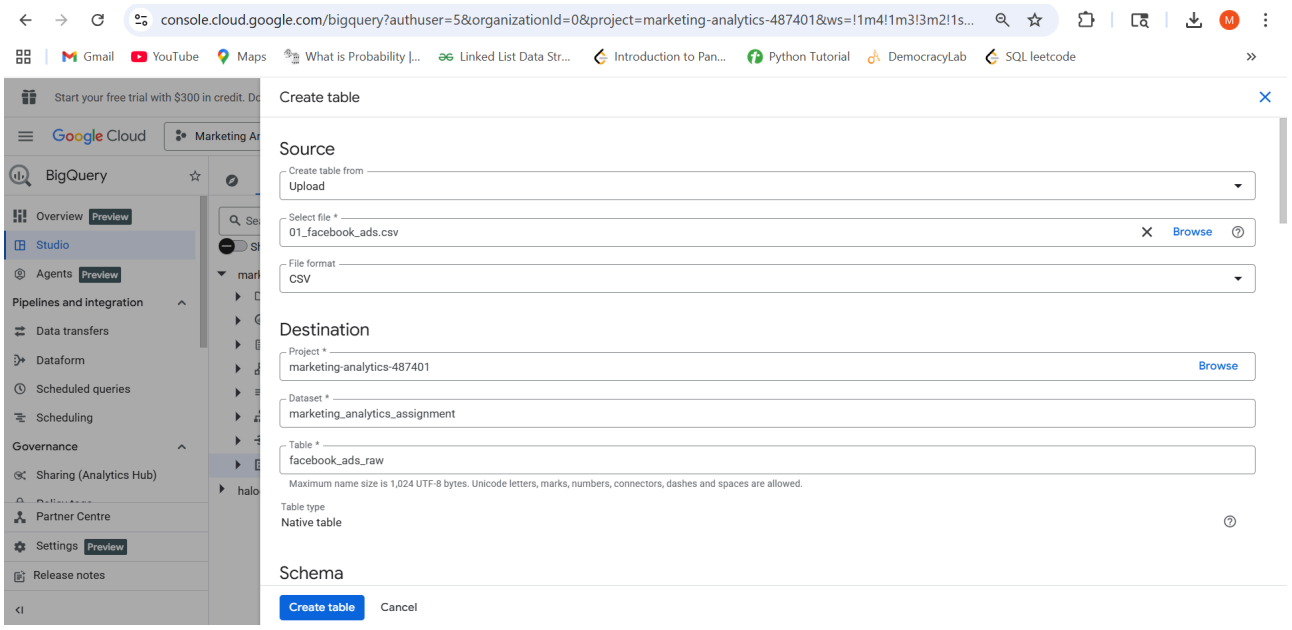
- Dataset ID: marketing_analytics_assignment
- Location: US (default)

Steps:

1. In BigQuery left panel, locate project: marketing-analytics-487401

2. Click ⋮ (three dots) next to project → Create dataset
3. Enter dataset id and click Create dataset





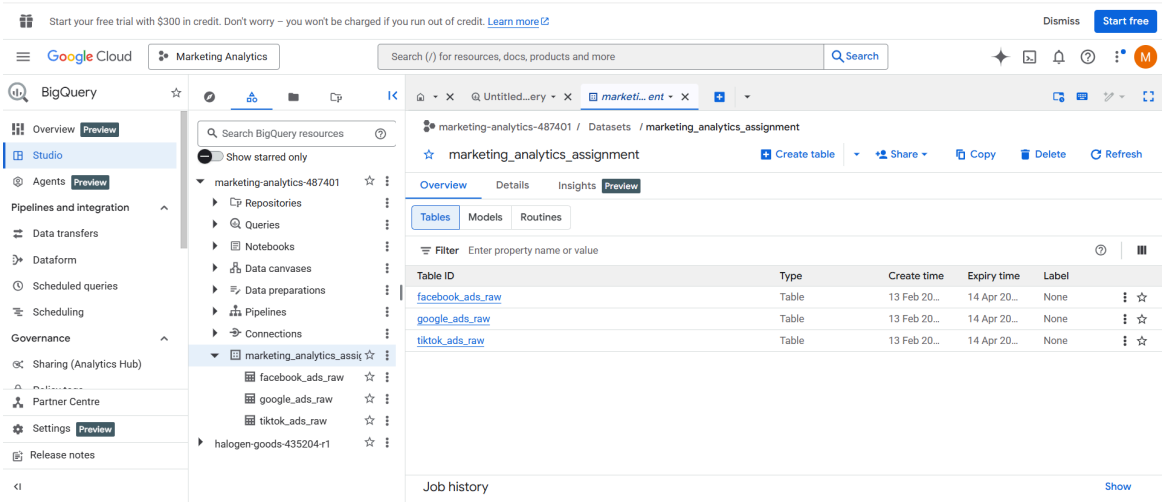
Step 3 — Upload CSVs into BigQuery Raw Tables

Uploaded each CSV into BigQuery with:

- Source: Upload
- File format: CSV
- Schema: Auto-detect enabled
- Header rows to skip: 1

Created 3 raw tables:

1. facebook_ads_raw (from 01_facebook_ads.csv)
2. google_ads_raw (from 02_google_ads.csv)
3. tiktok_ads_raw (from 03_tiktok_ads.csv)



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4) Unified Data Model (SQL Transformations)

4.1 Goal of the transformation

To enable cross-channel analysis, I standardized Facebook, Google Ads, and TikTok datasets into a single unified schema with consistent column names and data types. This allows seamless aggregation and filtering by platform, campaign, ad group, and date.

