Operation Analytics and Investigating Metric Spike

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DESCRIPTION:

- Operation Analytics is the analysis done for the complete end to end operations of a company. With the help of this, the company then finds the areas on which it must improve upon. You work closely with the ops team, support team, marketing team, etc and help them derive insights out of the data they collect.

- Being one of the most important parts of a company, this kind of analysis is further used to predict the overall growth or decline of a company's fortune. It means better automation, better understanding between cross-functional teams, and more effective workflows.

- Investigating metric spike is also an important part of operation analytics as being a Data Analyst you must be able to understand or make other teams understand questions like- Why is there a dip in daily engagement? Why have sales taken a dip? Etc. Questions like these must be answered daily and for that its very important to investigate metric spike.

- You are working for a company like Microsoft designated as Data Analyst Lead and is provided with different data sets, tables from which you must derive certain insights out of it and answer the questions asked by different departments.

- We need to provide a case study on the the given datasets.

APPROACH:

We need to import our dataset i.e;tables into mysql and using different sql operations the following questions and analysis must be done.

TECHSTACK USED: MYSQL WORKBENCH

Case Study 1 (Job Data)

Below is the structure of the table with the definition of each column that you must work on:

- Table-1: job_data
- job_id: unique identifier of jobs
- actor_id: unique identifier of actor
- event: decision/skip/transfer
- language: language of the content
- time_spent: time spent to review the job in seconds
- org: organization of the actor
- ds: date in the yyyy/mm/dd format. It is stored in the form of text and we use presto to run. no need for date function

Case Study 2 (Investigating metric spike)

The structure of the table with the definition of each column that you must work on is present in the project image

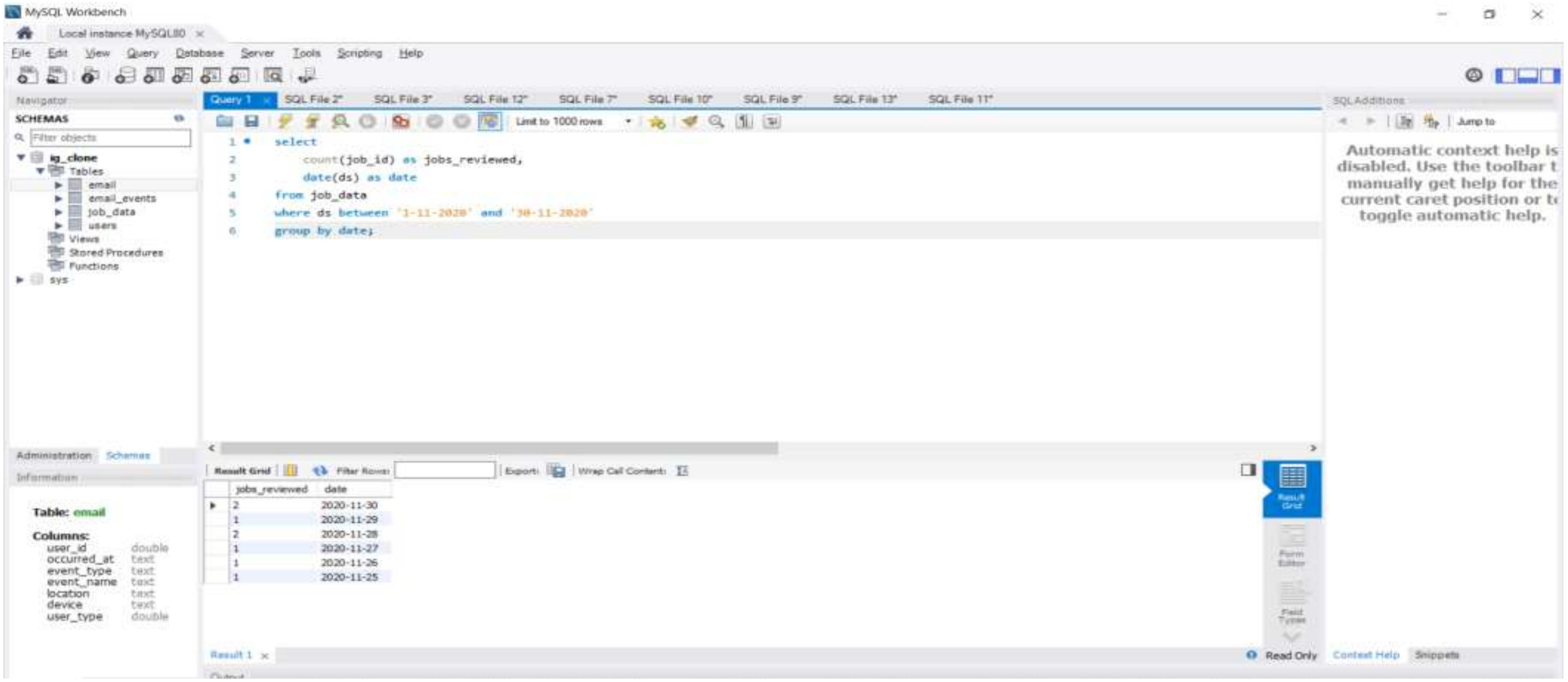
- Table-1: users
- This table includes one row per user, with descriptive information about that user's account.
- Table-2: events
- This table includes one row per event, where an event is an action that a user has taken. These events include login events, messaging events, search events, events logged as users progress through a signup funnel, events around received emails.
- Table-3: email_events
- This table contains events specific to the sending of emails. It is similar in structure to the events table above.

