

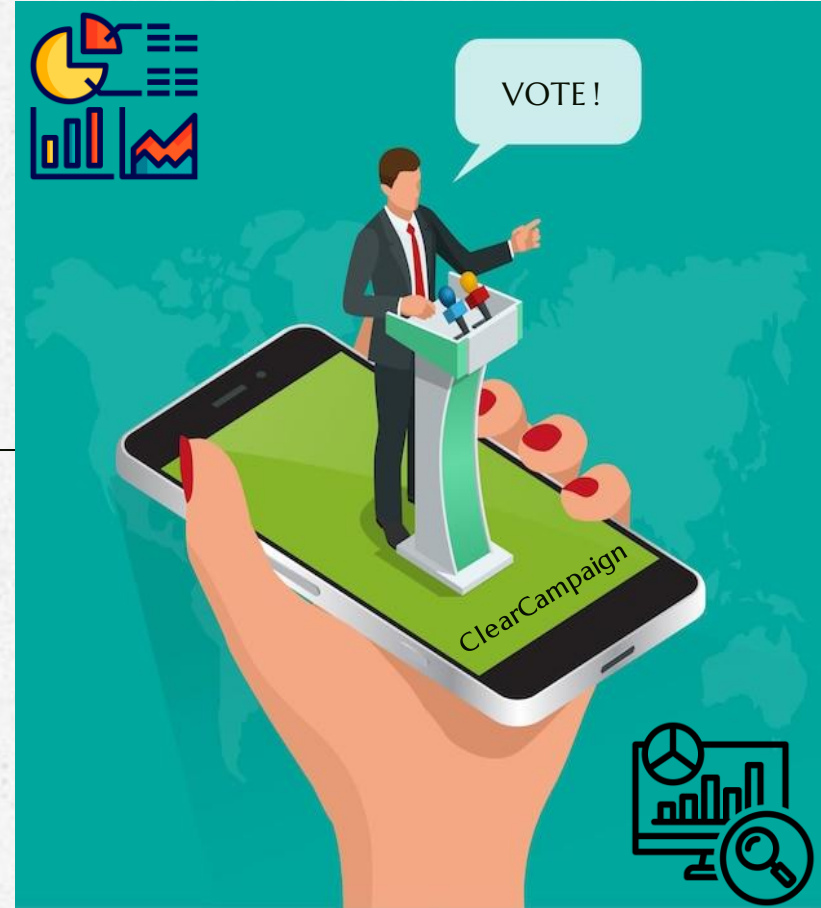
# Data Layer Analysis of “ClearCampaign” An App For Transparent Political Ad Data

By  
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## Statement Of The Problem

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Can You Access Political Ad Campaign Data ?  
***DEPENDS. NOT AN EMPHATIC YES!***

WHERE?



Bloomberg  
Government



Roku Advertising

Easily Accessible ?

Data Quality ?

All Information At One Place ?

Customizations ?

Last Updated ?

Mode Of Access ?

***INSUFFICIENT !***

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***SOLUTION : ClearCampaign***

# ClearCampaign



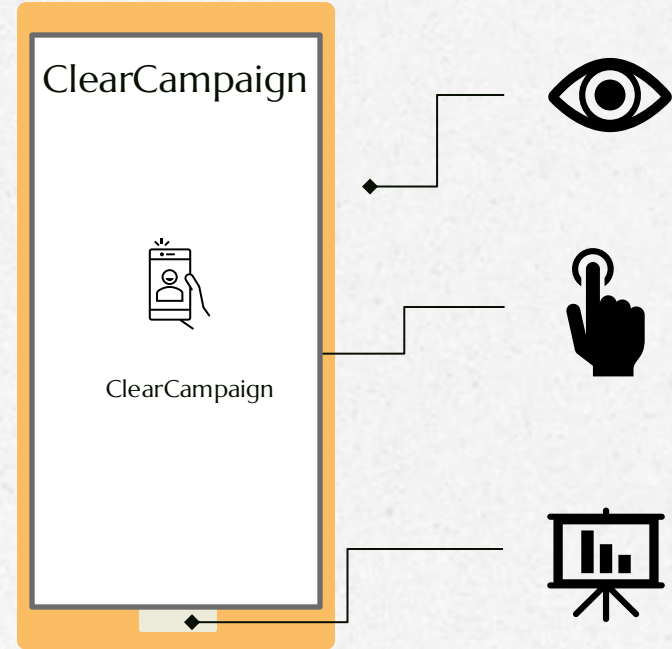
Vision : to create transparency in the arena of politics for a better world and a better future



