Operation Analytics and Investigating Metric Spike

Kiruba Shankar S
Data Analytics Trainee

Case Study 2: Investigating Metric Spike

Investigating Metric Spike

Description:

This project aims to investigate metric spikes in user engagement, growth, retention, and email interactions. The ultimate goal is to derive actionable insights that can inform strategic decisions to enhance user experience, optimize marketing efforts, and improve overall product engagement.

SQL Task

A. Weekly User Engagement:

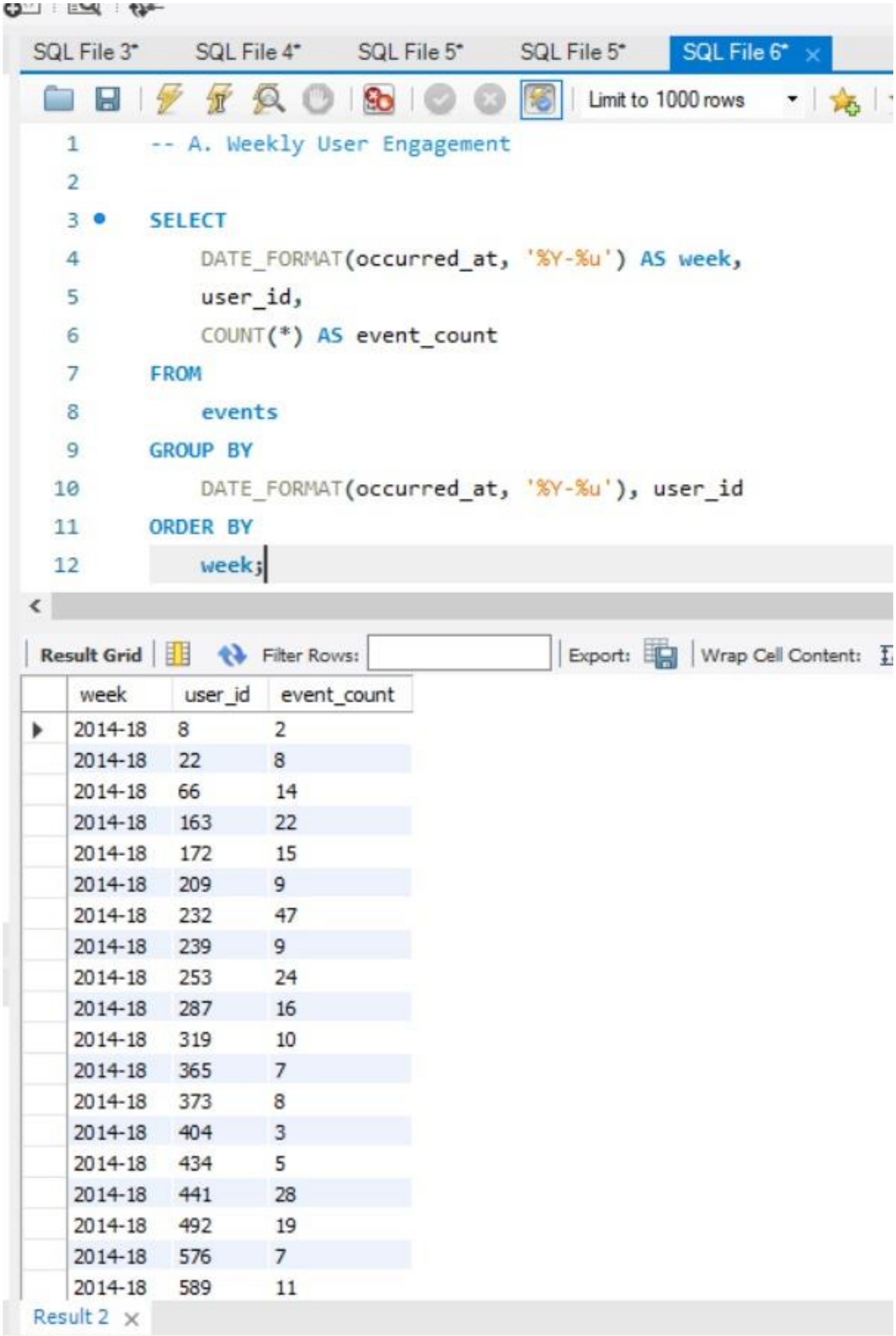
Objective: Measure the activeness of users on a weekly basis.
Your Task: Write an SQL query to calculate the weekly user engagement.