TASKS FOR CASE STUDY-1
TASK -1

- Number of jobs reviewed: Amount of jobs reviewed over time.
- Your task: Calculate the number of jobs reviewed per hour per day for November 2020?
- QUERY:
- select
- count(job_id) as jobs_reviewed,
- date(ds) as date
- from job_data
- where ds between '1-11-2020' and '30-11-2020'
- group by date;

TASKS FOR CASE STUDY-1

TASK -1



```sql
select
    count(job_id) as jobs_reviewed,
    date(ds) as date
from job_data
where ds between '1-11-2020' and '30-11-2020'
group by date;
```

jobs_reviewed	date
2	2020-11-30
1	2020-11-29
2	2020-11-28
1	2020-11-27
1	2020-11-26
1	2020-11-25

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or t toggle automatic help.

TASKS FOR CASE STUDY-1

TASK -2

Throughput: It is the no. of events happening per second.

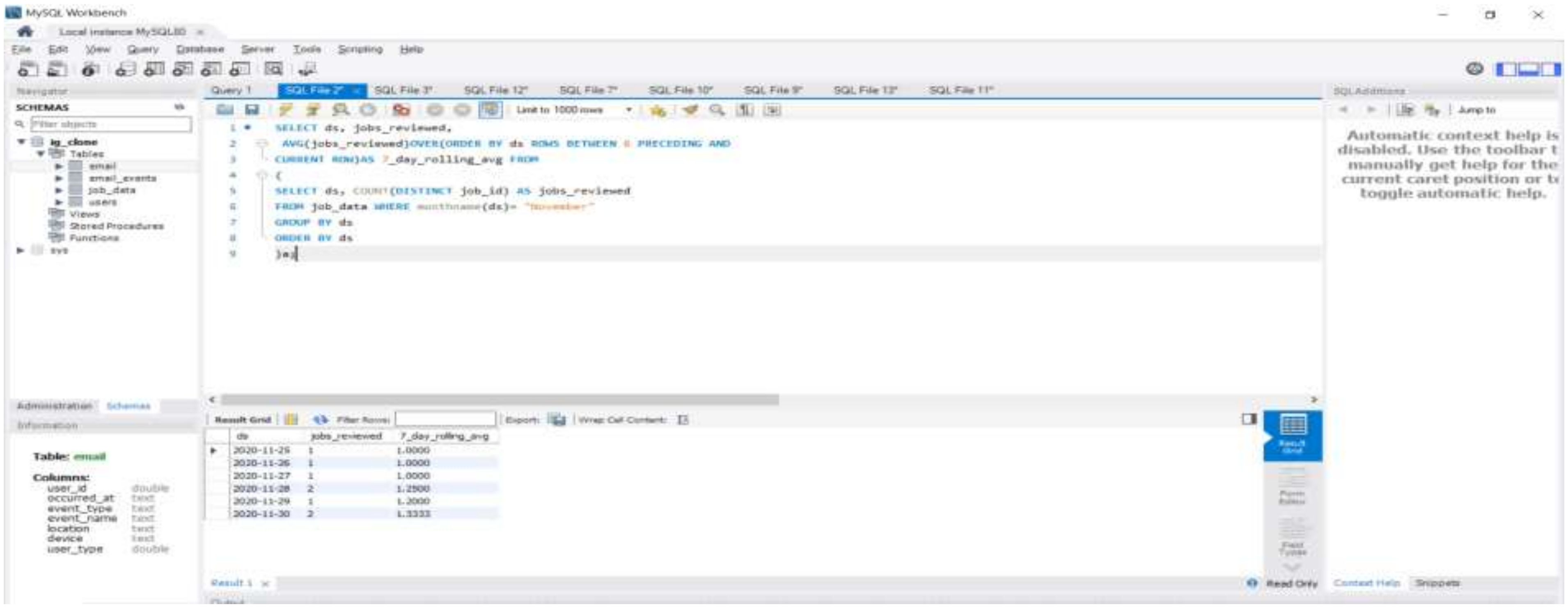
Your task: Let’s say the above metric is called throughput. Calculate 7 day rolling average of throughput? For throughput, do you prefer daily metric or 7-day rolling and why?

QUERY:

```
SELECT ds, jobs_reviewed,

 AVG(jobs_reviewed)OVER(ORDER BY ds ROWS BETWEEN 6 PRECEDING AND

CURRENT ROW)AS 7_day_rolling_avg FROM

(

SELECT ds, COUNT(DISTINCT job_id) AS jobs_reviewed

FROM job_data WHERE monthname(ds)= "November"

GROUP BY ds

ORDER BY ds

)a;
```

TASKS FOR CASE STUDY-1

TASK -2



```
SELECT ds, jobs_reviewed,
 AVG(jobs_reviewed)OVER(ORDER BY ds ROWS BETWEEN 6 PRECEDING AND
CURRENT ROW)AS 7_day_rolling_avg FROM
(
SELECT ds, COUNT(DISTINCT job_id) AS jobs_reviewed
FROM job_data WHERE monthname(ds)= "November"
GROUP BY ds
ORDER BY ds
)a;
```

ds	jobs_reviewed	7_day_rolling_avg
2020-11-25	1	1.0000
2020-11-26	1	1.0000
2020-11-27	1	1.0000
2020-11-28	2	1.2500
2020-11-29	1	1.2000
2020-11-30	2	1.3333

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

output:7 day rolling is prefarable for detail aspects as in each day most the events are not happening.

TASKS FOR CASE STUDY-1
TASK -3

Percentage share of each language: Share of each language for different contents.