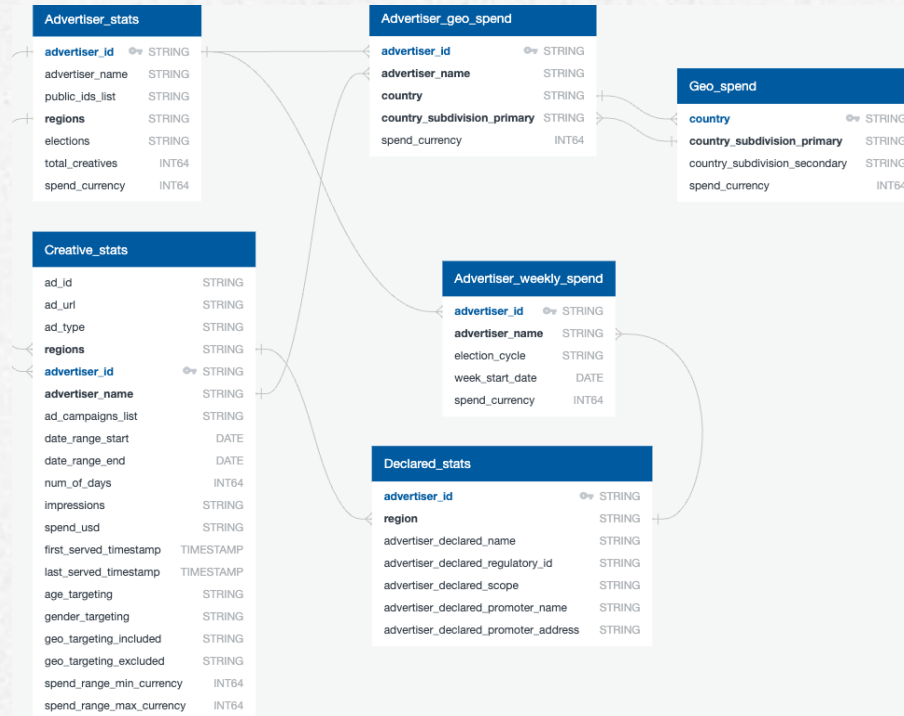
Value : Political Ad Campaign Data at user's fingertip



Versatility : Wide range of attributes to filter from, due to vast data stored.



## Dataset : google\_political\_ads



# Features & Queries To Implement The Application Features

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## Feature 1: All Time Top 10 Political Ad Campaigns of USA by Spending

```
WITH FilteredCreativeStats AS (  
  SELECT  
    advertiser_id,  
    EXTRACT(YEAR FROM last_served_timestamp) AS year,  
    spend_range_max_usd,  
    impressions,  
    ad_type,  
    age_targeting,  
    gender_targeting,  
    geo_targeting_included,  
    EXTRACT(YEAR FROM date_range_start) AS start_year  
  FROM  
    `bigquery-public-data.google_political_ads.creative_stats`  
  WHERE  
    age_targeting IS NOT NULL AND  
    EXTRACT(YEAR FROM date_range_start) = 2024  
)  
FilteredAdvertiserStats AS (  
  SELECT  
    advertiser_id,  
    regions,  
    advertiser_name,  
    spend_usd  
  FROM  
    `bigquery-public-data.google_political_ads.advertiser_stats`  
  WHERE  
    regions = 'US' AND spend_usd <> 0)
```

```
SELECT  
  a.regions,  
  c.year,  
  a.advertiser_name,  
  SUM(c.spend_range_max_usd) AS Spending,  
  c.impressions,  
  c.ad_type,  
  c.age_targeting,  
  c.gender_targeting,  
  c.geo_targeting_included  
FROM  
  FilteredCreativeStats c  
JOIN  
  FilteredAdvertiserStats a ON c.advertiser_id = a.advertiser_id  
GROUP BY  
  a.regions,  
  c.year,  
  a.advertiser_name,  
  c.ad_type,  
  c.impressions,  
  c.age_targeting,  
  c.gender_targeting,  
  c.geo_targeting_included  
ORDER BY  
  Spending DESC  
LIMIT  
  10;
```