4.2 Platform Clean Views

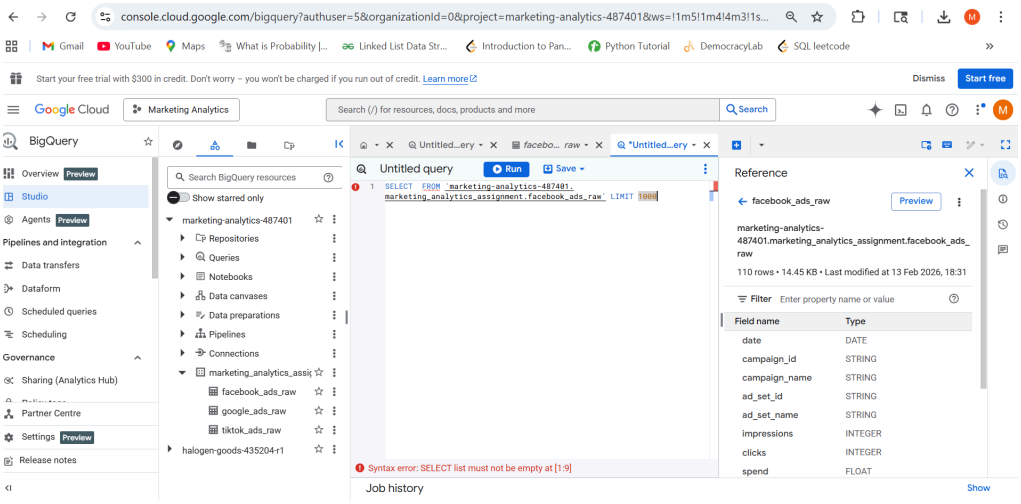
Created 3 “clean” views, one per platform:

- facebook_ads_clean
- google_ads_clean
- tiktok_ads_clean

Each clean view:

- Adds a platform field (facebook, google, tiktok)
- Renames platform-specific identifiers to shared fields (adgroup_id, adgroup_name)
- Casts metrics into correct types using SAFE_CAST
    - impressions/clicks/conversions → INT64
    - spend/cost → NUMERIC
- Sets fields unavailable for that platform to NULL to maintain schema consistency