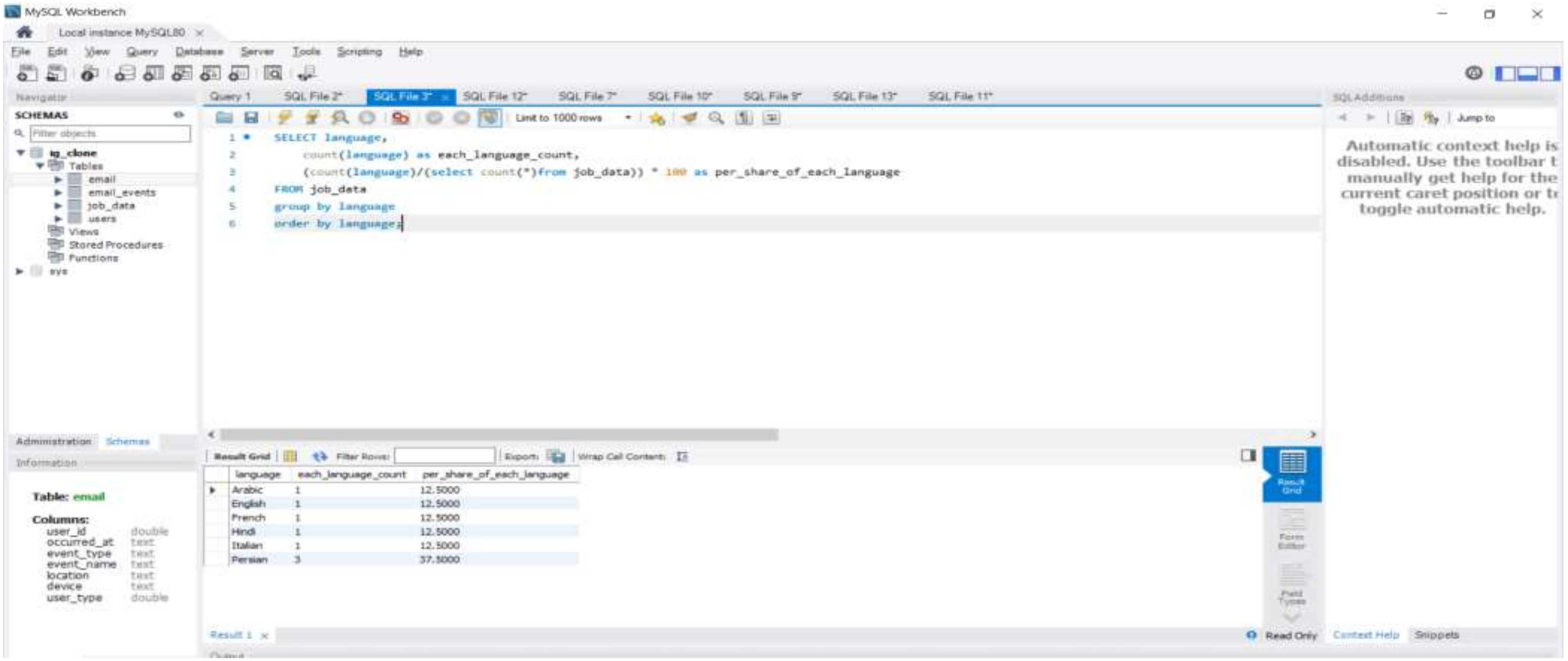
Your task: Calculate the percentage share of each language in the last 30 days?

QUERY:

```
SELECT language,
   count(language) as each_language_count,
   (count(language)/(select count(*)from job_data)) * 100 as per_share_of_each_language
FROM job_data
group by language
order by language;
```

TASKS FOR CASE STUDY-1

TASK -3



```
SELECT language,
    count(language) as each_language_count,
    (count(language)/(select count(*)from job_data)) * 100 as per_share_of_each_language
FROM job_data
group by language
order by language;
```

language	each_language_count	per_share_of_each_language
Arabic	1	12.5000
English	1	12.5000
French	1	12.5000
Hindi	1	12.5000
Italian	1	12.5000
Persian	3	37.5000

Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or t toggle automatic help.

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

TASKS FOR CASE STUDY-1
TASK -4

Duplicate rows: Rows that have the same value present in them.

