# Operation and metric analysis

This project operation and metric analysis focuses on analysing the data which is provided by and answer the question asked by different departments. This project insights is helpful for ops team, support team, marketing team and also means better automation and better understanding between cross-functional teams, and more effective workflow. Investigating metric spike is also an important part of operation analytics to be able to understand or make other teams understand questions.

Here ,I have been given 2 different case studies and related data sets of total 4,where I have driven certain insights out of it and answered the questions.

**Approach :** I have already installed mysql workbench for the previous project ,I have created new query page in mysql and  created database and loaded existing datasets in this project ,and then if there are any modifications like unsufficient data I have modified it and then I wrote queries to extract the tables and drawn insights and extracted some useful information to answer the given question.

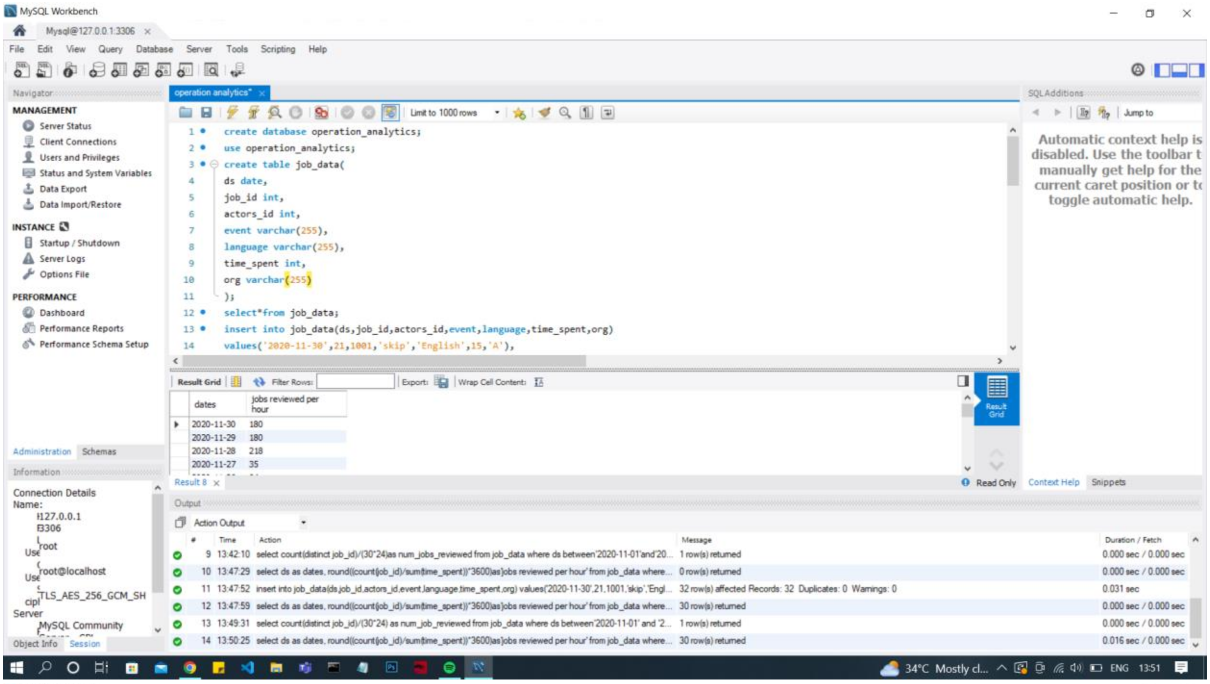
**Tech-stack** : used is mysql workbench for to extract data and for writing queries and to store the large amounts of data.

**Insights:**

In case study-1(job data)

1.calculate the number of jobs reviewed per hour per day for November 2020?

Here in the first case the given data set which was provided was unsufficient so I created a database and then a table and then filled of 30 value where 8 values were given and rest of them were filled manually.



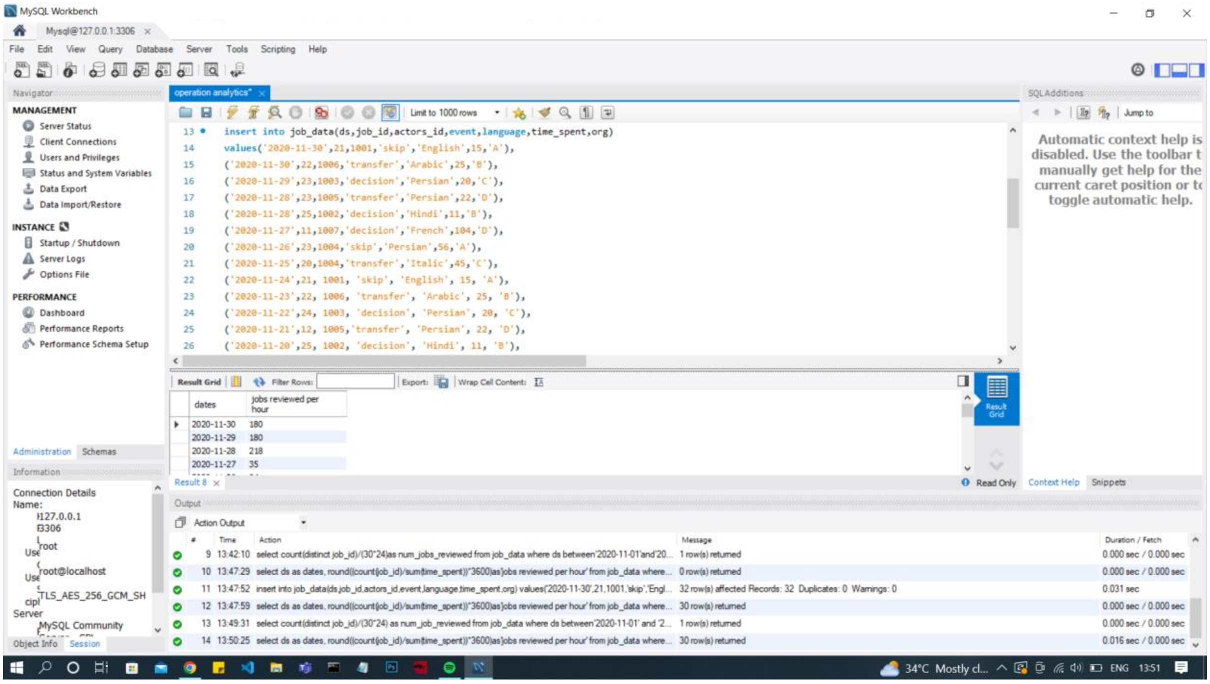
```
create database operation_analytics;
use operation_analytics;
create table job_data(
ds date,
job_id int,
actors_id int,
event varchar(255),
language varchar(255),
time_spent int,
org varchar(255)
);
select*from job_data;
insert into job_data(ds,job_id,actors_id,event,language,time_spent,org)
values('2020-11-30',21,1001,'skip','English',15,'A'),
```

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

Connection Details
Name:
127.0.0.1
3306
Use root
Use root@localhost
cipl TLS_AES_256_GCM_SH
Server: MySQL Community

| | dates | jobs reviewed per hour |
|---|---|---|
| ▶ | 2020-11-30 | 180 |
| | 2020-11-29 | 180 |
| | 2020-11-28 | 218 |
| | 2020-11-27 | 35 |

```
#   Time      Action                                                                                           Message                                                       Duration / Fetch
9   13:42:10  select count(distinct job_id)/(30*24)as num_jobs_reviewed from job_data where ds between'2020-11-01'and'20...   1 row(s) returned                                             0.000 sec / 0.000 sec
10  13:47:29  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   0 row(s) returned                                             0.000 sec / 0.000 sec
11  13:47:52  insert into job_data(ds,job_id,actors_id,event,language,time_spent,org) values('2020-11-30',21,1001,'skip','Engl...   32 row(s) affected Records: 32  Duplicates: 0  Warnings: 0   0.031 sec
12  13:47:59  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   30 row(s) returned                                            0.000 sec / 0.000 sec
13  13:49:31  select count(distinct job_id)/(30*24) as num_job_reviewed from job_data where ds between'2020-11-01' and '2...   1 row(s) returned                                             0.000 sec / 0.000 sec
14  13:50:25  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   30 row(s) returned                                            0.016 sec / 0.000 sec
```



```
insert into job_data(ds,job_id,actors_id,event,language,time_spent,org)
values('2020-11-30',21,1001,'skip','English',15,'A'),
('2020-11-30',22,1006,'transfer','Arabic',25,'B'),
('2020-11-29',23,1003,'decision','Persian',20,'C'),
('2020-11-28',23,1005,'transfer','Persian',22,'D'),
('2020-11-28',25,1002,'decision','Hindi',11,'B'),
('2020-11-27',11,1007,'decision','French',104,'D'),
('2020-11-26',23,1004,'skip','Persian',56,'A'),
('2020-11-25',20,1004,'transfer','Italic',45,'C'),
('2020-11-24',21, 1001, 'skip', 'English', 15, 'A'),
('2020-11-23',22, 1006, 'transfer', 'Arabic', 25, 'B'),
('2020-11-22',24, 1003, 'decision', 'Persian', 20, 'C'),
('2020-11-21',12, 1005,'transfer', 'Persian', 22, 'D'),
('2020-11-20',25, 1002, 'decision', 'Hindi', 11, 'B'),
```

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

Connection Details
Name:
127.0.0.1
3306
Use root
Use root@localhost
cipl TLS_AES_256_GCM_SH
Server: MySQL Community

| | dates | jobs reviewed per hour |
|---|---|---|
| ▶ | 2020-11-30 | 180 |
| | 2020-11-29 | 180 |
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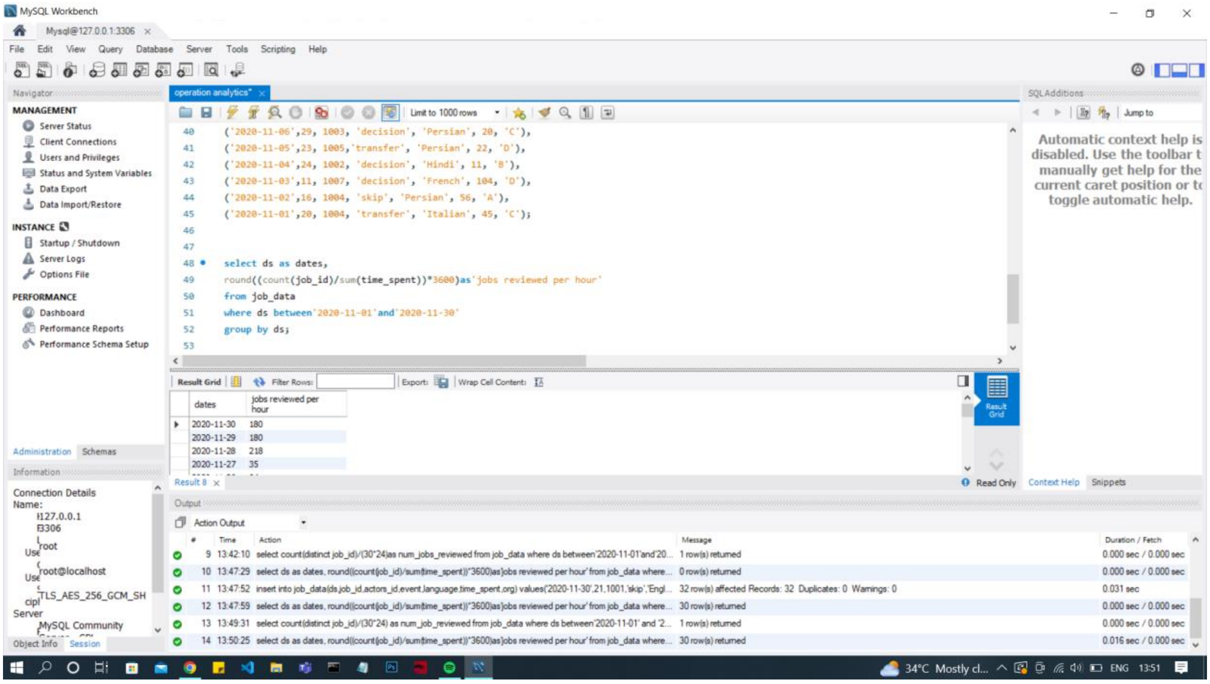
| | 2020-11-27 | 35 |

```
#   Time      Action                                                                                           Message                                                       Duration / Fetch
9   13:42:10  select count(distinct job_id)/(30*24)as num_jobs_reviewed from job_data where ds between'2020-11-01'and'20...   1 row(s) returned                                             0.000 sec / 0.000 sec
10  13:47:29  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   0 row(s) returned                                             0.000 sec / 0.000 sec
11  13:47:52  insert into job_data(ds,job_id,actors_id,event,language,time_spent,org) values('2020-11-30',21,1001,'skip','Engl...   32 row(s) affected Records: 32  Duplicates: 0  Warnings: 0   0.031 sec
12  13:47:59  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   30 row(s) returned                                            0.000 sec / 0.000 sec
13  13:49:31  select count(distinct job_id)/(30*24) as num_job_reviewed from job_data where ds between'2020-11-01' and '2...   1 row(s) returned                                             0.000 sec / 0.000 sec
14  13:50:25  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   30 row(s) returned                                            0.016 sec / 0.000 sec
```