---



### Feature 2 : Weekly Political Ad Spends in California, 2024

```
WITH FilteredGeoSpend AS (  
  SELECT  
    advertiser_id,  
    country_subdivision_primary  
  FROM  
    `bigquery-public-  
data.google_political_ads.advertise  
r_geo_spend`  
  WHERE  
    country = 'US'  
  AND  
    country_subdivision_primary = 'CA'  
)
```

```
SELECT  
  g.country_subdivision_primary,  
  w.week_start_date,  
  w.advertiser_name,  
  SUM(w.spend_usd) AS total_weekly_spend_usd  
FROM  
  `bigquery-public-  
data.google_political_ads.advertiser_weekl  
y_spend` AS w  
JOIN  
  FilteredGeoSpend AS g  
ON  
  w.advertiser_id = g.advertiser_id  
GROUP BY  
  1, 2, 3  
ORDER BY  
  1, 2 DESC LIMIT 100;
```

---

# Features & Queries To Implement The Application Features

---

## Feature 3 : Demographics Targetted by Top 10 US Political Ad Spends & It's Impact in 2024

```
WITH FilteredCreativeStats AS (  
  SELECT  
    advertiser_id,  
    EXTRACT(YEAR FROM last_served_timestamp) AS year,  
    spend_range_max_usd,  
    impressions,  
    ad_type,  
    age_targeting,  
    gender_targeting,  
    geo_targeting_included,  
    EXTRACT(YEAR FROM date_range_start) AS start_year  
  FROM  
    `bigquery-public-data.google_political_ads.creative_stats`  
  WHERE  
    age_targeting IS NOT NULL AND  
    EXTRACT(YEAR FROM date_range_start) = 2024  
)  
FilteredAdvertiserStats AS (  
  SELECT  
    advertiser_id,  
    regions,  
    advertiser_name,  
    spend_usd  
  FROM  
    `bigquery-public-data.google_political_ads.advertiser_stats`  
  WHERE  
    regions = 'US' AND  
    spend_usd <> 0  
)
```

```
SELECT  
  a.regions,  
  c.year,  
  a.advertiser_name,  
  SUM(c.spend_range_max_usd) AS Spending,  
  c.impressions,  
  c.ad_type,  
  c.age_targeting,  
  c.gender_targeting,  
  c.geo_targeting_included  
FROM  
  FilteredCreativeStats c  
JOIN  
  FilteredAdvertiserStats a ON c.advertiser_id = a.advertiser_id  
GROUP BY  
  a.regions,  
  c.year,  
  a.advertiser_name,  
  c.ad_type,  
  c.impressions,  
  c.age_targeting,  
  c.gender_targeting,  
  c.geo_targeting_included  
ORDER BY  
  Spending DESC LIMIT 100;
```

---

# Features & Queries To Implement The Application Features

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## Feature 4 : State Wise Total Political Ad Spending in US

```
SELECT
  a.advertiser_id,
  a.advertiser_name,
  g.country_subdivision_primary,
  SUM(g.spend_usd) AS total_spend_usd
FROM
  `bigquery-public-
data.google_political_ads.advertiser_stats` AS
a
JOIN
  `bigquery-public-
data.google_political_ads.advertiser_geo_spend`
AS g
ON
  a.advertiser_id = g.advertiser_id
WHERE
  g.country = 'US'
GROUP BY
  a.advertiser_id,
  a.advertiser_name,
  g.country_subdivision_primary
ORDER BY
  total_spend_usd DESC LIMIT
100;
```