Query:

```
SELECT
   DATE_FORMAT(occurred_at, '%Y-%u') AS week,
   user_id,
   COUNT(*) AS event_count
FROM
   events
GROUP BY
   DATE_FORMAT(occurred_at, '%Y-%u'), user_id
ORDER BY
   week;
```

Insights:

- Identifying users with consistent engagement can help target retention strategies and understand what drives active participation.
- Investigate the factors contributing to high engagement weeks and replicate successful strategies in other weeks.
- Develop personalized engagement campaigns for users with lower engagement levels.



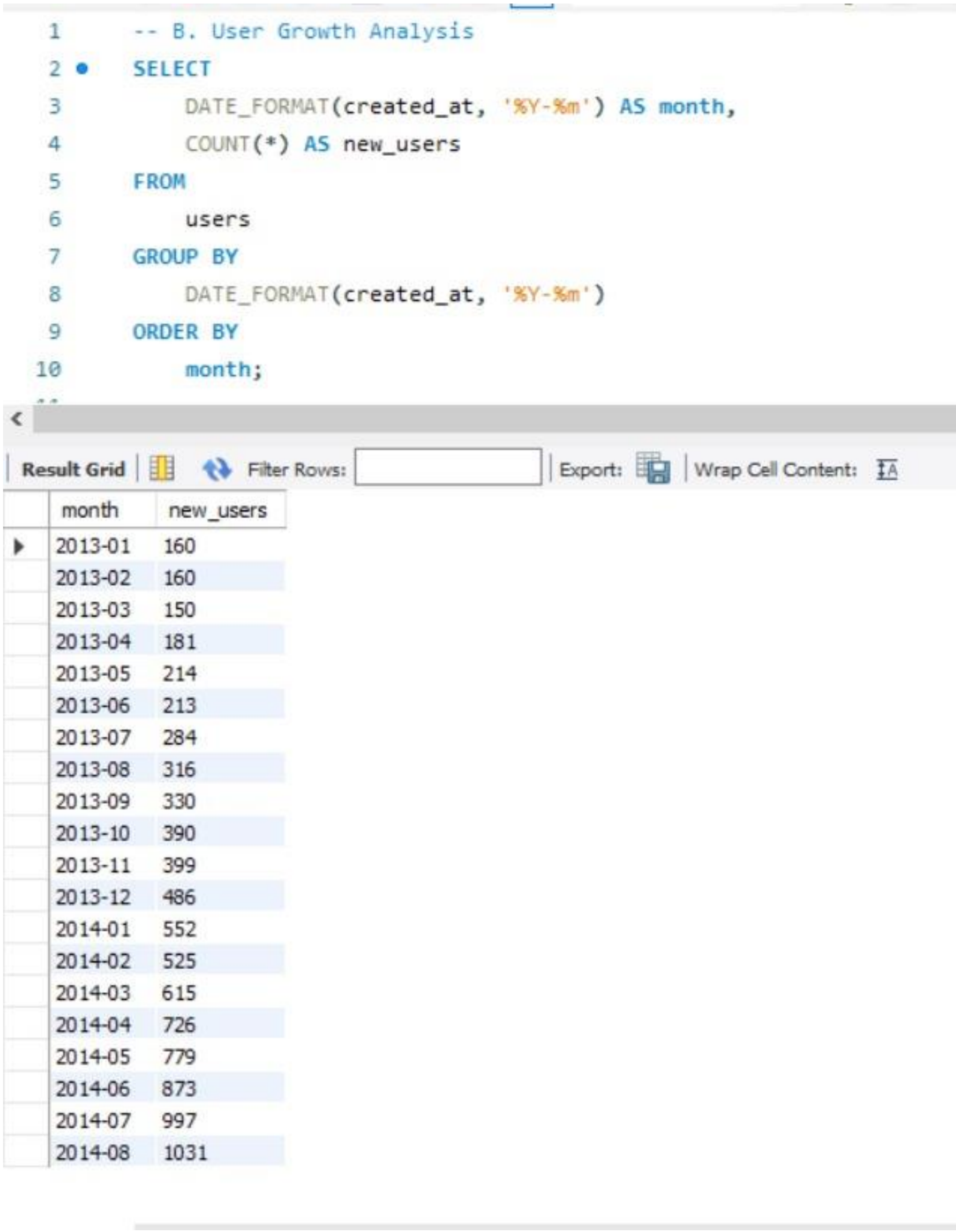
```sql
-- A. Weekly User Engagement

SELECT
    DATE_FORMAT(occurred_at, '%Y-%u') AS week,
    user_id,
    COUNT(*) AS event_count
FROM
    events
GROUP BY
    DATE_FORMAT(occurred_at, '%Y-%u'), user_id
ORDER BY
    week;
```