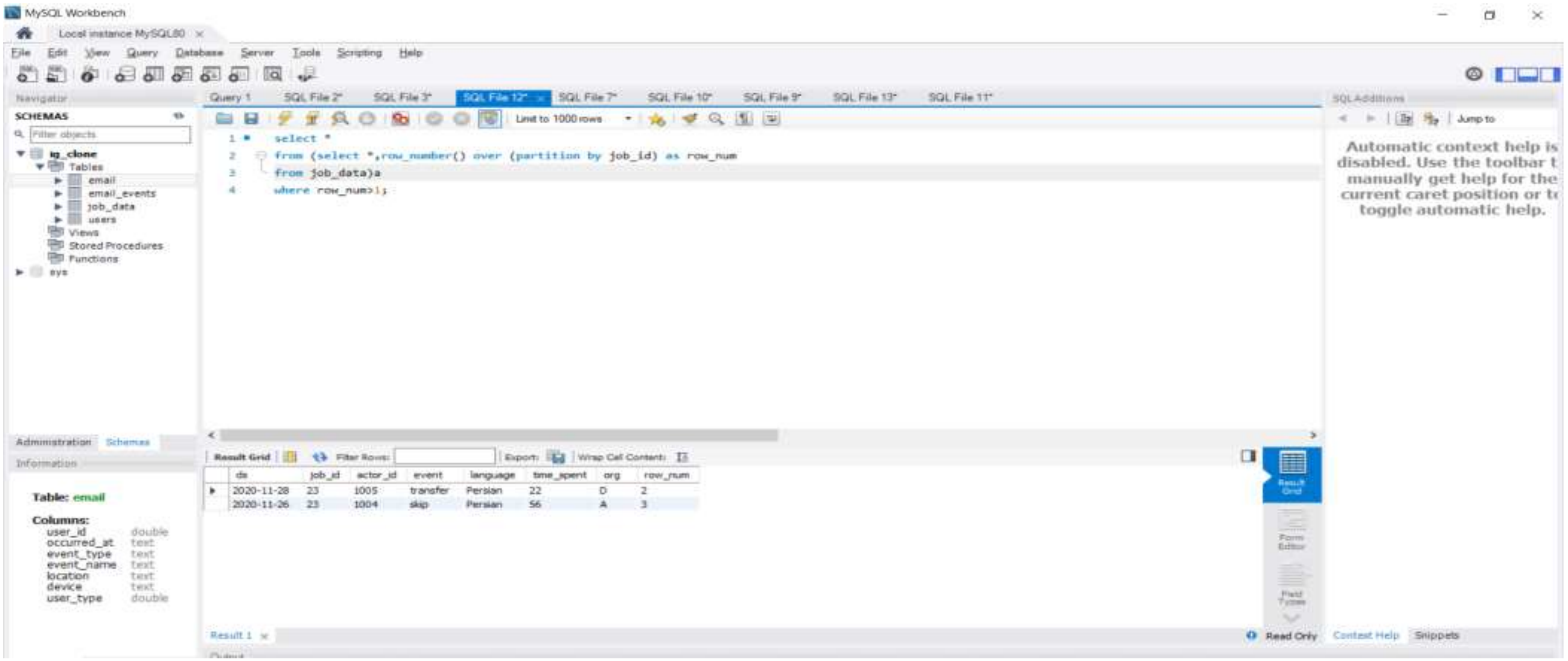
Your task: Let’s say you see some duplicate rows in the data. How will you display duplicates from the table?

QUERY:

```
select *

from (select *,row_number() over (partition by job_id) as row_num

from jobdata)a

where row_num>1;
```

TASKS FOR CASE STUDY-1

TASK -4



```sql
select *
from (select *,row_number() over (partition by job_id) as row_num
from job_data)a
where row_num>1;
```

ds	job_id	actor_id	event	language	time_spent	org	row_num
2020-11-28	23	1005	transfer	Persian	22	D	2
2020-11-26	23	1004	skip	Persian	56	A	3

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or t toggle automatic help.

TASKS FOR CASE STUDY-2
TASK -1

User Engagement: To measure the activeness of a user. Measuring if the user finds quality in a product/service.

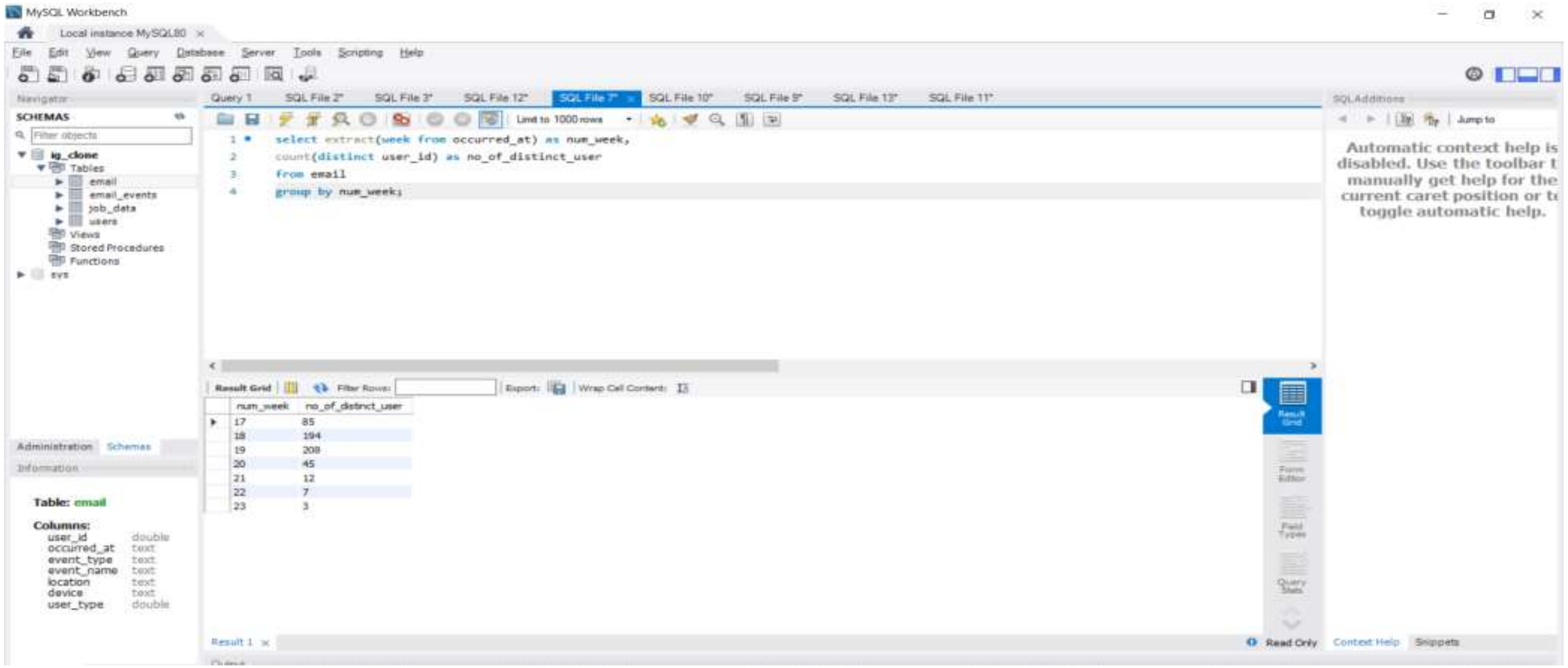
Your task: Calculate the weekly user engagement?