Row	advertiser_id	advertiser_name	country_subdivision_primary	total_spend_usd
1	AR07182956219827486721	WARNOCK FOR GEORGIA	GA	14346100
2	AR12365610929977556993	BIDEN FOR PRESIDENT	FL	13752300
3	AR12365610929977556993	BIDEN FOR PRESIDENT	PA	13557900
4	AR11825178974693097473	DONALD J. TRUMP FOR PRESI...	FL	11550000
5	AR00764926253714112513	Yes on 27 - Californians for Solutions to Homelessness and Mental Health Support, a Coalition of Housing and Mental Health Experts,	CA	10247100



### Other Features :

- Impressions of Ads
- Country Wise Political Ad Spending
  - US Ad Spending By Gender
- Weekly Total Political Ad Spending

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DEMO

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



# DEMO : Q1

---

## Before Optimization

Elapsed time	Slot time consumed 	Bytes shuffled 	Bytes spilled to disk 
1 sec	5 sec	28.38 MB	0 B 

## After Optimization

Elapsed time	Slot time consumed 	Bytes shuffled 	Bytes spilled to disk 
1 sec	4 sec	28.38 MB	0 B 

Bytes shuffled: BigQuery shuffles data in order to support large-scale computation.

Slot time: A slot is a unit of computational capacity required to execute SQL queries.

Before optimization:

Bytes shuffled/ slot time =  $28.83\text{MB}/5\text{sec} = 5.6\text{MB/sec}$

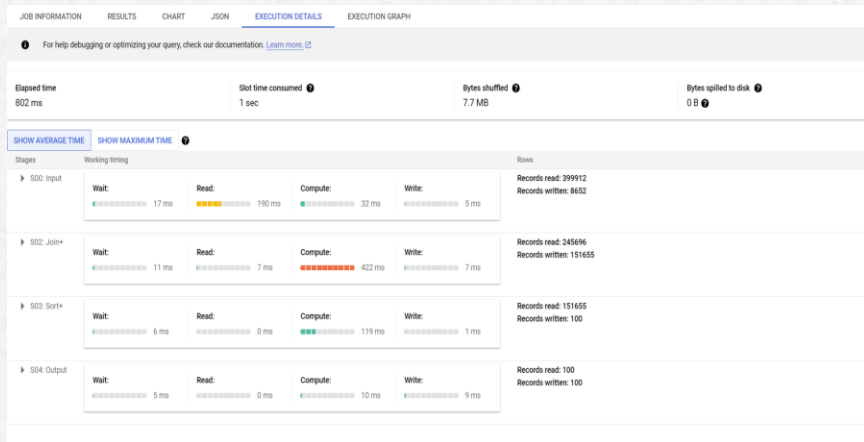
After optimization:

Bytes shuffled/ slot time =  $28.83\text{MB}/4\text{sec} = 7.2\text{MB/sec}$

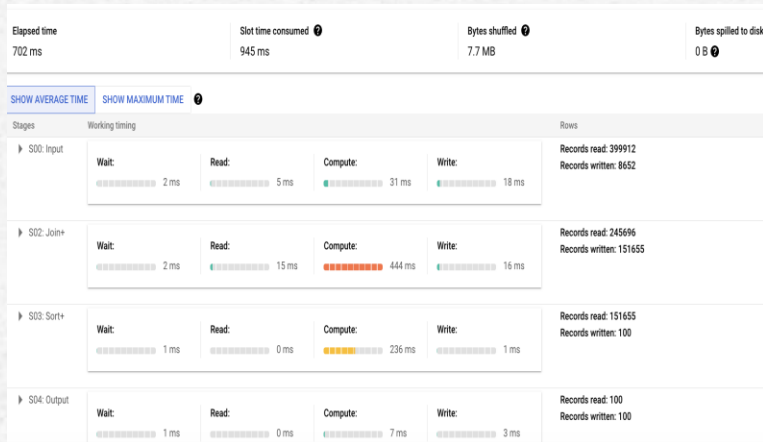
---

# DEMO : Q2

## Before Optimization

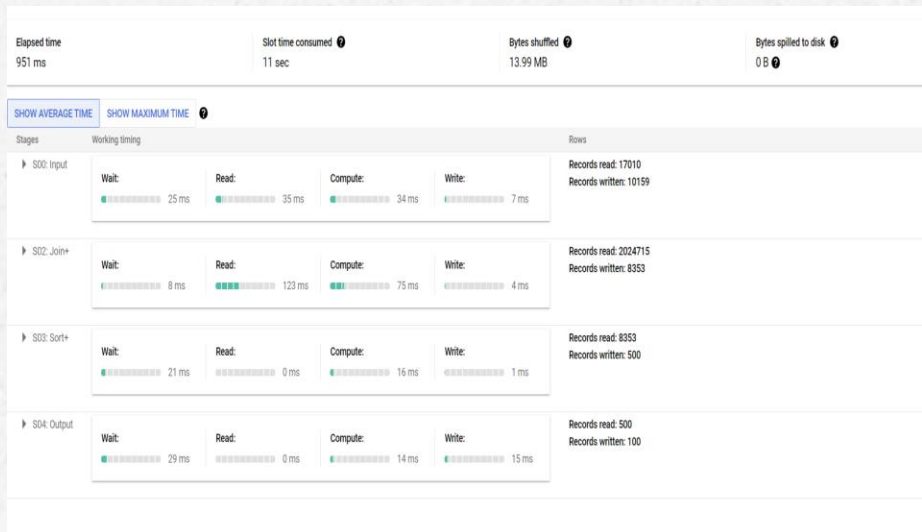


## After Optimization

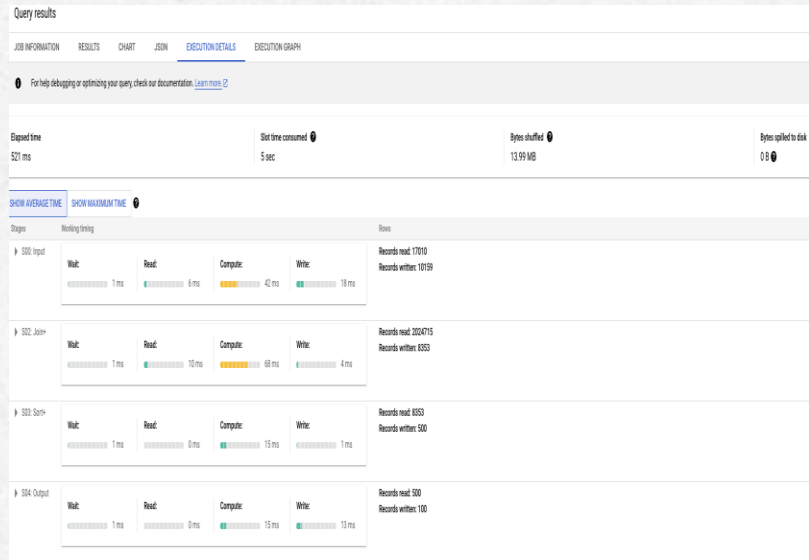


# DEMO : Q3

## Before Optimization



## After Optimization





# DEMO : Q4

## Before Optimization

Elapsed time 1 sec	Slot time consumed ⓘ 3 sec	Bytes shuffled ⓘ 28.66 MB
<a href="#">SHOW AVERAGE TIME</a>	<a href="#">SHOW MAXIMUM TIME ⓘ</a>	
Stages	Working timing	Rows
▶ S01: Input	<div>Wait: ██████████ 37 ms</div> <div>Read: ██████████ 5 ms</div> <div>Compute: ██████████ 36 ms</div> <div>Write: ██████████ 9 ms</div>	Records read: 17010 Records written: 17010
▶ S02: Join+	<div>Wait: ██████████ 2 ms</div> <div>Read: ██████████ 5 ms</div> <div>Compute: ██████████ 1 sec</div> <div>Write: ██████████ 14 ms</div>	Records read: 416922 Records written: 394578
▶ S03: Aggregate+	<div>Wait: ██████████ 20 ms</div> <div>Read: ██████████ 0 ms</div> <div>Compute: ██████████ 807 ms</div> <div>Write: ██████████ 1 ms</div>	Records read: 394578 Records written: 100
▶ S04: Output	<div>Wait: ██████████ 16 ms</div> <div>Read: ██████████ 0 ms</div> <div>Compute: ██████████ 6 ms</div> <div>Write: ██████████ 12 ms</div>	Records read: 100 Records written: 100