week	user_id	event_count
2014-18	8	2
2014-18	22	8
2014-18	66	14
2014-18	163	22
2014-18	172	15
2014-18	209	9
2014-18	232	47
2014-18	239	9
2014-18	253	24
2014-18	287	16
2014-18	319	10
2014-18	365	7
2014-18	373	8
2014-18	404	3
2014-18	434	5
2014-18	441	28
2014-18	492	19
2014-18	576	7
2014-18	589	11

B. User Growth Analysis:

Objective: Analyze the growth of users over time for a product.
Your Task: Write an SQL query to calculate the user growth for the product.



```sql
-- B. User Growth Analysis
SELECT
    DATE_FORMAT(created_at, '%Y-%m') AS month,
    COUNT(*) AS new_users
FROM
    users
GROUP BY
    DATE_FORMAT(created_at, '%Y-%m')
ORDER BY
    month;
```

month	new_users
2013-01	160
2013-02	160
2013-03	150
2013-04	181
2013-05	214
2013-06	213
2013-07	284
2013-08	316
2013-09	330
2013-10	390
2013-11	399
2013-12	486
2014-01	552
2014-02	525
2014-03	615
2014-04	726
2014-05	779
2014-06	873
2014-07	997
2014-08	1031

Query:

```
SELECT
   DATE_FORMAT(created_at, '%Y-%m') AS month,
   COUNT(*) AS new_users
FROM
   users
GROUP BY
   DATE_FORMAT(created_at, '%Y-%m')
ORDER BY
   month;
```

Insights:

- Continuous monitoring of user growth trends helps understand the impact of marketing campaigns or product changes on user acquisition.
- Analyze marketing efforts or product features introduced in January and February that led to higher growth.
- Investigate reasons for the slight decline in March and address any issues to sustain growth.

C. Weekly Retention Analysis:

Objective: Analyze the retention of users on a weekly basis after signing up for a product.
Your Task: Write an SQL query to calculate the weekly retention of users based on their sign-up cohort.