QUERY:

```
select extract(week from occurred_at) as num_week,

count(distinct user_id) as no_of_distinct_user

from email

group by num_week;
```

TASKS FOR CASE STUDY-2

TASK -1



```sql
select extract(week from occurred_at) as num_week,
count(distinct user_id) as no_of_distinct_user
from email
group by num_week;
```

num_week	no_of_distinct_user
17	85
18	194
19	208
20	45
21	12
22	7
23	3

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or t toggle automatic help.

TASKS FOR CASE STUDY-2
TASK -2

User Growth: Amount of users growing over time for a product.

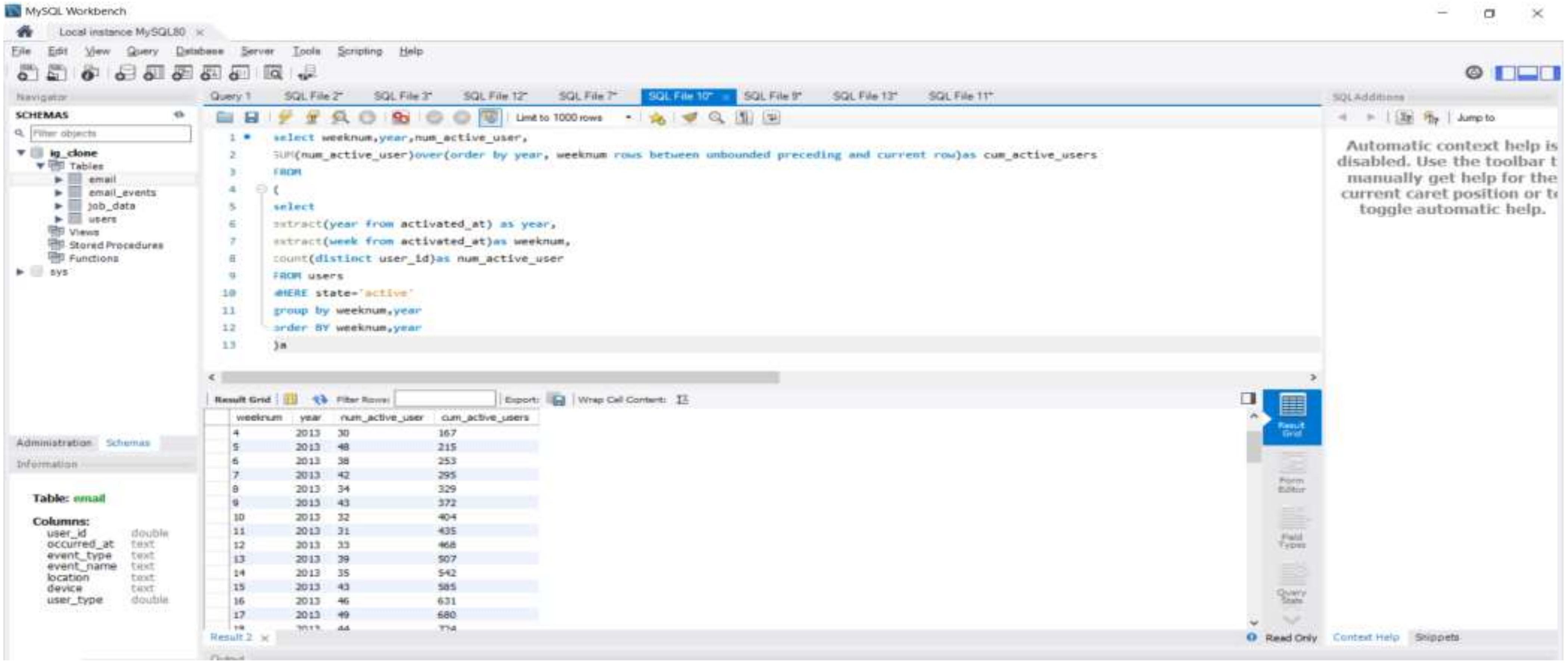
Your task: Calculate the user growth for product?