This ensures each platform outputs the same columns, making it safe to union.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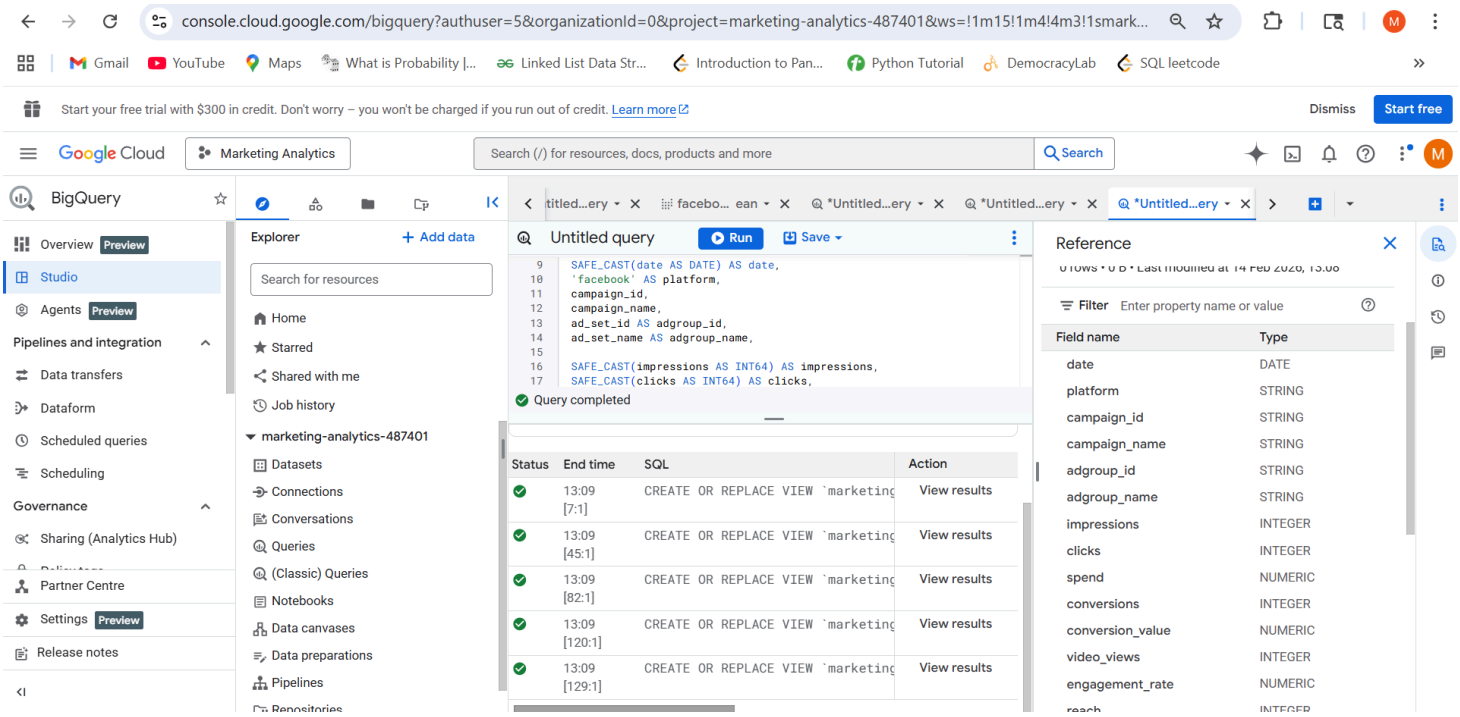
Scheduling
Governance
Sharing (Analytics Hub)
Partner Centre
Settings
Release notes
Search BigQuery resources
Show starred only
marketing-analytics-487401
Repositories
Queries
Notebooks
Data canvases
Data preparations
Pipelines
Connections
facebook_ads_raw
google_ads_raw
tiktok_ads_raw
halogen-goods-435204-r1
Untitled query
Run
Save
SELECT FROM `marketing-analytics-487401.marketing_analytics_assignment.facebook_ads_raw` LIMIT 1000
Syntax error: SELECT list must not be empty at [1:9]
Job history
Show
Reference
facebook_ads_raw
Preview
marketing-analytics-487401.marketing_analytics_assignment.facebook_ads_raw
110 rows • 14.45 KB • Last modified at 13 Feb 2026, 18:31
Filter
Enter property name or value
Field name
Type
date
DATE
campaign_id
STRING
campaign_name
STRING
ad_set_id
STRING
ad_set_name
STRING
impressions
INTEGER
clicks
INTEGER
spend
FLOAT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Governance
Sharing (Analytics Hub)
Partner Centre
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Release notes
Explorer
+ Add data
Search for resources
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Starred
Shared with me
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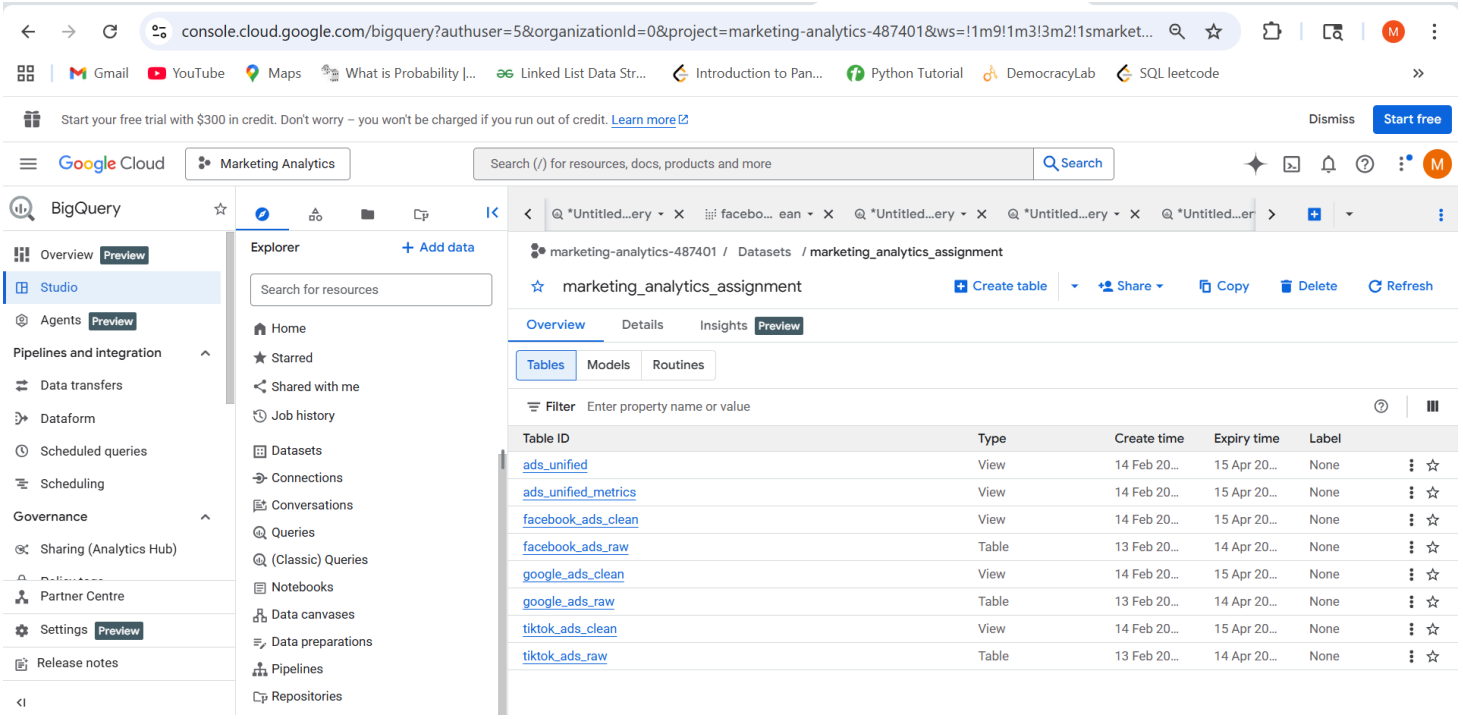
Datasets
Connections
Conversations
Queries
(Classic) Queries
Notebooks
Data canvases
Data preparations
Pipelines
Untitled query
Run
Save
SAFE_CAST(date AS DATE) AS date,
'facebook' AS platform,
campaign_id,
campaign_name,
ad_set_id AS adgroup_id,
ad_set_name AS adgroup_name,
SAFE_CAST(impressions AS INT64) AS impressions,
SAFE_CAST(clicks AS INT64) AS clicks,
Query completed
Status
End time
SQL
Action
13:09 [7:1]
13:09 [45:1]
13:09 [82:1]
13:09 [120:1]
13:09 [129:1]
CREATE OR REPLACE VIEW `marketing
View results
Reference
Filter
Enter property name or value
Field name
Type
date
DATE
platform
STRING
campaign_id
STRING
campaign_name
STRING
adgroup_id
STRING
adgroup_name
STRING
impressions
INTEGER
clicks
INTEGER
spend
NUMERIC
conversions
INTEGER
conversion_value
NUMERIC
video_views
INTEGER
engagement_rate
NUMERIC