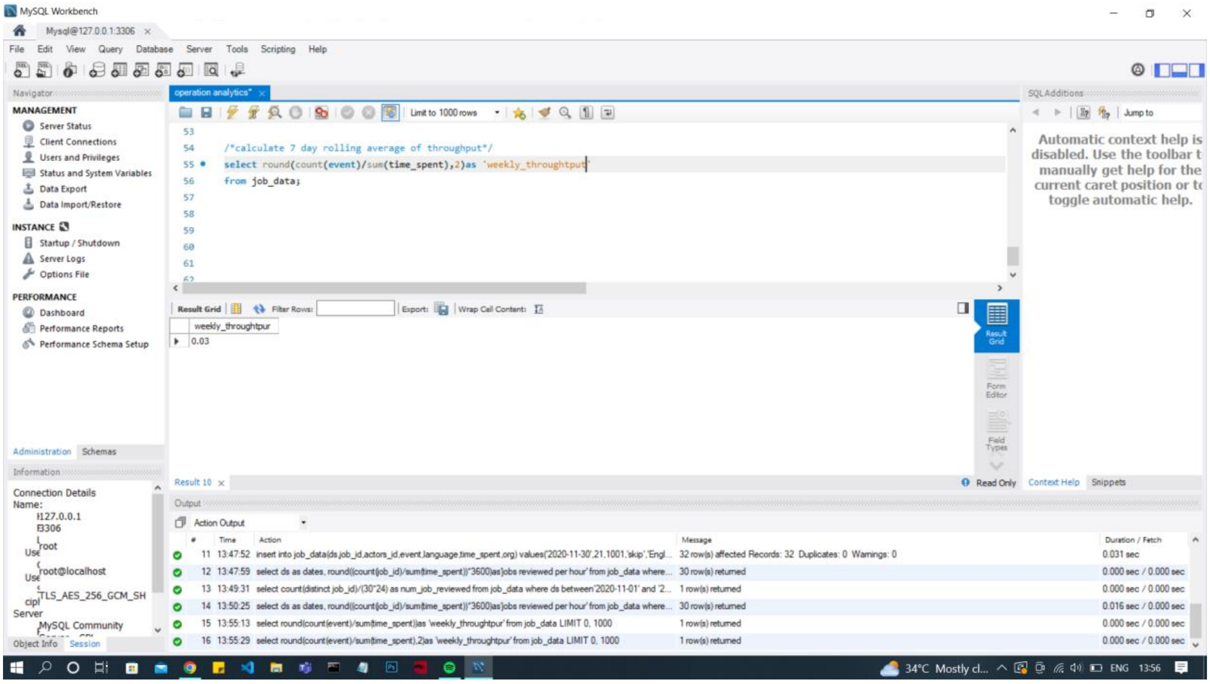


```sql
('2020-11-06',29, 1003, 'decision', 'Persian', 20, 'C'),
('2020-11-05',23, 1005,'transfer', 'Persian', 22, 'D'),
('2020-11-04',24, 1002, 'decision', 'Hindi', 11, 'B'),
('2020-11-03',11, 1007, 'decision', 'French', 104, 'D'),
('2020-11-02',16, 1004, 'skip', 'Persian', 56, 'A'),
('2020-11-01',20, 1004, 'transfer', 'Italian', 45, 'C');


select ds as dates,
round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour'
from job_data
where ds between'2020-11-01'and'2020-11-30'
group by ds;
```

| dates | jobs reviewed per hour |
|---|---|
| 2020-11-30 | 180 |
| 2020-11-29 | 180 |
| 2020-11-28 | 218 |
| 2020-11-27 | 35 |

```
#   Time      Action                                                                                                        Message                                                        Duration / Fetch
9   13:42:10  select count(distinct job_id)/(30*24)as num_jobs_reviewed from job_data where ds between'2020-11-01'and'20...  1 row(s) returned                                              0.000 sec / 0.000 sec
10  13:47:29  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...  0 row(s) returned                                              0.000 sec / 0.000 sec
11  13:47:52  insert into job_data(ds,job_id,actors_id,event,language,time_spent,org) values('2020-11-30',21,1001,'skip','Engl...  32 row(s) affected Records: 32  Duplicates: 0  Warnings: 0  0.031 sec
12  13:47:59  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...  30 row(s) returned                                             0.000 sec / 0.000 sec
13  13:49:31  select count(distinct job_id)/(30*24) as num_job_reviewed from job_data where ds between'2020-11-01' and '2...  1 row(s) returned                                              0.000 sec / 0.000 sec
14  13:50:25  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...  30 row(s) returned                                             0.016 sec / 0.000 sec
```

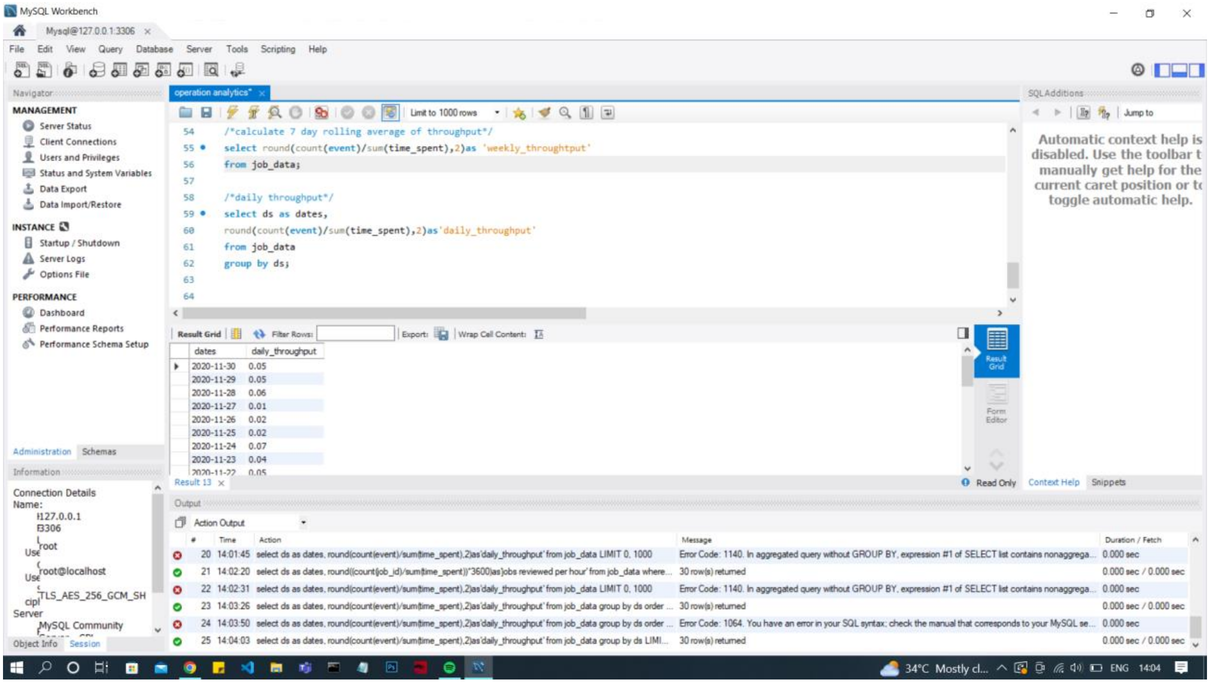
2.calculate 7-day rolling average of throughput? For throughput, do you prefer daily metric or 7-day rolling and why?



```sql
/*calculate 7 day rolling average of throughput*/
select round(count(event)/sum(time_spent),2)as 'weekly_throughtput'
from job_data;
```

| weekly_throughtpur |
|---|
| 0.03 |

```
#   Time      Action                                                                                                        Message                                                        Duration / Fetch
11  13:47:52  insert into job_data(ds,job_id,actors_id,event,language,time_spent,org) values('2020-11-30',21,1001,'skip','Engl...  32 row(s) affected Records: 32  Duplicates: 0  Warnings: 0  0.031 sec
12  13:47:59  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...  30 row(s) returned                                             0.000 sec / 0.000 sec
13  13:49:31  select count(distinct job_id)/(30*24) as num_job_reviewed from job_data where ds between'2020-11-01' and '2...  1 row(s) returned                                              0.000 sec / 0.000 sec
14  13:50:25  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...  30 row(s) returned                                             0.016 sec / 0.000 sec
15  13:55:13  select round(count(event)/sum(time_spent))as 'weekly_throughtpur' from job_data LIMIT 0, 1000                   1 row(s) returned                                              0.000 sec / 0.000 sec
16  13:55:29  select round(count(event)/sum(time_spent),2)as 'weekly_throughtpur' from job_data LIMIT 0, 1000                 1 row(s) returned                                              0.000 sec / 0.000 sec
```