QUERY:

```
select weeknum,year,num_active_user,
SUM(num_active_user)over(order by year, weeknum rows between unbounded preceding and current row)as cum_active_users
FROM
(select
extract(year from activated_at) as year,
extract(week from activated_at)as weeknum,
count(distinct user_id)as num_active_user
FROM users
WHERE state='active'
group by weeknum,year
order BY weeknum,year)a
```

TASKS FOR CASE STUDY-2

TASK -2



```sql
select weeknum,year,num_active_user,
SUM(num_active_user)over(order by year, weeknum rows between unbounded preceding and current row)as cum_active_users
FROM
(
select
extract(year from activated_at) as year,
extract(week from activated_at)as weeknum,
count(distinct user_id)as num_active_user
FROM users
WHERE state='active'
group by weeknum,year
order BY weeknum,year
)a
```

```
weeknum  year  num_active_user  cum_active_users
4        2013  30               167
5        2013  48               215
6        2013  38               253
7        2013  42               295
8        2013  34               329
9        2013  43               372
10       2013  32               404
11       2013  31               435
12       2013  33               468
13       2013  39               507
14       2013  35               542
15       2013  43               585
16       2013  46               631
17       2013  49               680
```

Table: email

Columns:

```
user_id      double
occurred_at  text
event_type   text
event_name   text
location     text
device       text
user_type    double
```

MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
Query 1 SQL File 2* SQL File 3* SQL File 12* SQL File 7* SQL File 10* SQL File 9* SQL File 13* SQL File 11*
Limit to 1000 rows
Navigator
SCHEMAS
Filter objects
ig_clone
Tables
email
email_events
job_data
users
Views
Stored Procedures
Functions
sys
Administration Schemas
Information
Result Grid Filter Rows: Export: Wrap Cell Content:
Result 2
Read Only
SQL Additions
Jump to
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Context Help Snippets
Result Grid
Form Editor
Field Types
Query Stats

TASKS FOR CASE STUDY-2
TASK -3

Weekly Retention: Users getting retained weekly after signing-up for a product.

Your task: Calculate the weekly retention of users-sign up cohort?

QUERY:

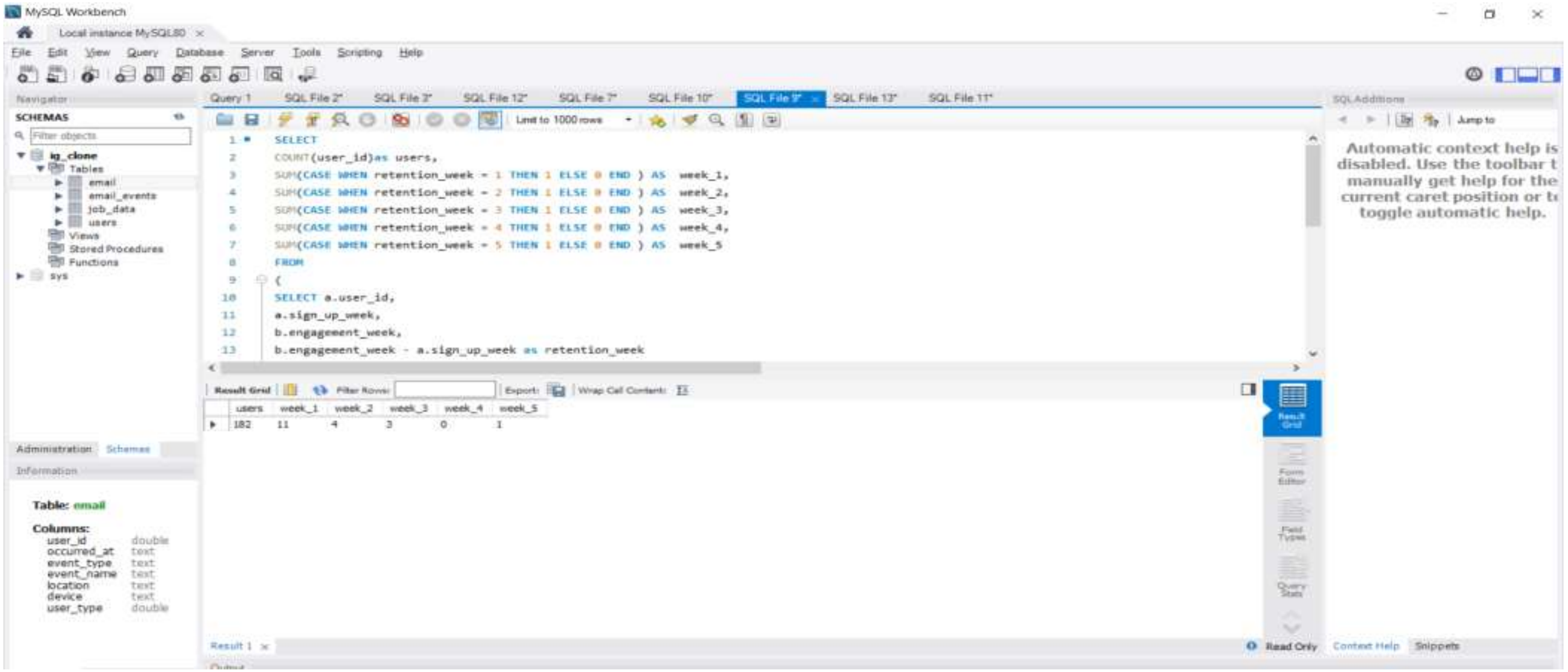
```
SELECT
COUNT(user_id)as users,
SUM(CASE WHEN retention_week = 1 THEN 1 ELSE 0 END ) AS  week_1,
SUM(CASE WHEN retention_week = 2 THEN 1 ELSE 0 END ) AS  week_2,
SUM(CASE WHEN retention_week = 3 THEN 1 ELSE 0 END ) AS  week_3,
SUM(CASE WHEN retention_week = 4 THEN 1 ELSE 0 END ) AS  week_4,
SUM(CASE WHEN retention_week = 5 THEN 1 ELSE 0 END ) AS  week_5
FROM
(
```