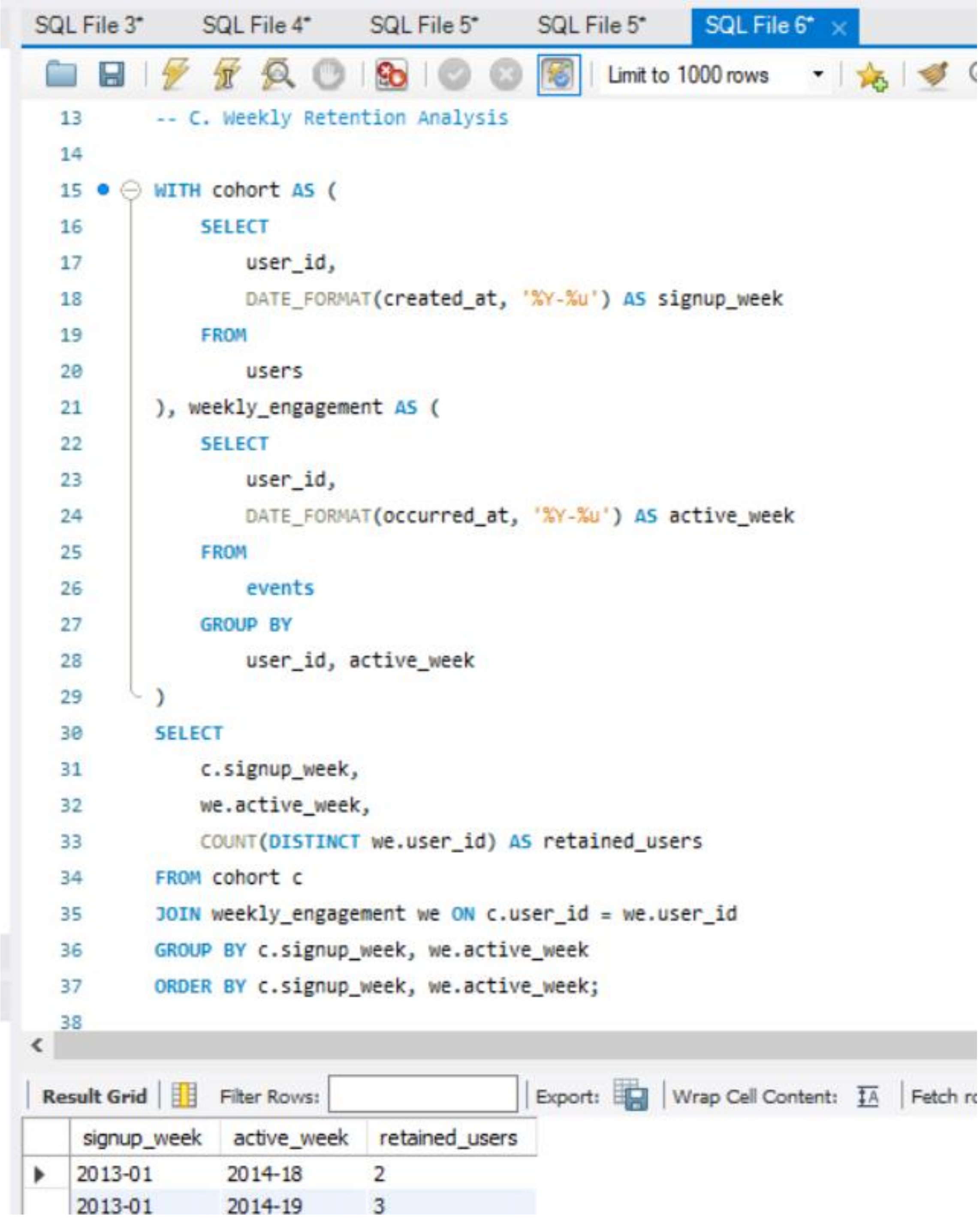
Query:

```
WITH cohort AS (
   SELECT
      user_id,
      DATE_FORMAT(created_at, '%Y-%u') AS signup_week
   FROM
      users
), weekly_engagement AS (
    SELECT
        user_id,

        DATE_FORMAT(occurred_at, '%Y-%u') AS active_week
    FROM
        events
    GROUP BY
        user_id, active_week
)
SELECT
    c.signup_week,
    we.active_week,
    COUNT(DISTINCT we.user_id) AS retained_users
FROM
    cohort c
JOIN
    weekly_engagement we ON c.user_id = we.user_id
GROUP BY
    c.signup_week, we.active_week
ORDER BY
    c.signup_week, we.active_week;
```

Insights:

- Trends indicate that while some users remain active long-term, retention generally declines over time, highlighting the need for ongoing engagement efforts.
- Investigate successful onboarding and engagement strategies for high-retention cohorts.
- Develop retention programs targeting users at risk of churn to improve long-term retention rates.
- By tracking the number of users who remain active each week following their sign-up to understand retention rates and identify successful onboarding strategies.