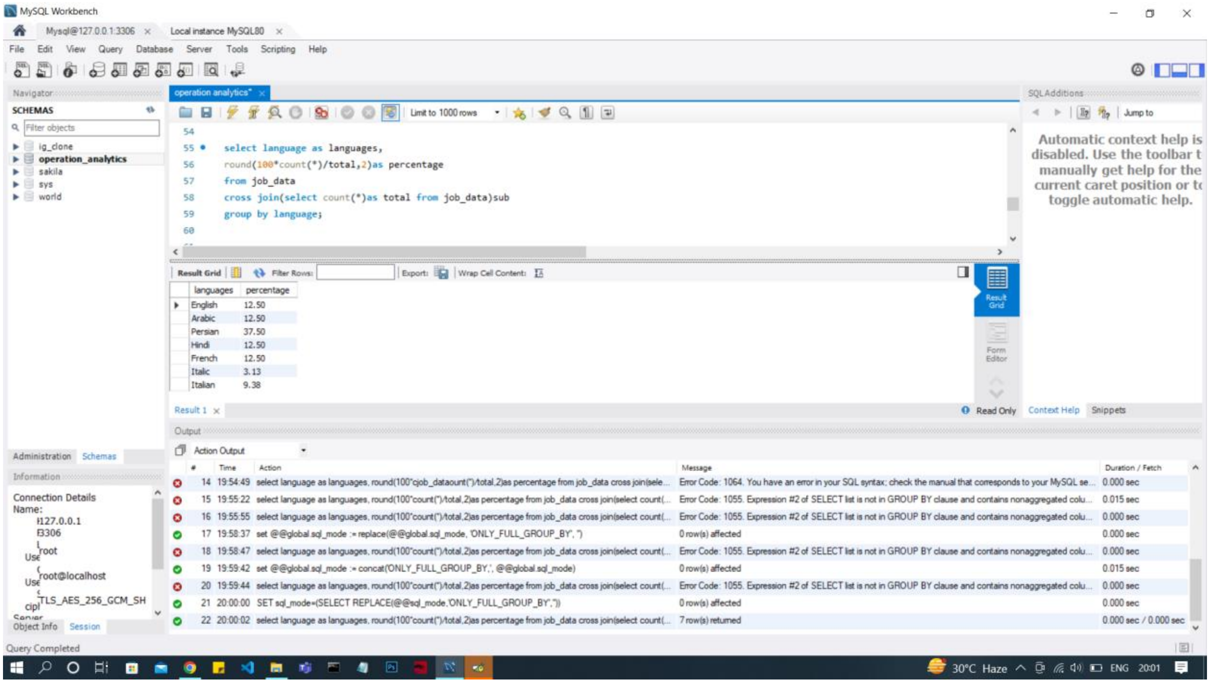
```
/*calculate 7 day rolling average of throughput*/
select round(count(event)/sum(time_spent),2)as 'weekly_throughtput'
from job_data;

/*daily throughput*/
select ds as dates,
round(count(event)/sum(time_spent),2)as'daily_throughput'
from job_data
group by ds;
```

| dates | daily_throughput |
|---|---|
| 2020-11-30 | 0.05 |
| 2020-11-29 | 0.05 |
| 2020-11-28 | 0.06 |
| 2020-11-27 | 0.01 |
| 2020-11-26 | 0.02 |
| 2020-11-25 | 0.02 |
| 2020-11-24 | 0.07 |
| 2020-11-23 | 0.04 |
| 2020-11-22 | 0.05 |

```
#   Time      Action                                                                                              Message                                                                                            Duration / Fetch
20  14:01:45  select ds as dates, round(count(event)/sum(time_spent),2)as'daily_throughput' from job_data LIMIT 0, 1000   Error Code: 1140. In aggregated query without GROUP BY, expression #1 of SELECT list contains nonaggrega...   0.000 sec
21  14:02:20  select ds as dates, round((count(job_id)/sum(time_spent))*3600)as'jobs reviewed per hour' from job_data where...   30 row(s) returned   0.000 sec / 0.000 sec
22  14:02:31  select ds as dates, round(count(event)/sum(time_spent),2)as'daily_throughput' from job_data LIMIT 0, 1000   Error Code: 1140. In aggregated query without GROUP BY, expression #1 of SELECT list contains nonaggrega...   0.000 sec
23  14:03:26  select ds as dates, round(count(event)/sum(time_spent),2)as'daily_throughput' from job_data group by ds order ...   30 row(s) returned   0.000 sec / 0.000 sec
24  14:03:50  select ds as dates, round(count(event)/sum(time_spent),2)as'daily_throughput' from job_data group by ds order ...   Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...   0.000 sec
25  14:04:03  select ds as dates, round(count(event)/sum(time_spent),2)as'daily_throughput' from job_data group by ds LIMI...   30 row(s) returned   0.000 sec / 0.000 sec
```

For throughput I prefer 7-day rolling because in daily metric the scale goes up and down and we cannot get pattern and in 7-day it gives you average value where we can get a conclusion.

3.calculate the percentage share of each language in the last 30 days?



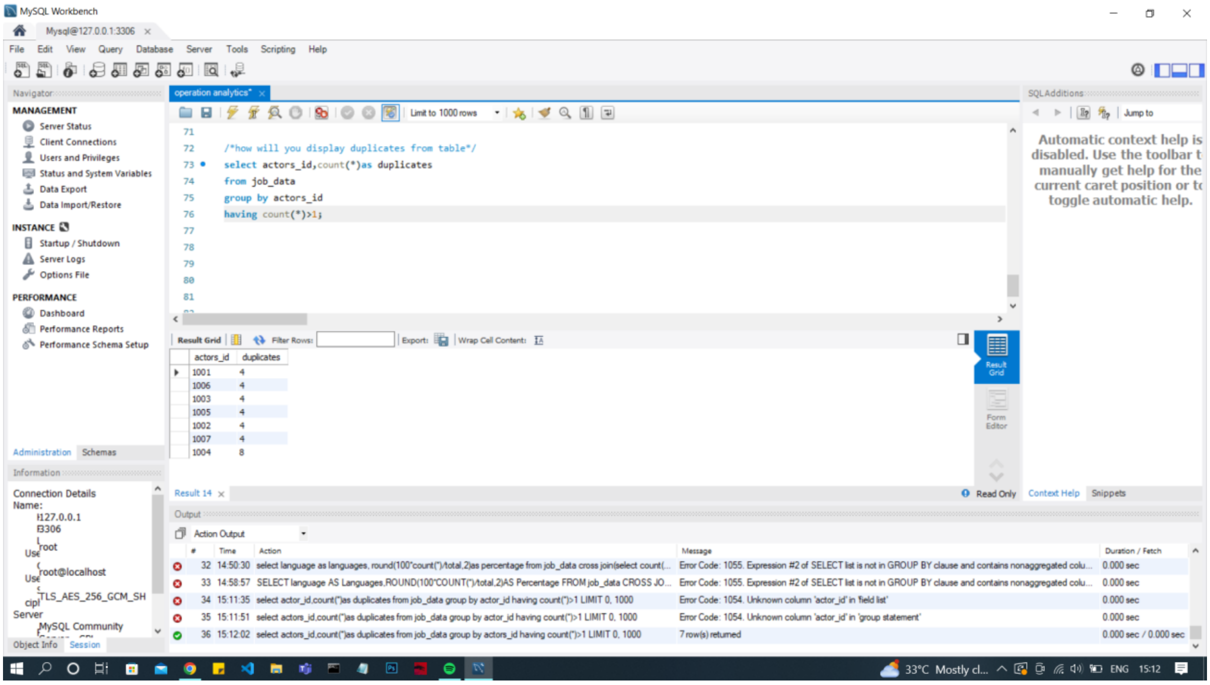
```
select language as languages,
round(100*count(*)/total,2)as percentage
from job_data
cross join(select count(*)as total from job_data)sub
group by language;
```

| languages | percentage |
|---|---|
| English | 12.50 |
| Arabic | 12.50 |
| Persian | 37.50 |
| Hindi | 12.50 |
| French | 12.50 |
| Italic | 3.13 |
| Italian | 9.38 |

```
#   Time      Action                                                                                                         Message                                                                                                Duration / Fetch
14  19:54:49  select language as languages, round(100*cjob_dataount(*)/total,2)as percentage from job_data cross join(sele...   Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...   0.000 sec
15  19:55:22  select language as languages, round(100*count(*)/total,2)as percentage from job_data cross join(select count(...   Error Code: 1055. Expression #2 of SELECT list is not in GROUP BY clause and contains nonaggregated colu...   0.015 sec
16  19:55:55  select language as languages, round(100*count(*)/total,2)as percentage from job_data cross join(select count(...   Error Code: 1055. Expression #2 of SELECT list is not in GROUP BY clause and contains nonaggregated colu...   0.000 sec
17  19:58:37  set @@global.sql_mode := replace(@@global.sql_mode, 'ONLY_FULL_GROUP_BY', '')   0 row(s) affected   0.000 sec
18  19:58:47  select language as languages, round(100*count(*)/total,2)as percentage from job_data cross join(select count(...   Error Code: 1055. Expression #2 of SELECT list is not in GROUP BY clause and contains nonaggregated colu...   0.000 sec
19  19:59:42  set @@global.sql_mode := concat('ONLY_FULL_GROUP_BY,', @@global.sql_mode)   0 row(s) affected   0.015 sec
20  19:59:44  select language as languages, round(100*count(*)/total,2)as percentage from job_data cross join(select count(...   Error Code: 1055. Expression #2 of SELECT list is not in GROUP BY clause and contains nonaggregated colu...   0.000 sec
21  20:00:00  SET sql_mode=(SELECT REPLACE(@@sql_mode,'ONLY_FULL_GROUP_BY',''))   0 row(s) affected   0.000 sec
22  20:00:02  select language as languages, round(100*count(*)/total,2)as percentage from job_data cross join(select count(...   7 row(s) returned   0.000 sec / 0.000 sec
```

In this Persian got the highest percentage of 37.50 and least is Italic of 3.13

4.how will you display duplicates from the table?



```
/*how will you display duplicates from table*/
select actors_id,count(*)as duplicates
from job_data
group by actors_id
having count(*)>1;
```

| actors_id | duplicates |
|---|---|
| 1001 | 4 |
| 1006 | 4 |
| 1003 | 4 |
| 1005 | 4 |
| 1002 | 4 |
| 1007 | 4 |
| 1004 | 8 |

```
#   Time      Action                                                                                                   Message                                                                                   Duration / Fetch
32  14:50:30  select language as languages, round(100*count(*)/total,2)as percentage from job_data cross join(select count(...   Error Code: 1055. Expression #2 of SELECT list is not in GROUP BY clause and contains nonaggregated colu...   0.000 sec
33  14:58:57  SELECT language AS Languages,ROUND(100*COUNT(*)/total,2)AS Percentage FROM job_data CROSS JO...                 Error Code: 1055. Expression #2 of SELECT list is not in GROUP BY clause and contains nonaggregated colu...   0.000 sec
34  15:11:35  select actor_id,count(*)as duplicates from job_data group by actor_id having count(*)>1 LIMIT 0, 1000              Error Code: 1054. Unknown column 'actor_id' in 'field list'                                                   0.000 sec
35  15:11:51  select actors_id,count(*)as duplicates from job_data group by actor_id having count(*)>1 LIMIT 0, 1000             Error Code: 1054. Unknown column 'actor_id' in 'group statement'                                              0.000 sec
36  15:12:02  select actors_id,count(*)as duplicates from job_data group by actors_id having count(*)>1 LIMIT 0, 1000            7 row(s) returned                                                                                             0.000 sec / 0.000 sec
```

This query helped me to display how many duplicates were present.