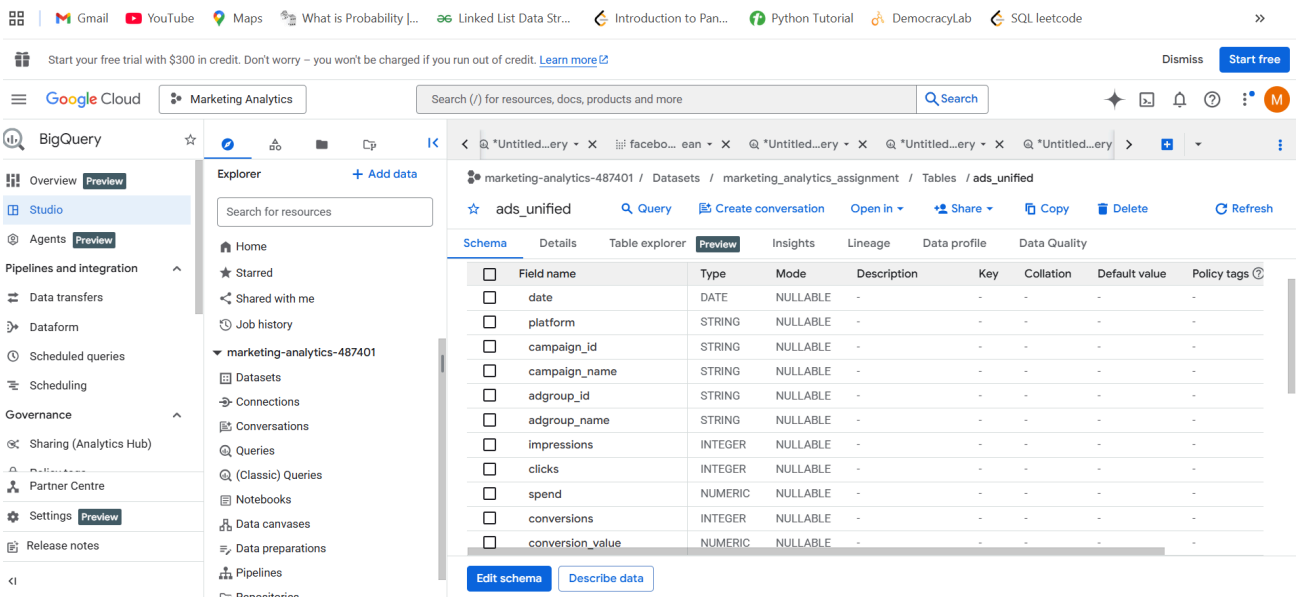
4.3 Unified Dataset Layer — ads_unified

Created a unified cross-channel view called ads_unified using UNION ALL across the 3 clean views.

Why UNION ALL:

- Advertising metrics are additive
- We must retain all records without deduplicating rows

This produces one cross-channel fact table where each row represents:
platform + campaign + ad group + date performance.



4.4 Metrics Layer — ads_unified_metrics

Created ads_unified_metrics as the dashboard-ready layer. It includes calculated KPIs:

- CTR = clicks / impressions
- CPC = spend / clicks
- CPA = spend / conversions
- CVR = conversions / clicks
- ROAS = conversion_value / spend *(when conversion_value exists; primarily Google)*

Also retains platform-specific fields:

- Facebook: engagement_rate, reach, frequency
- Google: quality_score, search_impression_share
- TikTok: video_watch_*, likes, shares, comments

This enables a single Looker Studio dashboard to show both standardized KPIs and channel-specific insights.