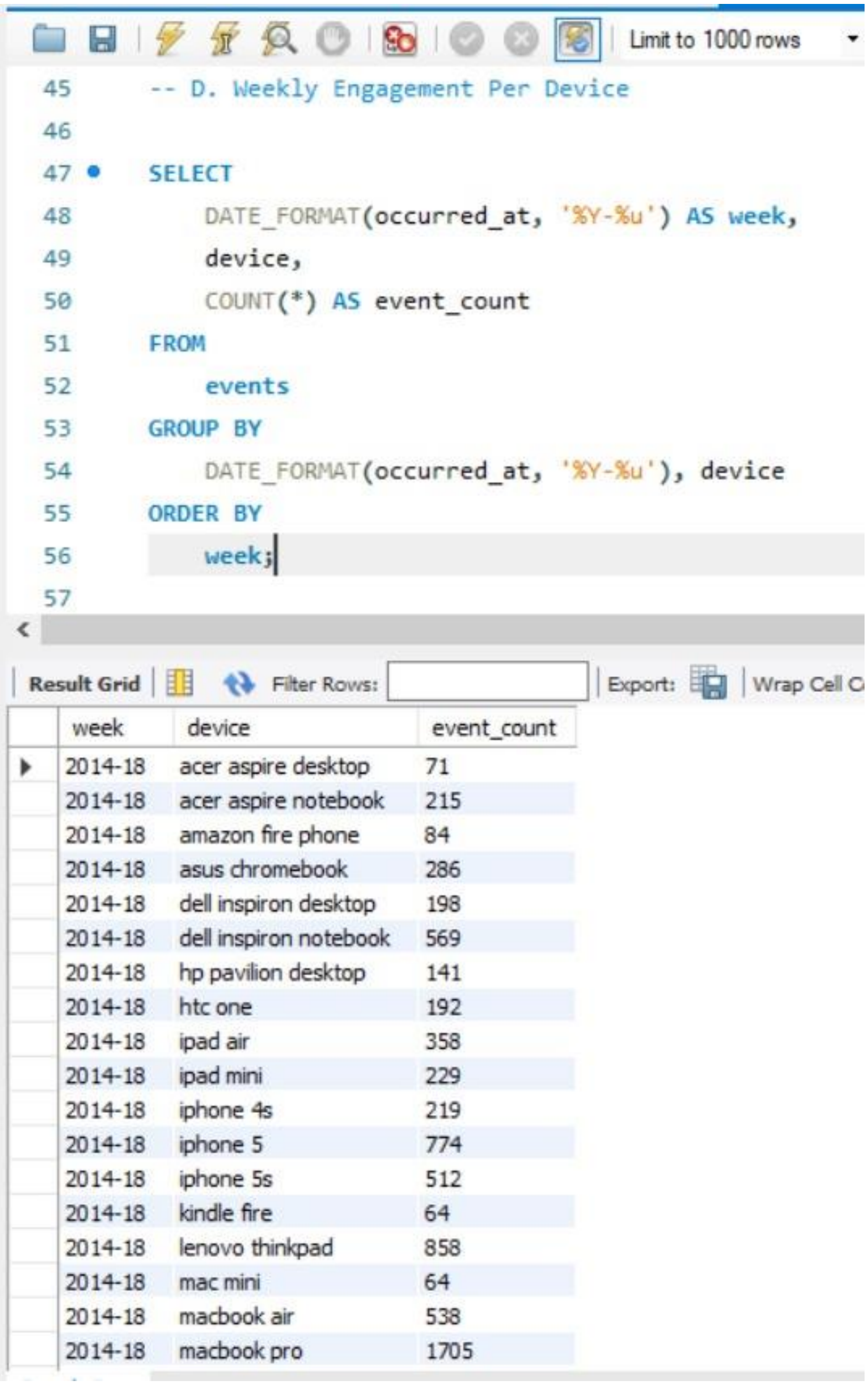
```sql
-- C. Weekly Retention Analysis

WITH cohort AS (
    SELECT
        user_id,
        DATE_FORMAT(created_at, '%Y-%u') AS signup_week
    FROM
        users
), weekly_engagement AS (
    SELECT
        user_id,
        DATE_FORMAT(occurred_at, '%Y-%u') AS active_week
    FROM
        events
    GROUP BY
        user_id, active_week
)
SELECT
    c.signup_week,
    we.active_week,
    COUNT(DISTINCT we.user_id) AS retained_users
FROM cohort c
JOIN weekly_engagement we ON c.user_id = we.user_id
GROUP BY c.signup_week, we.active_week
ORDER BY c.signup_week, we.active_week;
```