## Case study 2(investigating metric spike)

This case study consists of 3 tables

1.table-1 users

2.table-2 events

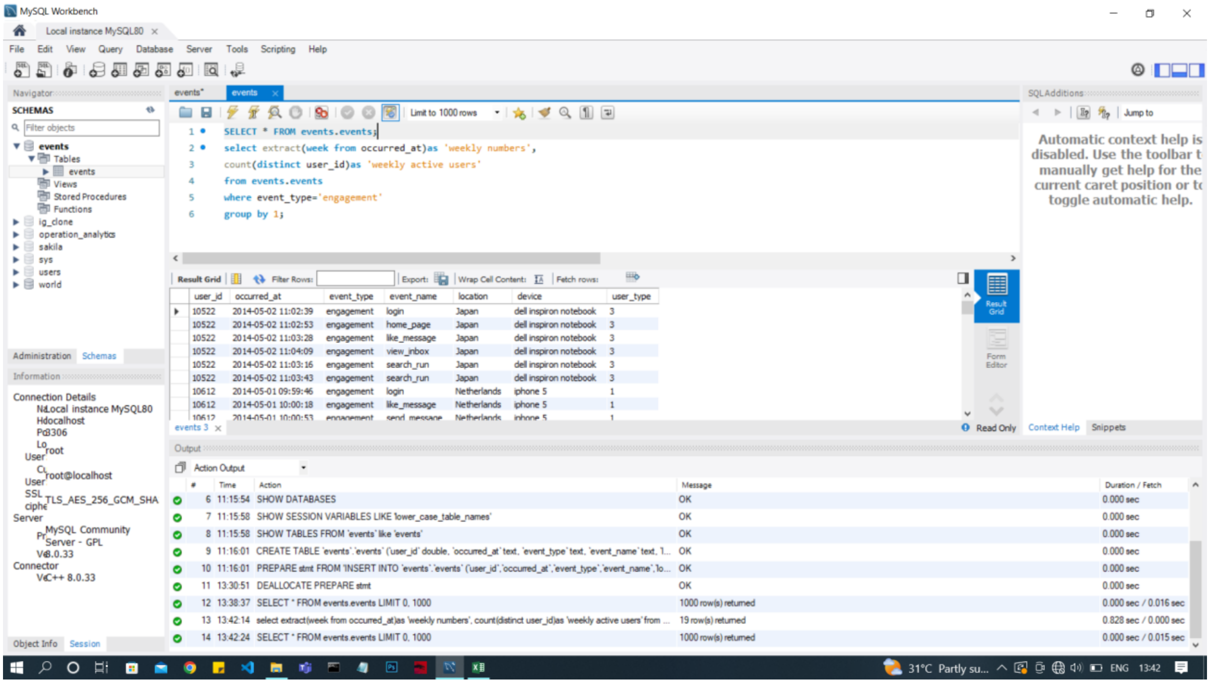
3.table-3 email_events

1.calculate the weekly user engagement?

I have imported a existing database table called events in mysql

This event table is the largest table among those two table which took a lot of time to get imported.

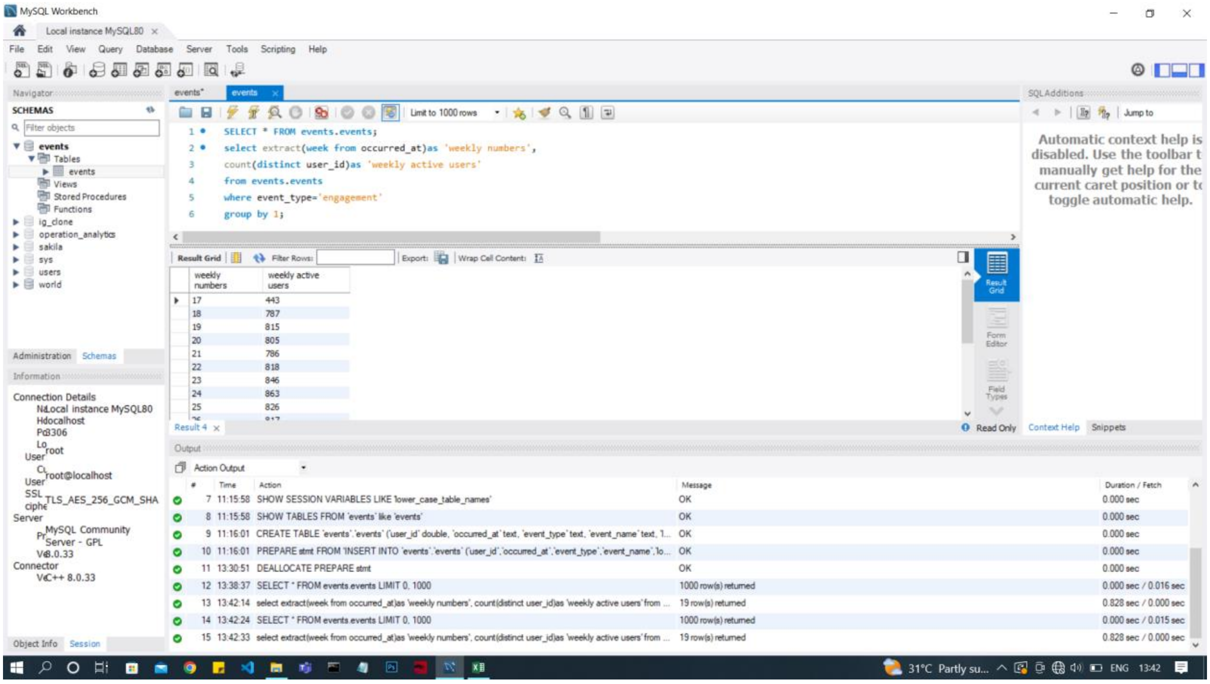
And after importing I loaded the data after loading the data I wrote query to get answer for the question



```
SELECT * FROM events.events;
select extract(week from occurred_at)as 'weekly numbers',
count(distinct user_id)as 'weekly active users'
from events.events
where event_type='engagement'
group by 1;
```

| user_id | occurred_at | event_type | event_name | location | device | user_type |
|---|---|---|---|---|---|---|
| 10522 | 2014-05-02 11:02:39 | engagement | login | Japan | dell inspiron notebook | 3 |
| 10522 | 2014-05-02 11:02:53 | engagement | home_page | Japan | dell inspiron notebook | 3 |
| 10522 | 2014-05-02 11:03:28 | engagement | like_message | Japan | dell inspiron notebook | 3 |
| 10522 | 2014-05-02 11:04:09 | engagement | view_inbox | Japan | dell inspiron notebook | 3 |
| 10522 | 2014-05-02 11:03:16 | engagement | search_run | Japan | dell inspiron notebook | 3 |
| 10522 | 2014-05-02 11:03:43 | engagement | search_run | Japan | dell inspiron notebook | 3 |
| 10612 | 2014-05-01 09:59:46 | engagement | login | Netherlands | iphone 5 | 1 |
| 10612 | 2014-05-01 10:00:18 | engagement | like_message | Netherlands | iphone 5 | 1 |
| 10612 | 2014-05-01 10:00:53 | engagement | send_message | Netherlands | iphone 5 | 1 |

```
#   Time      Action                                                                                              Message                Duration / Fetch
6   11:15:54  SHOW DATABASES                                                                                      OK                     0.000 sec
7   11:15:58  SHOW SESSION VARIABLES LIKE 'lower_case_table_names'                                                OK                     0.000 sec
8   11:15:58  SHOW TABLES FROM 'events' like 'events'                                                             OK                     0.000 sec
9   11:16:01  CREATE TABLE 'events'.'events' ('user_id' double, 'occurred_at' text, 'event_type' text, 'event_name' text, 1...  OK     0.000 sec
10  11:16:01  PREPARE stmt FROM 'INSERT INTO 'events'.'events' ('user_id','occurred_at','event_type','event_name','lo...  OK    0.000 sec
11  13:30:51  DEALLOCATE PREPARE stmt                                                                             OK                     0.000 sec
12  13:38:37  SELECT * FROM events.events LIMIT 0, 1000                                                           1000 row(s) returned   0.000 sec / 0.016 sec
13  13:42:14  select extract(week from occurred_at)as 'weekly numbers', count(distinct user_id)as 'weekly active users' from ...  19 row(s) returned  0.828 sec / 0.000 sec
14  13:42:24  SELECT * FROM events.events LIMIT 0, 1000                                                           1000 row(s) returned   0.000 sec / 0.015 sec
```

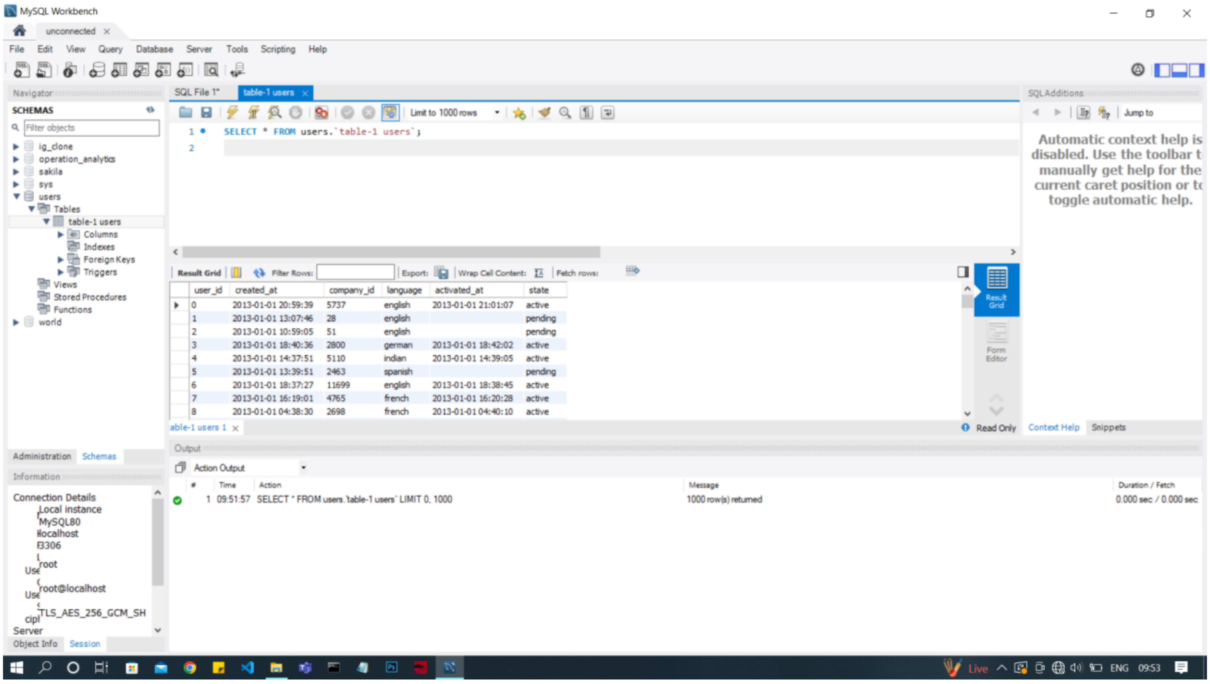


```
SELECT * FROM events.events;
select extract(week from occurred_at)as 'weekly numbers',
count(distinct user_id)as 'weekly active users'
from events.events
where event_type='engagement'
group by 1;
```

| weekly numbers | weekly active users |
|---|---|
| 17 | 443 |
| 18 | 787 |
| 19 | 815 |
| 20 | 805 |
| 21 | 786 |
| 22 | 818 |
| 23 | 846 |
| 24 | 863 |
| 25 | 826 |

```
#   Time      Action                                                                                              Message                Duration / Fetch
7   11:15:58  SHOW SESSION VARIABLES LIKE 'lower_case_table_names'                                                OK                     0.000 sec
8   11:15:58  SHOW TABLES FROM 'events' like 'events'                                                             OK                     0.000 sec
9   11:16:01  CREATE TABLE 'events'.'events' ('user_id' double, 'occurred_at' text, 'event_type' text, 'event_name' text, 1...  OK     0.000 sec
10  11:16:01  PREPARE stmt FROM 'INSERT INTO 'events'.'events' ('user_id','occurred_at','event_type','event_name','lo...  OK    0.000 sec
11  13:30:51  DEALLOCATE PREPARE stmt                                                                             OK                     0.000 sec
12  13:38:37  SELECT * FROM events.events LIMIT 0, 1000                                                           1000 row(s) returned   0.000 sec / 0.016 sec
13  13:42:14  select extract(week from occurred_at)as 'weekly numbers', count(distinct user_id)as 'weekly active users' from ...  19 row(s) returned  0.828 sec / 0.000 sec
14  13:42:24  SELECT * FROM events.events LIMIT 0, 1000                                                           1000 row(s) returned   0.000 sec / 0.015 sec
15  13:42:33  select extract(week from occurred_at)as 'weekly numbers', count(distinct user_id)as 'weekly active users' from ...  19 row(s) returned  0.828 sec / 0.000 sec
```