KPI Definitions (How metrics are calculated)

Base metrics (from unified model)

These fields come directly from the unified dataset and are aggregated in the dashboard (typically SUM):

- **Spend** = `SUM(spend)`
- **Impressions** = `SUM(impressions)`
- **Clicks** = `SUM(clicks)`
- **Conversions** = `SUM(conversions)`

Calculated KPIs (platform-neutral)

1) CTR (Click-Through Rate)

Definition: % of impressions that resulted in a click
Formula (recommended ratio-of-totals):

- CTR = `SUM(clicks) / SUM(impressions)`

Looker Studio calculated field used:

IF(SUM(impressions)=0, 0, SUM(clicks)/SUM(impressions))

Format: Percent

2) CPC (Cost per Click)

Definition: average cost paid per click
Formula:

- CPC = `SUM(spend) / SUM(clicks)`

Looker Studio calculated field used:

IF(SUM(clicks)=0, 0, SUM(spend)/SUM(clicks))

Format: Currency

3) CPA (Cost per Acquisition / Cost per Conversion)

Definition: average cost paid per conversion
Formula:

- CPA = `SUM(spend) / SUM(conversions)`

Looker Studio calculated field used:

IF(SUM(conversions)=0, 0, SUM(spend)/SUM(conversions))

Format: Currency

4) CVR (Conversion Rate)

Definition: % of clicks that resulted in a conversion
Formula:

- CVR = `SUM(conversions) / SUM(clicks)`

Looker Studio calculated field used:

IF(SUM(clicks)=0, 0, SUM(conversions)/SUM(clicks))

Format: Percent

5) ROAS (Return on Ad Spend) *(available where conversion_value exists — mainly Google Ads)*

Definition: revenue/value returned per $1 of ad spend
Formula:

- ROAS = `SUM(conversion_value) / SUM(spend)`

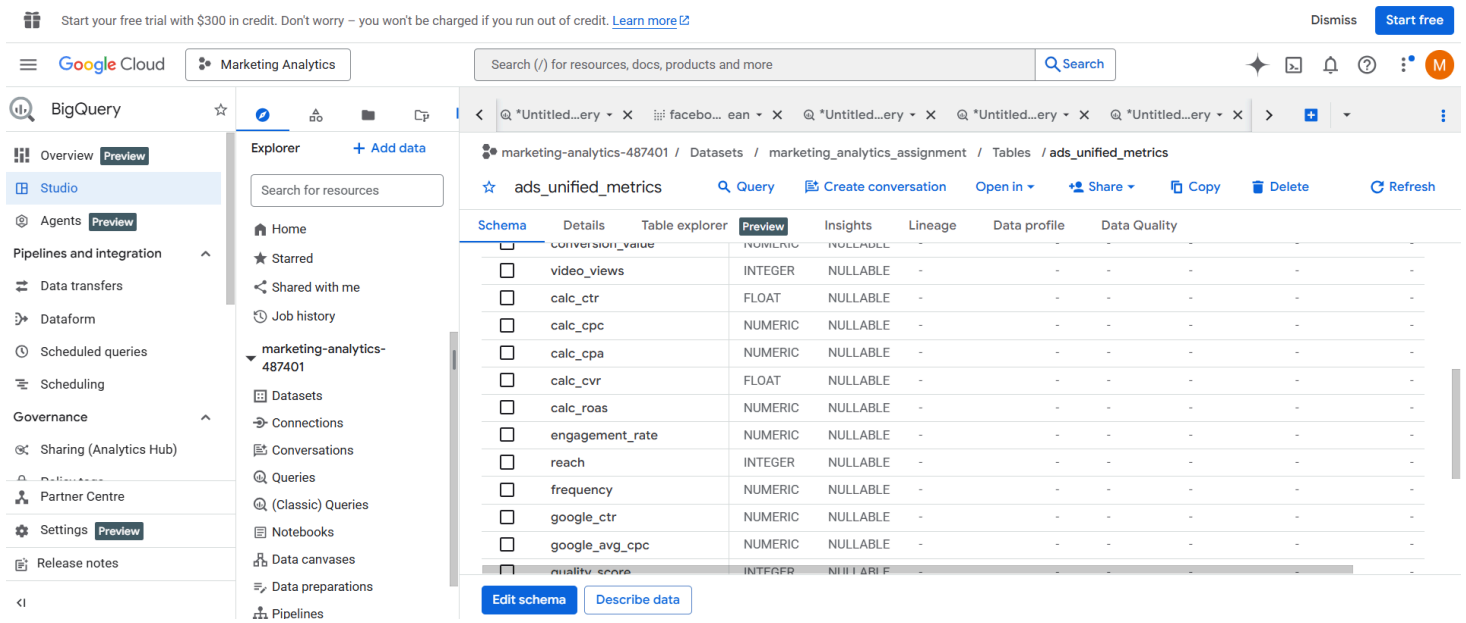
In BigQuery metrics view (`ads_unified_metrics`):

SAFE_DIVIDE(conversion_value, spend) AS calc_roas

Why KPI calculations were done this way

KPIs were calculated as **ratio-of-totals** (e.g., `SUM(clicks)/SUM(impressions)`) to avoid distortion that can happen if averaging daily rates. This makes metrics consistent across different date ranges and filters.

BigQuery uses `SAFE_DIVIDE` to avoid errors from divide-by-zero, and Looker Studio uses `IF()` logic for the same reason in dashboard-level calculated fields.