TASKS FOR CASE STUDY-2
TASK -3

```
FROM (SELECT a.user_id,
a.sign_up_week,
b.engagement_week,
b.engagement_week - a.sign_up_week as retention_week FROM (
(select distinct user_id, extract(week from occurred_at) as sign_up_week
from email
where event_type='signup_flow'
and event_name='complete_signup'
and extract(week from occurred_at)=18)a
left JOIN (
select distinct user_id,
extract(week from occurred_at) as engagement_week
from email
where event_type='engagement')b
on a.user_id=b.user_id )
order by
a.user_id )a
```

TASKS FOR CASE STUDY-2

TASK -3



Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

```sql
SELECT
COUNT(user_id)as users,
SUM(CASE WHEN retention_week = 1 THEN 1 ELSE 0 END ) AS  week_1,
SUM(CASE WHEN retention_week = 2 THEN 1 ELSE 0 END ) AS  week_2,
SUM(CASE WHEN retention_week = 3 THEN 1 ELSE 0 END ) AS  week_3,
SUM(CASE WHEN retention_week = 4 THEN 1 ELSE 0 END ) AS  week_4,
SUM(CASE WHEN retention_week = 5 THEN 1 ELSE 0 END ) AS  week_5
FROM
(
SELECT a.user_id,
a.sign_up_week,
b.engagement_week,
b.engagement_week - a.sign_up_week as retention_week
```

users	week_1	week_2	week_3	week_4	week_5
182	11	4	3	0	1

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

TASKS FOR CASE STUDY-2
TASK -4

Weekly Engagement: To measure the activeness of a user. Measuring if the user finds quality in a product/service weekly.

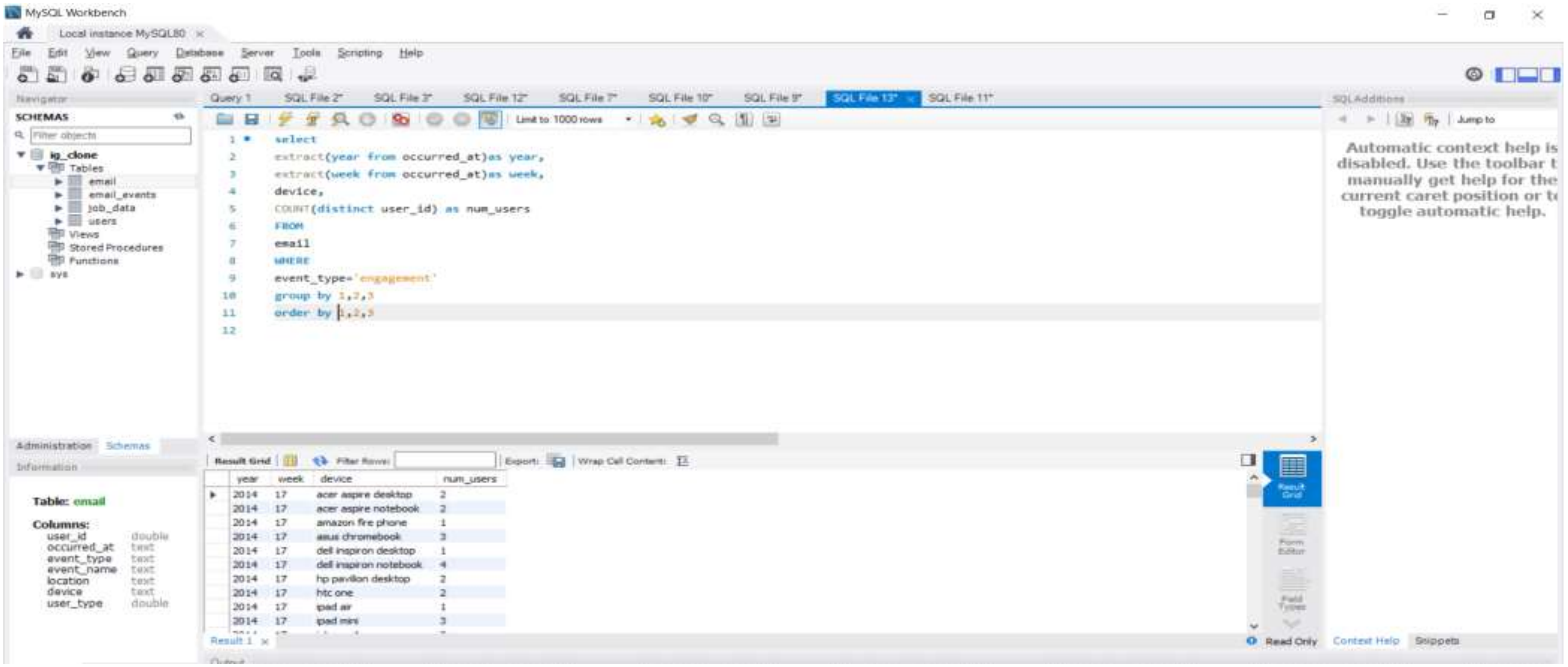
Your task: Calculate the weekly engagement per device?

QUERY:

```
select
extract(year from occurred_at)as year,
extract(week from occurred_at)as week,
device,
COUNT(distinct user_id) as num_users
FROM
email
WHERE
event_type='engagement'
group by 1,2,3
order by 1,2,3
```

TASKS FOR CASE STUDY-2

TASK -4



```sql
select
extract(year from occurred_at)as year,
extract(week from occurred_at)as week,
device,
COUNT(distinct user_id) as num_users
FROM
email
WHERE
event_type='engagement'
group by 1,2,3
order by 1,2,3
```

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

year	week	device	num_users
2014	17	acer aspire desktop	2
2014	17	acer aspire notebook	2
2014	17	amazon fire phone	1
2014	17	asus chromebook	3
2014	17	dell inspiron desktop	1
2014	17	dell inspiron notebook	4
2014	17	hp pavilion desktop	2
2014	17	htc one	2
2014	17	ipad air	1
2014	17	ipad mini	3

Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or t toggle automatic help.