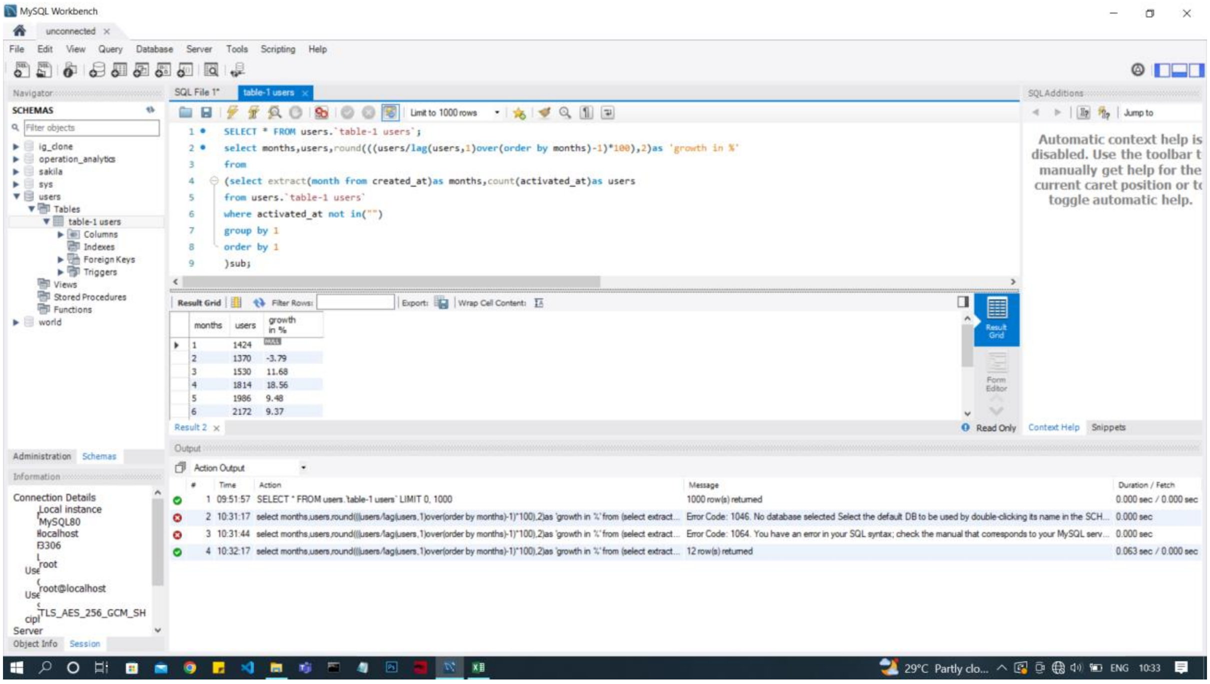
# 2.calculate the user growth for product?



```
SELECT * FROM users.`table-1 users`;
```

| user_id | created_at | company_id | language | activated_at | state |
|---|---|---|---|---|---|
| 0 | 2013-01-01 20:59:39 | 5737 | english | 2013-01-01 21:01:07 | active |
| 1 | 2013-01-01 13:07:46 | 28 | english | | pending |
| 2 | 2013-01-01 10:59:05 | 51 | english | | pending |
| 3 | 2013-01-01 18:40:36 | 2800 | german | 2013-01-01 18:42:02 | active |
| 4 | 2013-01-01 14:37:51 | 5110 | indian | 2013-01-01 14:39:05 | active |
| 5 | 2013-01-01 13:39:51 | 2463 | spanish | | pending |
| 6 | 2013-01-01 18:37:27 | 11699 | english | 2013-01-01 18:38:45 | active |
| 7 | 2013-01-01 16:19:01 | 4765 | french | 2013-01-01 16:20:28 | active |
| 8 | 2013-01-01 04:38:30 | 2698 | french | 2013-01-01 04:40:10 | active |

```
#  Time      Action                                              Message                  Duration / Fetch
1  09:51:57  SELECT * FROM users.`table-1 users` LIMIT 0, 1000   1000 row(s) returned     0.000 sec / 0.000 sec
```

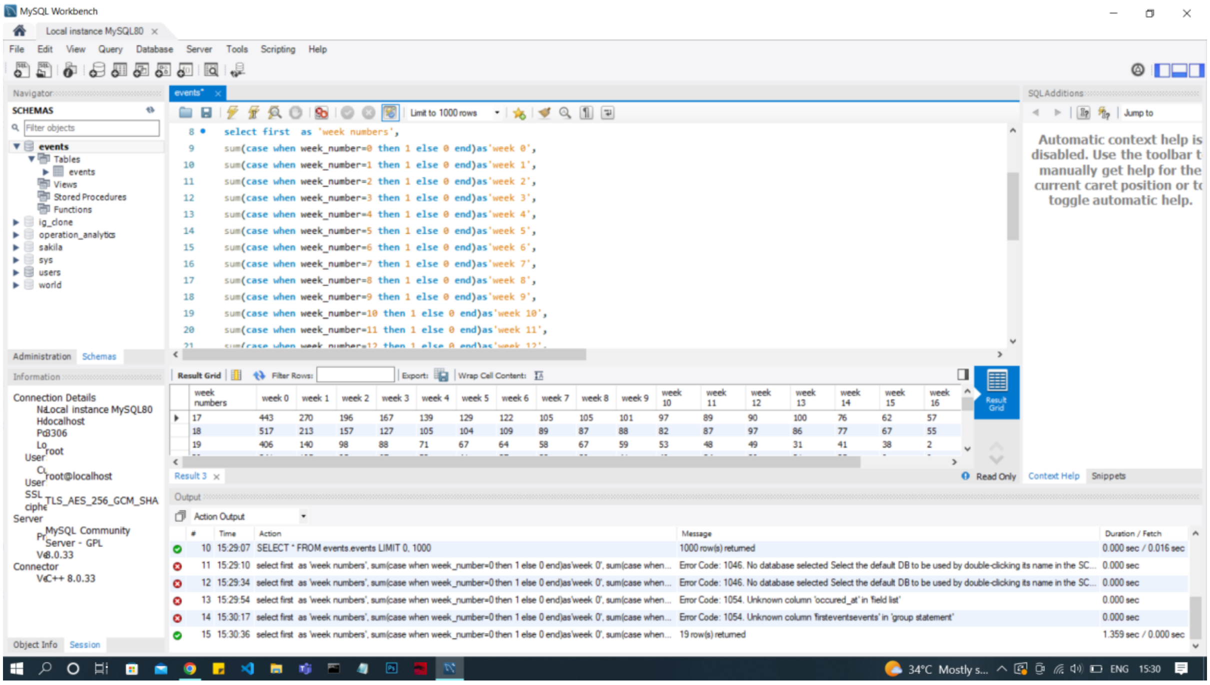


```
SELECT * FROM users.`table-1 users`;
select months,users,round(((users/lag(users,1)over(order by months)-1)*100),2)as 'growth in %'
from
(select extract(month from created_at)as months,count(activated_at)as users
from users.`table-1 users`
where activated_at not in("")
group by 1
order by 1
)sub;
```

| months | users | growth in % |
|---|---|---|
| 1 | 1424 | NULL |
| 2 | 1370 | -3.79 |
| 3 | 1530 | 11.68 |
| 4 | 1814 | 18.56 |
| 5 | 1986 | 9.48 |
| 6 | 2172 | 9.37 |

```
#  Time      Action                                                                                         Message                                                                                          Duration / Fetch
1  09:51:57  SELECT * FROM users.`table-1 users` LIMIT 0, 1000                                              1000 row(s) returned                                                                             0.000 sec / 0.000 sec
2  10:31:17  select months,users,round(((users/lag(users,1)over(order by months)-1)*100),2)as 'growth in %' from (select extract...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SCH...  0.000 sec
3  10:31:44  select months,users,round(((users/lag(users,1)over(order by months)-1)*100),2)as 'growth in %' from (select extract...  Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL serv...  0.000 sec
4  10:32:17  select months,users,round(((users/lag(users,1)over(order by months)-1)*100),2)as 'growth in %' from (select extract...  12 row(s) returned                                                                               0.063 sec / 0.000 sec
```

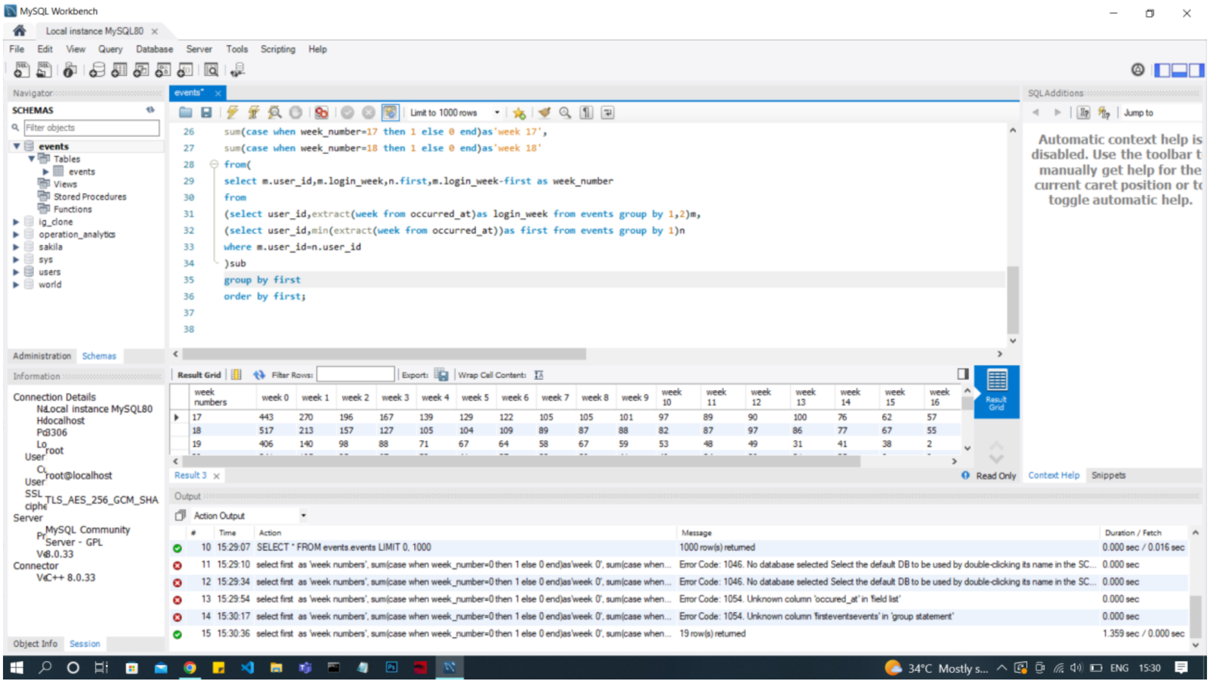
# 3.calculate the weekly retention of users-sign up cohort?



```
select first  as 'week numbers',
sum(case when week_number=0 then 1 else 0 end)as'week 0',
sum(case when week_number=1 then 1 else 0 end)as'week 1',
sum(case when week_number=2 then 1 else 0 end)as'week 2',
sum(case when week_number=3 then 1 else 0 end)as'week 3',
sum(case when week_number=4 then 1 else 0 end)as'week 4',
sum(case when week_number=5 then 1 else 0 end)as'week 5',
sum(case when week_number=6 then 1 else 0 end)as'week 6',
sum(case when week_number=7 then 1 else 0 end)as'week 7',
sum(case when week_number=8 then 1 else 0 end)as'week 8',
sum(case when week_number=9 then 1 else 0 end)as'week 9',
sum(case when week_number=10 then 1 else 0 end)as'week 10',
sum(case when week_number=11 then 1 else 0 end)as'week 11',
sum(case when week_number=12 then 1 else 0 end)as'week 12',
```