signup_week	active_week	retained_users
2013-01	2014-18	2
2013-01	2014-19	3

D. Weekly Engagement Per Device:

Objective: Measure the activeness of users on a weekly basis per device.
Your Task: Write an SQL query to calculate the weekly engagement per device.



```
-- D. Weekly Engagement Per Device

SELECT
    DATE_FORMAT(occurred_at, '%Y-%u') AS week,
    device,
    COUNT(*) AS event_count
FROM
    events
GROUP BY
    DATE_FORMAT(occurred_at, '%Y-%u'), device
ORDER BY
    week;
```

week	device	event_count
2014-18	acer aspire desktop	71
2014-18	acer aspire notebook	215
2014-18	amazon fire phone	84
2014-18	asus chromebook	286
2014-18	dell inspiron desktop	198
2014-18	dell inspiron notebook	569
2014-18	hp pavilion desktop	141
2014-18	htc one	192
2014-18	ipad air	358
2014-18	ipad mini	229
2014-18	iphone 4s	219
2014-18	iphone 5	774
2014-18	iphone 5s	512
2014-18	kindle fire	64
2014-18	lenovo thinkpad	858
2014-18	mac mini	64
2014-18	macbook air	538
2014-18	macbook pro	1705

Query:

```
SELECT
   DATE_FORMAT(occurred_at, '%Y-%u') AS week,
   device,
   COUNT(*) AS event_count
FROM
   events
GROUP BY
```

```
   DATE_FORMAT(occurred_at, '%Y-%u'), device
ORDER BY
   week;
```

Insights:

- Lower engagement on devices like the Amazon Fire Phone suggests potential usability issues or lack of optimization.
- Focus on optimizing the user experience for popular devices to maintain high engagement levels.
- Investigate and address usability issues on less popular devices to improve overall engagement.

E. Email Engagement Analysis:

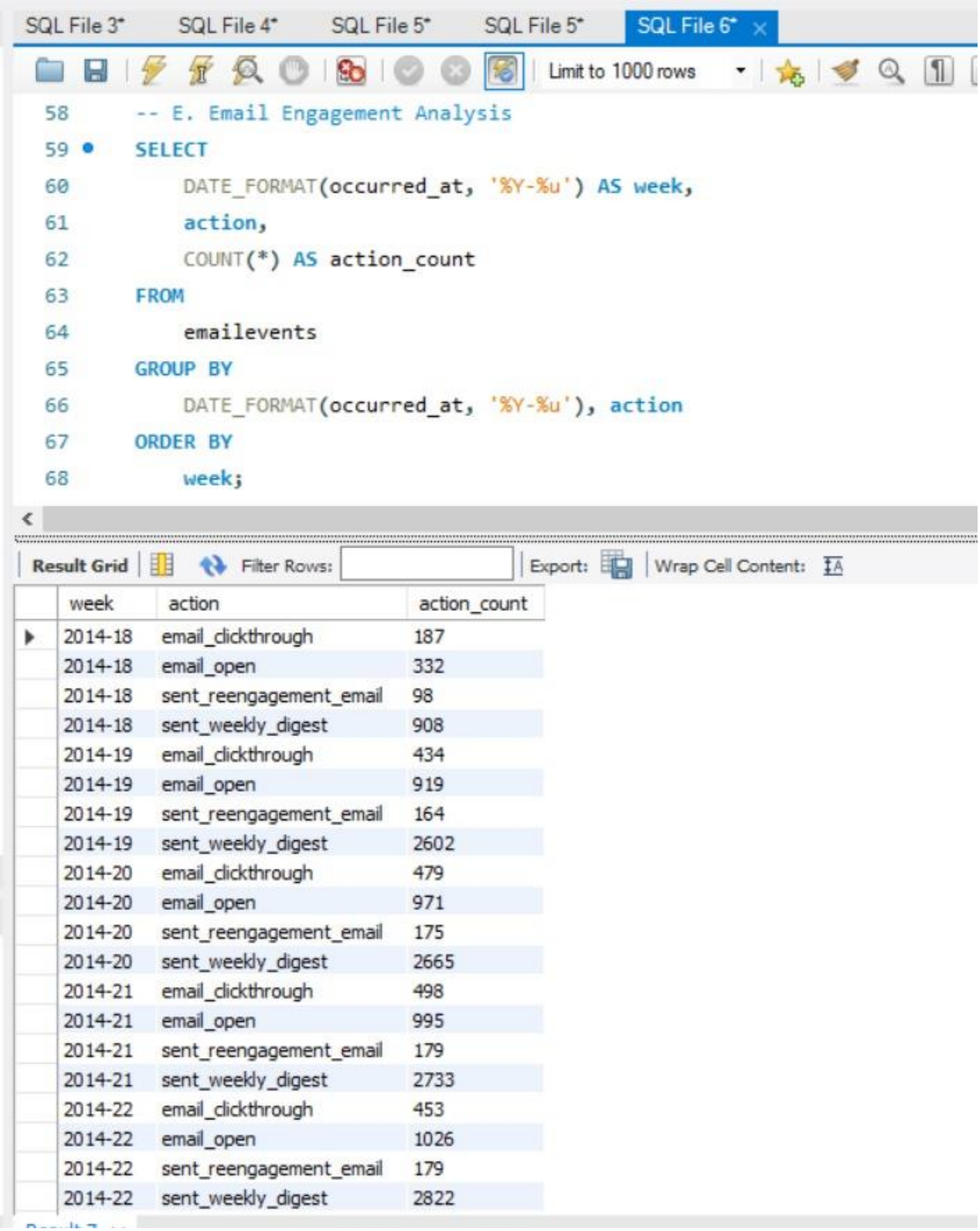
objective: Analyze how users are engaging with the email service.
Your Task: Write an SQL query to calculate the email engagement metrics.