Read cost per GB: 0.01\$

Write cost per GB: 0.02\$

Total average size of each record is 100bytes

Read cost before optimization =

$(17061+417711+395205)*100*0.01 = 0.0082\$$

Write cost before optimization =

$(17061+395205+395205)*100*0.02 = 0.016\$$

Total I/O cost before optimization = (Read cost + write cost) =  
 $(0.0082+0.016) = 0.0242\$$

## After Optimization

Elapsed time 1 sec	Slot time consumed ⓘ 2 sec	Bytes shuffled ⓘ 18.02 MB
<a href="#">SHOW AVERAGE TIME</a>	<a href="#">SHOW MAXIMUM TIME ⓘ</a>	
Stages	Working timing	Rows
▶ S01: Input	<div>Wait: ██████████ 31 ms</div> <div>Read: ██████████ 9 ms</div> <div>Compute: ██████████ 45 ms</div> <div>Write: ██████████ 9 ms</div>	Records read: 17010 Records written: 17010
▶ S02: Join+	<div>Wait: ██████████ 2 ms</div> <div>Read: ██████████ 8 ms</div> <div>Compute: ██████████ 1 sec</div> <div>Write: ██████████ 190 ms</div>	Records read: 416922 Records written: 383130
▶ S03: Aggregate+	<div>Wait: ██████████ 1 ms</div> <div>Read: ██████████ 0 ms</div> <div>Compute: ██████████ 211 ms</div> <div>Write: ██████████ 0 ms</div>	Records read: 383130 Records written: 100
▶ S04: Output	<div>Wait: ██████████ 2 ms</div> <div>Read: ██████████ 0 ms</div> <div>Compute: ██████████ 8 ms</div> <div>Write: ██████████ 7 ms</div>	Records read: 100 Records written: 100

Read cost after optimization =

$(17061+417711+383725)*100*0.01$   
 $= 0.0081\$$

Write cost after optimization =

$(17061+383725+383725)*100*0.02$   
 $= 0.0156\$$

Total I/O cost after optimization = (Read cost + write cost)  
 $= (0.0081+0.0156) = 0.0237\$$

## Before Optimization

Elapsed time		Slot time consumed		Bytes shuffled
1 sec		3 sec		28.66 MB
<div><div>SHOW AVERAGE TIME</div><div>SHOW MAXIMUM TIME</div></div>				
Stages	Working timing			Rows
▶ S01: Input	<div><div>Wait:</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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## After Optimization

Elapsed time 1 sec	Slot time consumed 2 sec	Bytes shuffled 18.02 MB
<div> SHOW AVERAGE TIME SHOW MAXIMUM TIME </div>		
Stages	Working timing	Rows
<div> S01: Input </div>	<div> <div>Wait: 31 ms</div> <div>Read: 9 ms</div> <div>Compute: 45 ms</div> <div>Write: 9 ms</div> </div>	<div> Records read: 17010 Records written: 17010 </div>
<div> S02: Join+ </div>	<div> <div>Wait: 2 ms</div> <div>Read: 8 ms</div> <div>Compute: 1 sec</div> <div>Write: 190 ms</div> </div>	<div> Records read: 416922 Records written: 383130 </div>
<div> S03: Aggregate+ </div>	<div> <div>Wait: 1 ms</div> <div>Read: 0 ms</div> <div>Compute: 211 ms</div> <div>Write: 0 ms</div> </div>	<div> Records read: 383130 Records written: 100 </div>
<div> S04: Output </div>	<div> <div>Wait: 2 ms</div> <div>Read: 0 ms</div> <div>Compute: 8 ms</div> <div>Write: 7 ms</div> </div>	<div> Records read: 100 Records written: 100 </div>

### Conclusion



#### BigQuery Data Accuracy & Insights

- + Data Variety
- + Accessibility
- Deprecated Tables Limiting Scope
- Index creation hindered by permissions



#### Learning

- + Optimization
- + SQL Exploration : Views, CTE, Indexes
- + Team Collaboration



#### Future Improvements & Scope

- + More Global Data
- + Revival of Deprecated Tables
  - > More Features of based application
- + Prediction based on historical data using AI

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Thank You

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