| week numbers | week 0 | week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7 | week 8 | week 9 | week 10 | week 11 | week 12 | week 13 | week 14 | week 15 | week 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 443 | 270 | 196 | 167 | 139 | 129 | 122 | 105 | 105 | 101 | 97 | 89 | 90 | 100 | 76 | 62 | 57 |
| 18 | 517 | 213 | 157 | 127 | 105 | 104 | 109 | 89 | 87 | 88 | 82 | 87 | 97 | 86 | 77 | 67 | 55 |
| 19 | 406 | 140 | 98 | 88 | 71 | 67 | 64 | 58 | 67 | 59 | 53 | 48 | 49 | 31 | 41 | 38 | 2 |

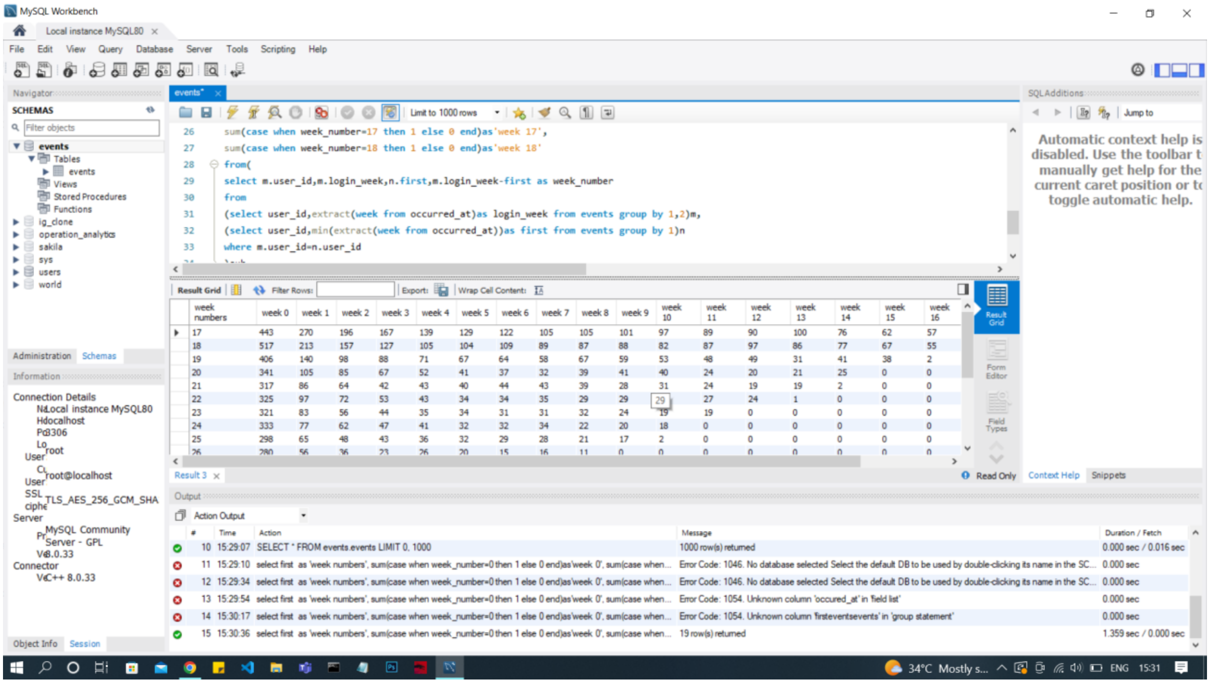
```
#   Time      Action                                                                                          Message                                                                                        Duration / Fetch
10  15:29:07  SELECT * FROM events.events LIMIT 0, 1000                                                       1000 row(s) returned                                                                           0.000 sec / 0.016 sec
11  15:29:10  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SC...  0.000 sec
12  15:29:34  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SC...  0.000 sec
13  15:29:54  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'occured_at' in 'field list'                                  0.000 sec
14  15:30:17  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'firsteventsevents' in 'group statement'                      0.000 sec
15  15:30:36  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  19 row(s) returned                                                                             1.359 sec / 0.000 sec
```



```
sum(case when week_number=17 then 1 else 0 end)as'week 17',
sum(case when week_number=18 then 1 else 0 end)as'week 18'
from(
select m.user_id,m.login_week,n.first,m.login_week-first as week_number
from
(select user_id,extract(week from occurred_at)as login_week from events group by 1,2)m,
(select user_id,min(extract(week from occurred_at))as first from events group by 1)n
where m.user_id=n.user_id
)sub
group by first
order by first;
```

| week numbers | week 0 | week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7 | week 8 | week 9 | week 10 | week 11 | week 12 | week 13 | week 14 | week 15 | week 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 443 | 270 | 196 | 167 | 139 | 129 | 122 | 105 | 105 | 101 | 97 | 89 | 90 | 100 | 76 | 62 | 57 |
| 18 | 517 | 213 | 157 | 127 | 105 | 104 | 109 | 89 | 87 | 88 | 82 | 87 | 97 | 86 | 77 | 67 | 55 |
| 19 | 406 | 140 | 98 | 88 | 71 | 67 | 64 | 58 | 67 | 59 | 53 | 48 | 49 | 31 | 41 | 38 | 2 |

```
#   Time      Action                                                                                          Message                                                                                        Duration / Fetch
10  15:29:07  SELECT * FROM events.events LIMIT 0, 1000                                                       1000 row(s) returned                                                                           0.000 sec / 0.016 sec
11  15:29:10  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SC...  0.000 sec
12  15:29:34  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SC...  0.000 sec
13  15:29:54  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'occured_at' in 'field list'                                  0.000 sec
14  15:30:17  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'firsteventsevents' in 'group statement'                      0.000 sec
15  15:30:36  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  19 row(s) returned                                                                             1.359 sec / 0.000 sec
```

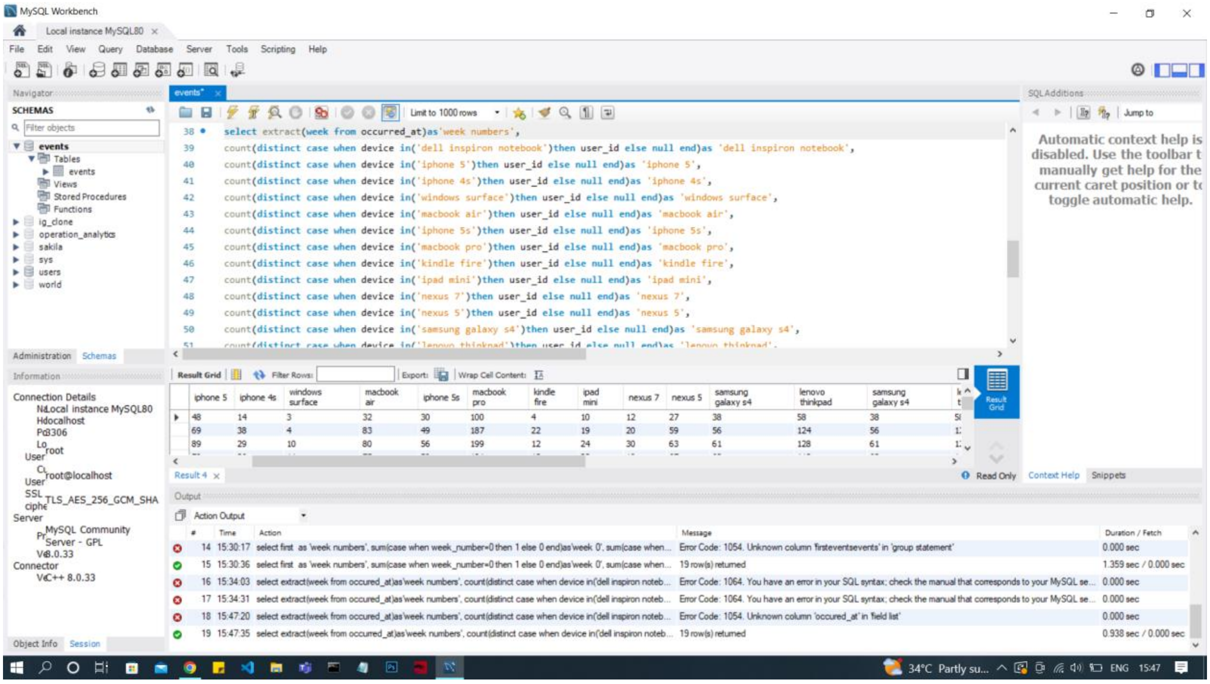


```sql
sum(case when week_number=17 then 1 else 0 end)as'week 17',
sum(case when week_number=18 then 1 else 0 end)as'week 18'
from(
select m.user_id,m.login_week,n.first,m.login_week-first as week_number
from
(select user_id,extract(week from occurred_at)as login_week from events group by 1,2)m,
(select user_id,min(extract(week from occurred_at))as first from events group by 1)n
where m.user_id=n.user_id
```

| week numbers | week 0 | week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7 | week 8 | week 9 | week 10 | week 11 | week 12 | week 13 | week 14 | week 15 | week 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 443 | 270 | 196 | 167 | 139 | 129 | 122 | 105 | 105 | 101 | 97 | 89 | 90 | 100 | 76 | 62 | 57 |
| 18 | 517 | 213 | 157 | 127 | 105 | 104 | 109 | 89 | 87 | 88 | 82 | 87 | 97 | 86 | 77 | 67 | 55 |
| 19 | 406 | 140 | 98 | 88 | 71 | 67 | 64 | 58 | 67 | 59 | 53 | 48 | 49 | 31 | 41 | 38 | 2 |
| 20 | 341 | 105 | 85 | 67 | 52 | 41 | 37 | 32 | 39 | 41 | 40 | 24 | 20 | 21 | 25 | 0 | 0 |
| 21 | 317 | 86 | 64 | 42 | 43 | 40 | 44 | 43 | 39 | 28 | 31 | 24 | 19 | 19 | 2 | 0 | 0 |
| 22 | 325 | 97 | 72 | 53 | 43 | 34 | 34 | 35 | 29 | 29 | 29 | 27 | 24 | 1 | 0 | 0 | 0 |
| 23 | 321 | 83 | 56 | 44 | 35 | 34 | 31 | 31 | 32 | 24 | 19 | 19 | 0 | 0 | 0 | 0 | 0 |
| 24 | 333 | 77 | 62 | 47 | 41 | 32 | 32 | 34 | 22 | 20 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 298 | 65 | 48 | 43 | 36 | 32 | 29 | 28 | 21 | 17 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | 280 | 56 | 36 | 23 | 26 | 20 | 15 | 16 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

```
#   Time      Action                                                                                  Message                                                                                              Duration / Fetch
10  15:29:07  SELECT * FROM events.events LIMIT 0, 1000                                                 1000 row(s) returned                                                                                 0.000 sec / 0.016 sec
11  15:29:10  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SC...  0.000 sec
12  15:29:34  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1046. No database selected Select the default DB to be used by double-clicking its name in the SC...  0.000 sec
13  15:29:54  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'occured_at' in 'field list'                        0.000 sec
14  15:30:17  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'firsteventsevents' in 'group statement'            0.000 sec
15  15:30:36  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  19 row(s) returned                                                                   1.359 sec / 0.000 sec
```