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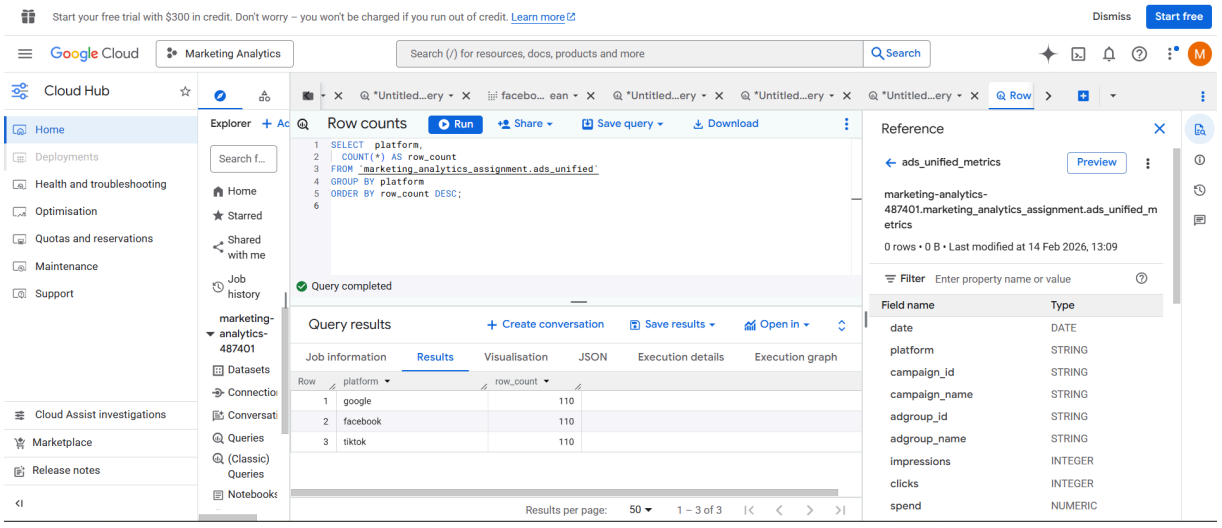
5) Data Quality & Validation Checks

5.1 Row counts by platform

Validated completeness of the unified dataset:

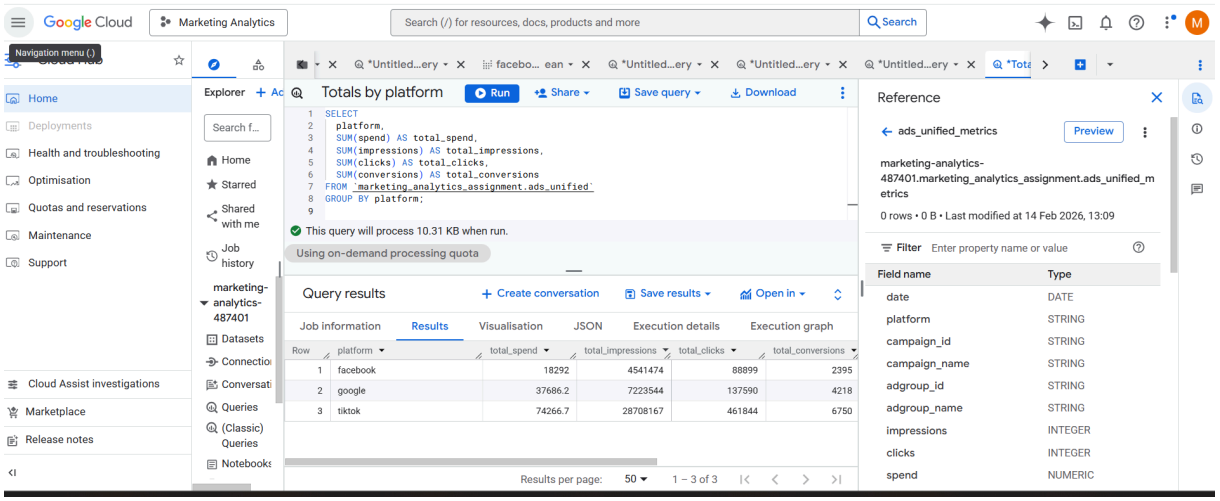
```
SELECT platform, COUNT(*) AS row_count
FROM `marketing_analytics_assignment.ads_unified`
GROUP BY platform
ORDER BY row_count DESC;
```



5.2 Totals by platform

Validated key totals to ensure aggregations work correctly:

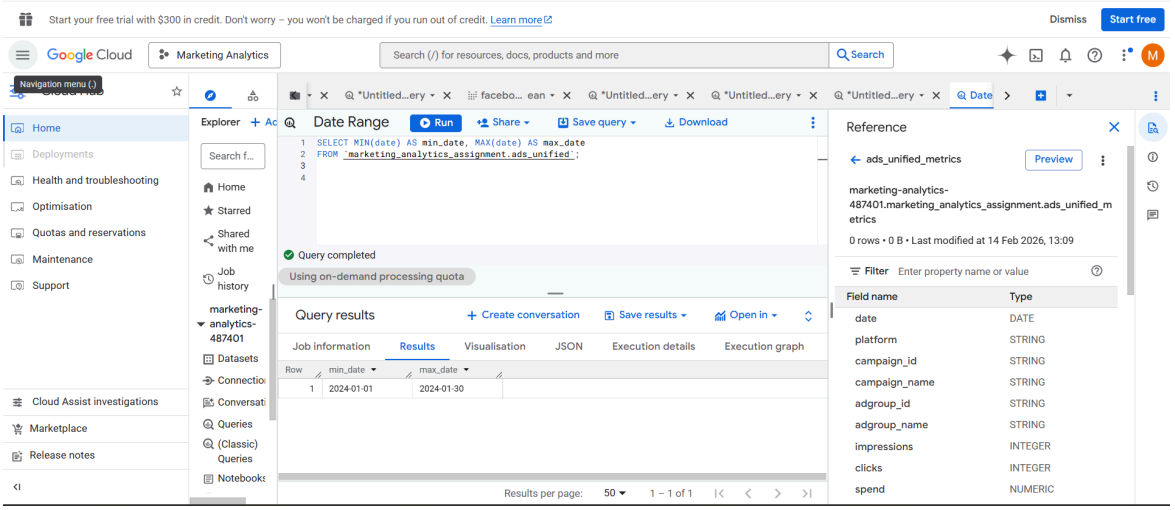
```
SELECT
  platform,
  SUM(spend) AS total_spend,
  SUM(impressions) AS total_impressions,
  SUM(clicks) AS total_clicks,
  SUM(conversions) AS total_conversions
FROM `marketing_analytics_assignment.ads_unified`
GROUP BY platform;
```



5.3 Date range validation

Confirmed min/max dates for correct reporting and dashboard filtering:

```
SELECT MIN(date) AS min_date, MAX(date) AS max_date
FROM `marketing_analytics_assignment.ads_unified`;
```

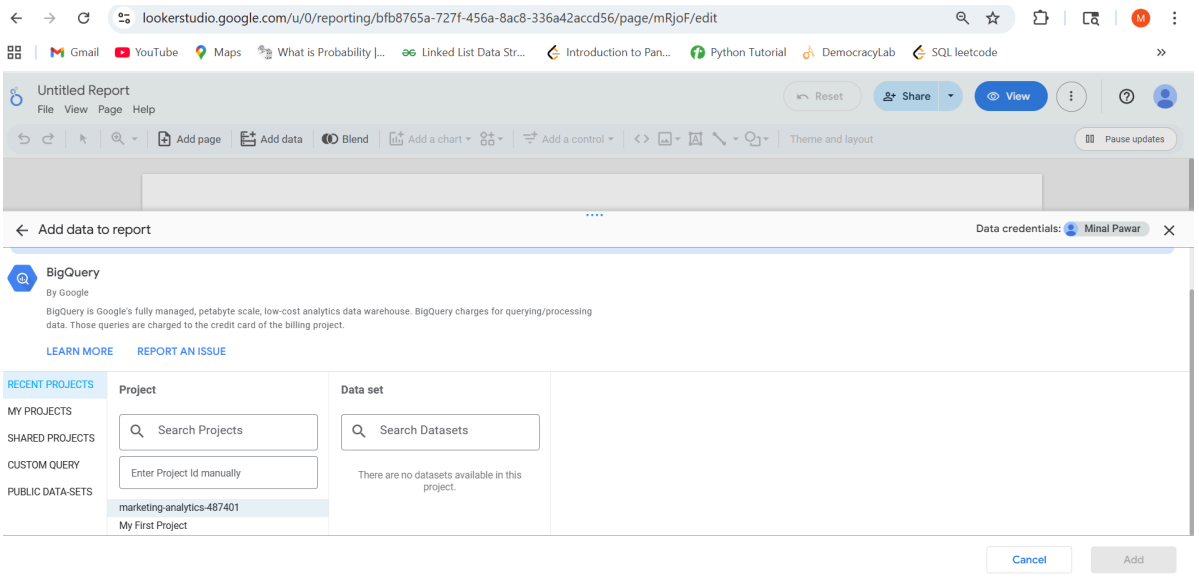


6) Dashboard Build (Looker Studio)

6.1 Connect Looker Studio to BigQuery

Steps:

1. Open Looker Studio
2. Create → Report
3. Connector: BigQuery
4. Select:
    - Project: your GCP project
    - Dataset: marketing_analytics_assignment
    - Table/View: ads_unified_metrics
5. Click Add to report



6.2 Dashboard Layout (One Page)

Dashboard includes filters, KPIs, trends, comparisons, and campaign drill-down.

Top Row: KPI Scorecards

- Total Spend (SUM spend)
- Total Impressions (SUM impressions)
- Total Clicks (SUM clicks)
- Total Conversions (SUM conversions)
- CTR (calculated field in Looker Studio)
- CPC (calculated field in Looker Studio)
- CPA (calculated field in Looker Studio)
- CVR (calculated field in Looker Studio)