Query:

```
SELECT
   DATE_FORMAT(occurred_at, '%Y-%u') AS week,
   action,
   COUNT(*) AS action_count
FROM
   emailevents
GROUP BY
   DATE_FORMAT(occurred_at, '%Y-%u'), action
ORDER BY
   week;
```

Insights:

- High email open rates suggest effective subject lines and timing, while click-through rates indicate the relevance of email content.
- Continue refining email strategies based on open and click-through rates to enhance engagement.
- Experiment with different email content, subject lines, and send times to optimize email performance.
- Calculate email engagement metrics, such as open and click-through rates, to assess the effectiveness of email campaigns and user interactions with email content.



```
-- E. Email Engagement Analysis
SELECT
    DATE_FORMAT(occurred_at, '%Y-%u') AS week,
    action,
    COUNT(*) AS action_count
FROM
    emailevents
GROUP BY
    DATE_FORMAT(occurred_at, '%Y-%u'), action
ORDER BY
    week;
```

week	action	action_count
2014-18	email_clickthrough	187
2014-18	email_open	332
2014-18	sent_reengagement_email	98
2014-18	sent_weekly_digest	908
2014-19	email_clickthrough	434
2014-19	email_open	919
2014-19	sent_reengagement_email	164
2014-19	sent_weekly_digest	2602
2014-20	email_clickthrough	479
2014-20	email_open	971
2014-20	sent_reengagement_email	175
2014-20	sent_weekly_digest	2665
2014-21	email_clickthrough	498
2014-21	email_open	995
2014-21	sent_reengagement_email	179
2014-21	sent_weekly_digest	2733
2014-22	email_clickthrough	453
2014-22	email_open	1026
2014-22	sent_reengagement_email	179
2014-22	sent_weekly_digest	2822

Conclusion:

The analysis provides valuable insights into user behavior and engagement, highlighting periods of high activity, growth trends, retention patterns, device preferences, and email interactions. These insights can inform strategic decisions to enhance user experience, optimize marketing efforts, and improve overall product engagement. By continuously monitoring and analyzing these metrics, the product team can make data-driven decisions to sustain and enhance user engagement and satisfaction.