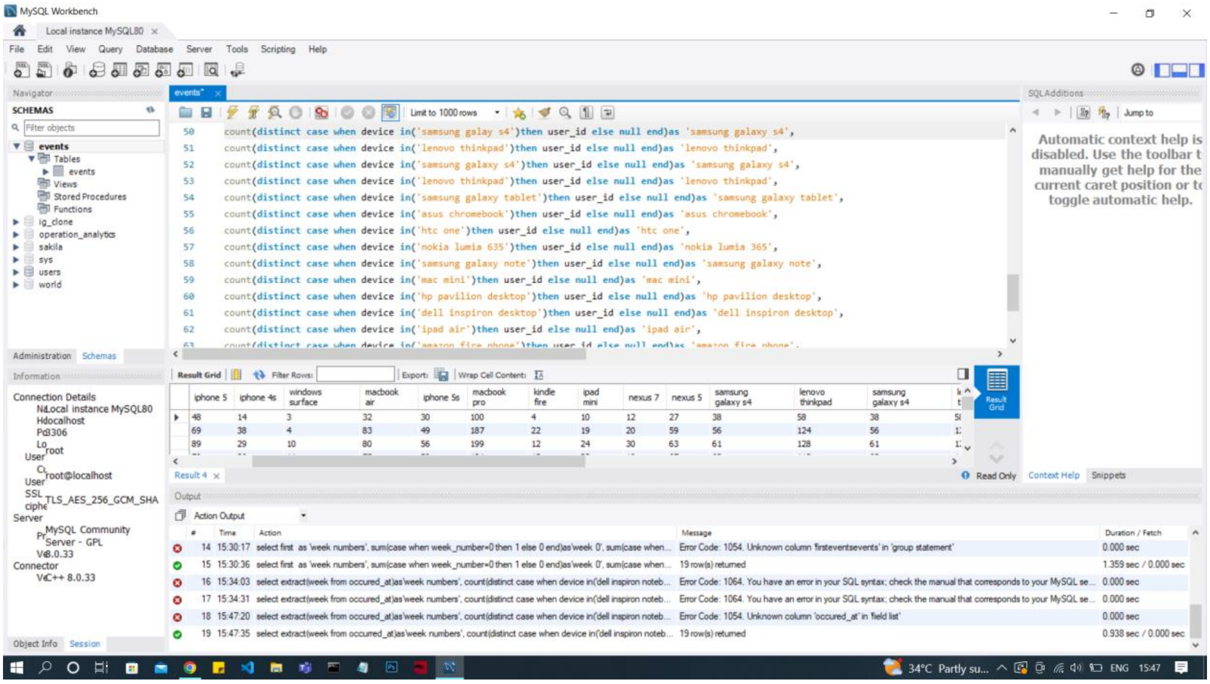
## 4.calculate the weekly engagement per device?



```sql
select extract(week from occurred_at)as'week numbers',
count(distinct case when device in('dell inspiron notebook')then user_id else null end)as 'dell inspiron notebook',
count(distinct case when device in('iphone 5')then user_id else null end)as 'iphone 5',
count(distinct case when device in('iphone 4s')then user_id else null end)as 'iphone 4s',
count(distinct case when device in('windows surface')then user_id else null end)as 'windows surface',
count(distinct case when device in('macbook air')then user_id else null end)as 'macbook air',
count(distinct case when device in('iphone 5s')then user_id else null end)as 'iphone 5s',
count(distinct case when device in('macbook pro')then user_id else null end)as 'macbook pro',
count(distinct case when device in('kindle fire')then user_id else null end)as 'kindle fire',
count(distinct case when device in('ipad mini')then user_id else null end)as 'ipad mini',
count(distinct case when device in('nexus 7')then user_id else null end)as 'nexus 7',
count(distinct case when device in('nexus 5')then user_id else null end)as 'nexus 5',
count(distinct case when device in('samsung galaxy s4')then user_id else null end)as 'samsung galaxy s4',
count(distinct case when device in('lenovo thinkpad')then user_id else null end)as 'lenovo thinkpad',
```

| iphone 5 | iphone 4s | windows surface | macbook air | iphone 5s | macbook pro | kindle fire | ipad mini | nexus 7 | nexus 5 | samsung galaxy s4 | lenovo thinkpad | samsung galaxy s4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | 14 | 3 | 32 | 30 | 100 | 4 | 10 | 12 | 27 | 38 | 58 | 38 |
| 69 | 38 | 4 | 83 | 49 | 187 | 22 | 19 | 20 | 59 | 56 | 124 | 56 |
| 89 | 29 | 10 | 80 | 56 | 199 | 12 | 24 | 30 | 63 | 61 | 128 | 61 |

```
#   Time      Action                                                                                  Message                                                                                              Duration / Fetch
14  15:30:17  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  Error Code: 1054. Unknown column 'firsteventsevents' in 'group statement'            0.000 sec
15  15:30:36  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...  19 row(s) returned                                                                   1.359 sec / 0.000 sec
16  15:34:03  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...  Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...  0.000 sec
17  15:34:31  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...  Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...  0.000 sec
18  15:47:20  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...  Error Code: 1054. Unknown column 'occured_at' in 'field list'                        0.000 sec
19  15:47:35  select extract(week from occurred_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...  19 row(s) returned                                                                   0.938 sec / 0.000 sec
```



Connection Details
Name: Local instance MySQL80
Host: localhost
Port: 3306
Login User: root
Current User: root@localhost
SSL cipher: TLS_AES_256_GCM_SHA
Server: MySQL Community Server - GPL
Version: 8.0.33
Connector Version: C++ 8.0.33

```sql
count(distinct case when device in('samsung galay s4')then user_id else null end)as 'samsung galaxy s4',
count(distinct case when device in('lenovo thinkpad')then user_id else null end)as 'lenovo thinkpad',
count(distinct case when device in('samsung galaxy s4')then user_id else null end)as 'samsung galaxy s4',
count(distinct case when device in('lenovo thinkpad')then user_id else null end)as 'lenovo thinkpad',
count(distinct case when device in('samsung galaxy tablet')then user_id else null end)as 'samsung galaxy tablet',
count(distinct case when device in('asus chromebook')then user_id else null end)as 'asus chromebook',
count(distinct case when device in('htc one')then user_id else null end)as 'htc one',
count(distinct case when device in('nokia lumia 635')then user_id else null end)as 'nokia lumia 365',
count(distinct case when device in('samsung galaxy note')then user_id else null end)as 'samsung galaxy note',
count(distinct case when device in('mac mini')then user_id else null end)as 'mac mini',
count(distinct case when device in('hp pavilion desktop')then user_id else null end)as 'hp pavilion desktop',
count(distinct case when device in('dell inspiron desktop')then user_id else null end)as 'dell inspiron desktop',
count(distinct case when device in('ipad air')then user_id else null end)as 'ipad air',
count(distinct case when device in('amazon fire phone')then user_id else null end)as 'amazon fire phone',
```

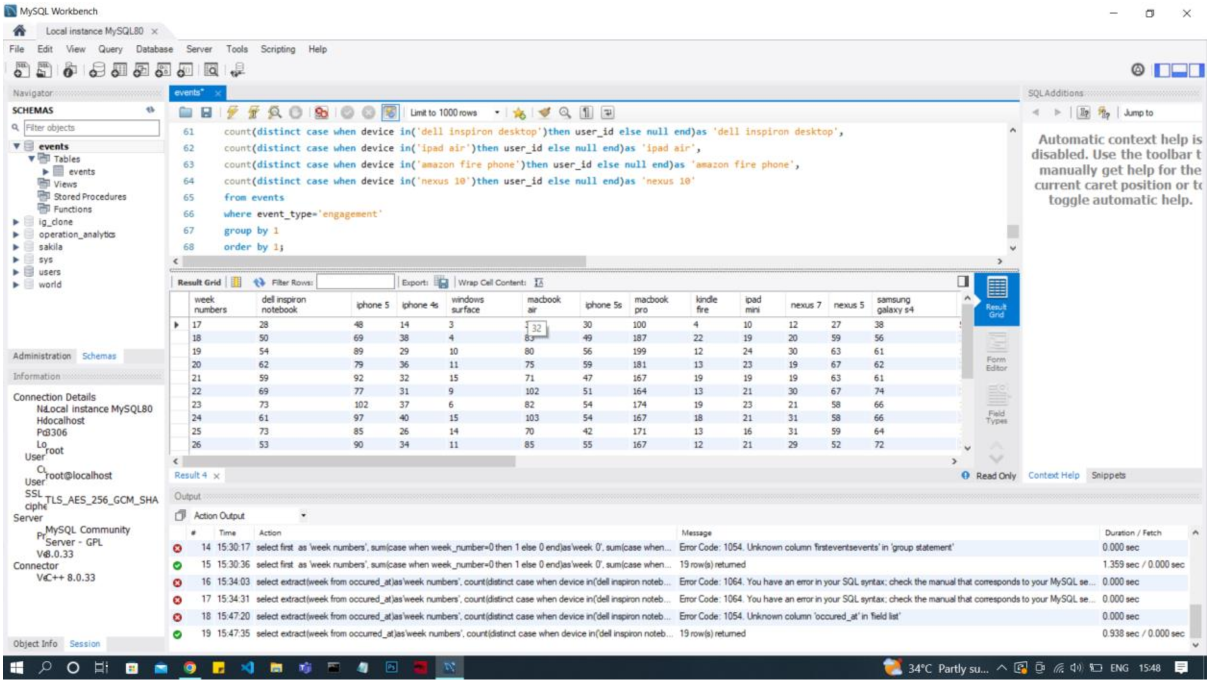
Result Grid | Filter Rows: | Export: | Wrap Cell Content:

| iphone 5 | iphone 4s | windows surface | macbook air | iphone 5s | macbook pro | kindle fire | ipad mini | nexus 7 | nexus 5 | samsung galaxy s4 | lenovo thinkpad | samsung galaxy s4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | 14 | 3 | 32 | 30 | 100 | 4 | 10 | 12 | 27 | 38 | 58 | 38 |
| 69 | 38 | 4 | 83 | 49 | 187 | 22 | 19 | 20 | 59 | 56 | 124 | 56 |
| 89 | 29 | 10 | 80 | 56 | 199 | 12 | 24 | 30 | 63 | 61 | 128 | 61 |