TASKS FOR CASE STUDY-2

TASK -5

Email Engagement: Users engaging with the email service.

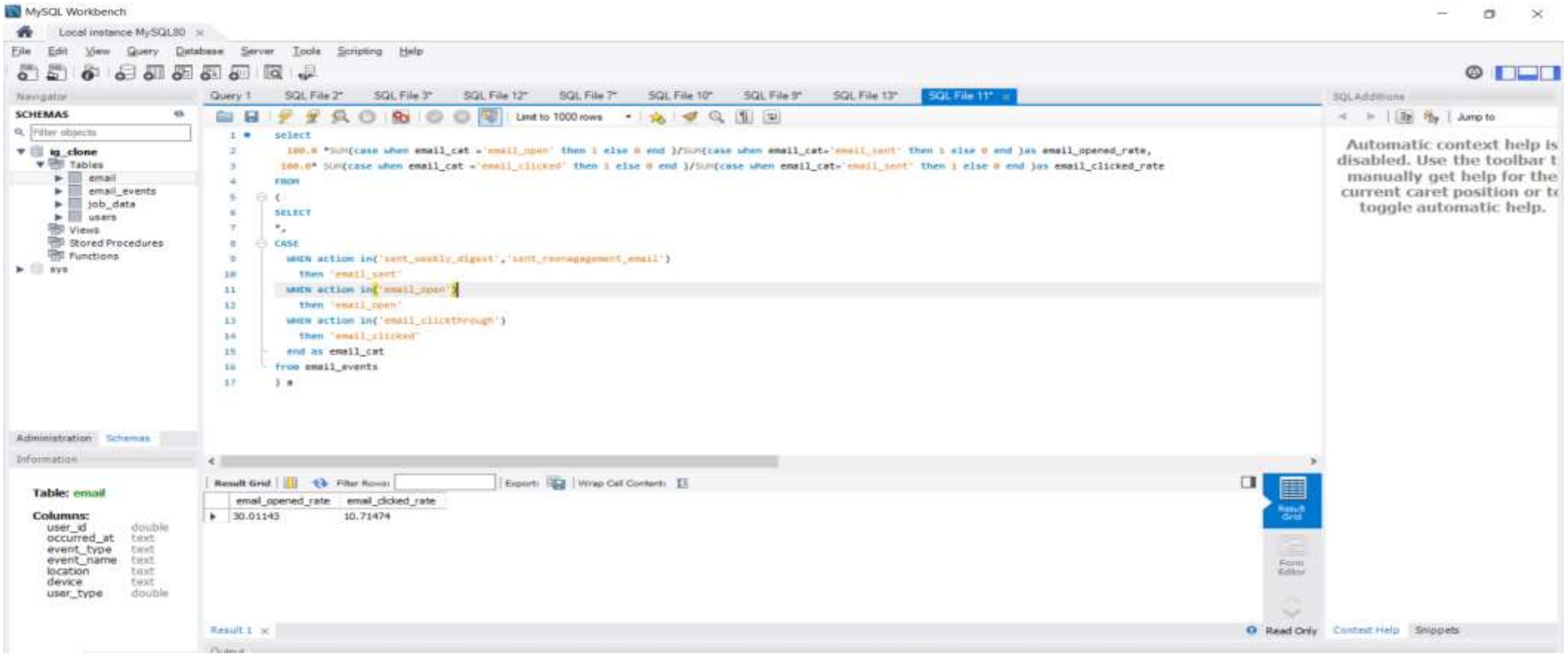
Your task: Calculate the email engagement metrics?

QUERY:

```
select
  100.0 *SUM(case when email_cat ='email_open' then 1 else 0 end )/SUM(case when email_cat='email_sent' then 1 else 0 end )as
email_opened_rate,
 100.0* SUM(case when email_cat ='email_clicked' then 1 else 0 end )/SUM(case when email_cat='email_sent' then 1 else 0 end )as
email_clicked_rate
FROM (SELECT *,CASE
  WHEN action in('sent_weekly_digest','sent_reenagagement_email')
    then 'email_sent'
  WHEN action in('email_open')
    then 'email_open'
  WHEN action in('email_clickthrough')
    then 'email_clicked'
  end as email_cat
from email_events
) a
```

TASKS FOR CASE STUDY-2

TASK -5



```
select
  100.0 *SUM(case when email_cat ='email_open' then 1 else 0 end )/SUM(case when email_cat='email_sent' then 1 else 0 end )as email_opened_rate,
 100.0* SUM(case when email_cat ='email_clicked' then 1 else 0 end )/SUM(case when email_cat='email_sent' then 1 else 0 end )as email_clicked_rate
FROM
(
SELECT
*,
CASE
  WHEN action in('sent_weekly_digest','sent_reengagement_email')
    then 'email_sent'
  WHEN action in('email_open')
    then 'email_open'
  WHEN action in('email_clickthrough')
    then 'email_clicked'
  end as email_cat
from email_events
) a
```

	email_opened_rate	email_clicked_rate
▶	30.01143	10.71474

Table: email

Columns:

user_id	double
occurred_at	text
event_type	text
event_name	text
location	text
device	text
user_type	double

RESULT

We have learned different sql functions like :

- extract
- date
- avg
- over
- distinction
- and many more.