Middle: Trend + Channel Comparison

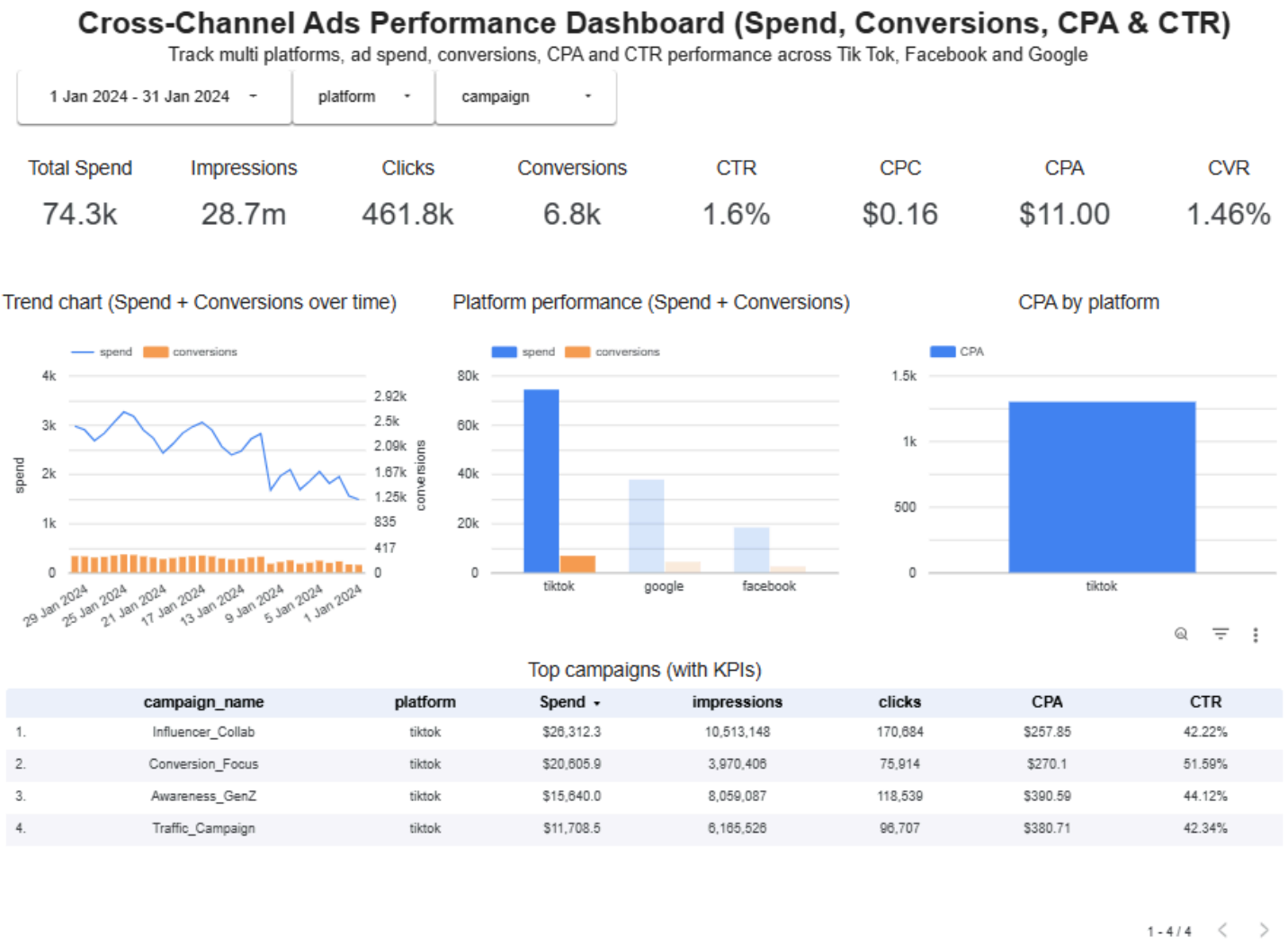
- Trend chart (Combo): Spend over time + Conversions over time
- Platform performance bar chart (Spend and conversions)
- CPA by platform

Bottom: Campaign Table

- campaign_name performance table with metrics:
    - spend, clicks, conversions, CTR, CPC, CPA, CVR
- Sorted by spend descending for quick identification of top campaigns

Filters

- Date range control
- Platform dropdown
- Campaign dropdown



	campaign_name	platform	Spend	impressions	clicks	CPA	CTR
1.	Influencer_Collab	tiktok	$26,312.3	10,513,148	170,684	$257.85	42.22%
2.	Conversion_Focus	tiktok	$20,605.9	3,970,406	75,914	$270.1	51.59%
3.	Awareness_GenZ	tiktok	$15,640.0	8,059,087	118,539	$390.59	44.12%
4.	Traffic_Campaign	tiktok	$11,708.5	6,165,526	96,707	$380.71	42.34%

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7) Key Insights (3–5)

- Efficiency varies by platform (CPA differences): CPA differs across channels, indicating opportunities to optimize budget allocation and improve underperforming channels.
- Spend and conversions move together over time: Trend analysis highlights periods where increased spend aligns with conversion lift and periods where it doesn't, signaling efficiency opportunities.
- Performance is concentrated in top campaigns: A subset of campaigns contributes most of the spend and conversions, allowing prioritization of winners and optimization of the long tail.
- CTR and CVR provide different funnel signals: CTR reflects engagement/traffic quality, while CVR reflects post-click effectiveness—both are needed for end-to-end performance evaluation.
- Unified reporting improves consistency: Standardized KPIs across platforms allow accurate cross-channel comparisons at campaign and ad group levels.