Result 4 | Read Only

Output
Action Output

```
#   Time      Action                                                                                              Message                                                                                         Duration / Fetch
14  15:30:17  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...   Error Code: 1054. Unknown column 'firsteventsevents' in 'group statement'                       0.000 sec
15  15:30:36  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...   19 row(s) returned                                                                              1.359 sec / 0.000 sec
16  15:34:03  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...   Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...   0.000 sec
17  15:34:31  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...   Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...   0.000 sec
18  15:47:20  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...   Error Code: 1054. Unknown column 'occured_at' in 'field list'                                   0.000 sec
19  15:47:35  select extract(week from occurred_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...  19 row(s) returned                                                                              0.938 sec / 0.000 sec
```



Connection Details
Name: Local instance MySQL80
Host: localhost
Port: 3306
Login User: root
Current User: root@localhost
SSL cipher: TLS_AES_256_GCM_SHA
Server: MySQL Community Server - GPL
Version: 8.0.33
Connector Version: C++ 8.0.33

```sql
count(distinct case when device in('dell inspiron desktop')then user_id else null end)as 'dell inspiron desktop',
count(distinct case when device in('ipad air')then user_id else null end)as 'ipad air',
count(distinct case when device in('amazon fire phone')then user_id else null end)as 'amazon fire phone',
count(distinct case when device in('nexus 10')then user_id else null end)as 'nexus 10'
from events
where event_type='engagement'
group by 1
order by 1;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

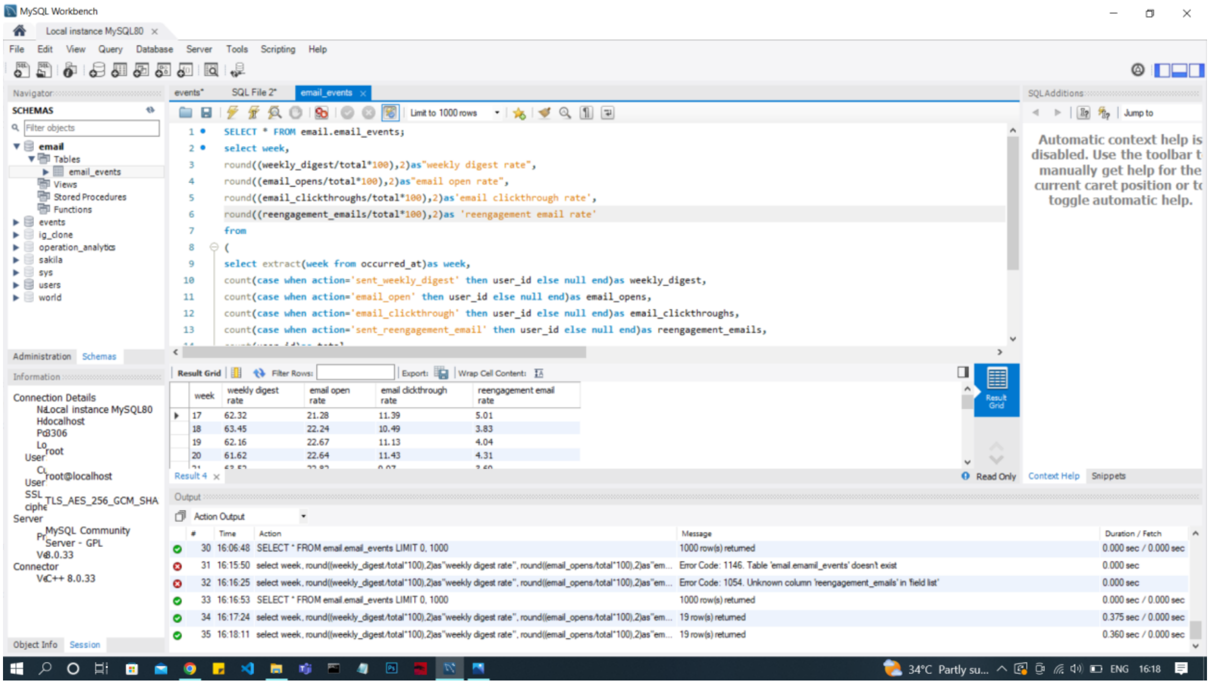
| week numbers | dell inspiron notebook | iphone 5 | iphone 4s | windows surface | macbook air | iphone 5s | macbook pro | kindle fire | ipad mini | nexus 7 | nexus 5 | samsung galaxy s4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 28 | 48 | 14 | 3 | 32 | 30 | 100 | 4 | 10 | 12 | 27 | 38 |
| 18 | 50 | 69 | 38 | 4 | 83 | 49 | 187 | 22 | 19 | 20 | 59 | 56 |
| 19 | 54 | 89 | 29 | 10 | 80 | 56 | 199 | 12 | 24 | 30 | 63 | 61 |
| 20 | 62 | 79 | 36 | 11 | 75 | 59 | 181 | 13 | 23 | 19 | 67 | 62 |
| 21 | 59 | 92 | 32 | 15 | 71 | 47 | 167 | 19 | 19 | 19 | 63 | 61 |
| 22 | 69 | 77 | 31 | 9 | 102 | 51 | 164 | 13 | 21 | 30 | 67 | 74 |
| 23 | 73 | 102 | 37 | 6 | 82 | 54 | 174 | 19 | 23 | 21 | 58 | 66 |
| 24 | 61 | 97 | 40 | 15 | 103 | 54 | 167 | 18 | 21 | 31 | 58 | 66 |
| 25 | 73 | 85 | 26 | 14 | 70 | 42 | 171 | 13 | 16 | 31 | 59 | 64 |
| 26 | 53 | 90 | 34 | 11 | 85 | 55 | 167 | 12 | 21 | 29 | 52 | 72 |

Result 4 | Read Only

Output
Action Output

```
#   Time      Action                                                                                              Message                                                                                         Duration / Fetch
14  15:30:17  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...   Error Code: 1054. Unknown column 'firsteventsevents' in 'group statement'                       0.000 sec
15  15:30:36  select first  as 'week numbers', sum(case when week_number=0 then 1 else 0 end)as'week 0', sum(case when...   19 row(s) returned                                                                              1.359 sec / 0.000 sec
16  15:34:03  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...   Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...   0.000 sec
17  15:34:31  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...   Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL se...   0.000 sec
18  15:47:20  select extract(week from occured_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...   Error Code: 1054. Unknown column 'occured_at' in 'field list'                                   0.000 sec
19  15:47:35  select extract(week from occurred_at)as'week numbers', count(distinct case when device in('dell inspiron noteb...  19 row(s) returned                                                                              0.938 sec / 0.000 sec
```

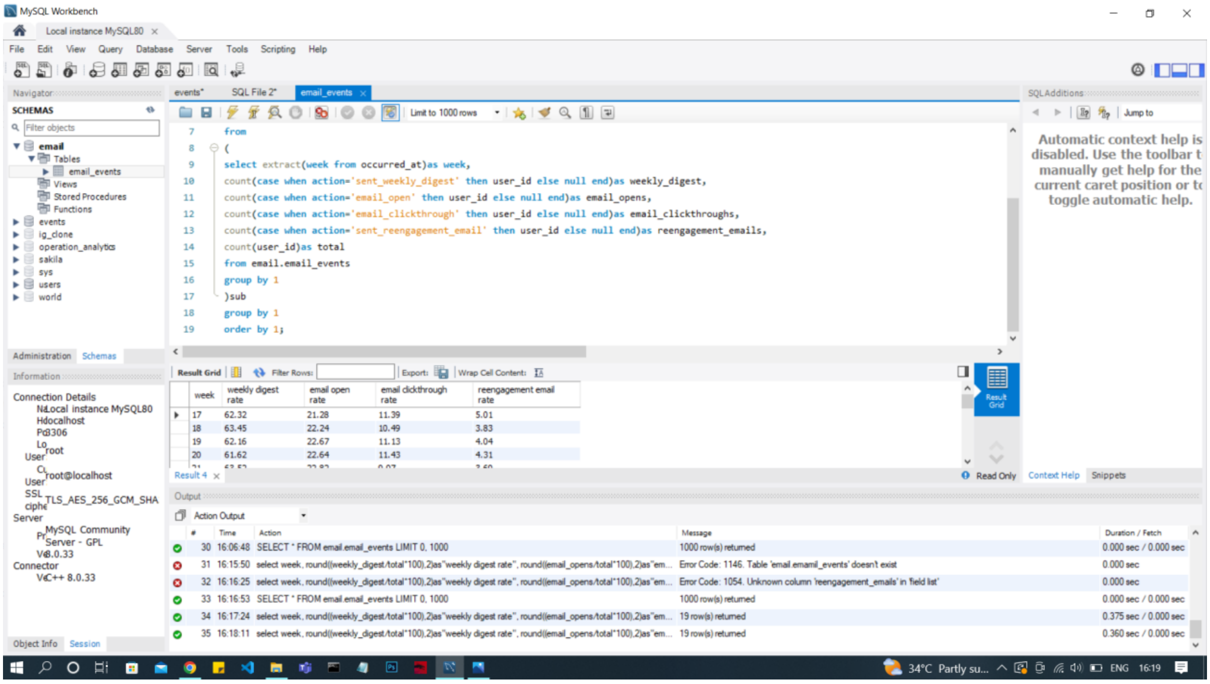
5.Calculate the email engagement metrics?



```
SELECT * FROM email.email_events;
select week,
round((weekly_digest/total*100),2)as"weekly digest rate",
round((email_opens/total*100),2)as"email open rate",
round((email_clickthroughs/total*100),2)as'email clickthrough rate',
round((reengagement_emails/total*100),2)as 'reengagement email rate'
from
(
select extract(week from occurred_at)as week,
count(case when action='sent_weekly_digest' then user_id else null end)as weekly_digest,
count(case when action='email_open' then user_id else null end)as email_opens,
count(case when action='email_clickthrough' then user_id else null end)as email_clickthroughs,
count(case when action='sent_reengagement_email' then user_id else null end)as reengagement_emails,
```

| week | weekly digest rate | email open rate | email clickthrough rate | reengagement email rate |
|---|---|---|---|---|
| 17 | 62.32 | 21.28 | 11.39 | 5.01 |
| 18 | 63.45 | 22.24 | 10.49 | 3.83 |
| 19 | 62.16 | 22.67 | 11.13 | 4.04 |
| 20 | 61.62 | 22.64 | 11.43 | 4.31 |

```
#   Time      Action                                                                               Message                                                          Duration / Fetch
30  16:06:48  SELECT * FROM email.email_events LIMIT 0, 1000                                       1000 row(s) returned                                             0.000 sec / 0.000 sec
31  16:15:50  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  Error Code: 1146. Table 'email.emamil_events' doesn't exist  0.000 sec
32  16:16:25  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  Error Code: 1054. Unknown column 'reengagement_emails' in 'field list'  0.000 sec
33  16:16:53  SELECT * FROM email.email_events LIMIT 0, 1000                                       1000 row(s) returned                                             0.000 sec / 0.000 sec
34  16:17:24  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  19 row(s) returned  0.375 sec / 0.000 sec
35  16:18:11  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  19 row(s) returned  0.360 sec / 0.000 sec
```



```
from
(
select extract(week from occurred_at)as week,
count(case when action='sent_weekly_digest' then user_id else null end)as weekly_digest,
count(case when action='email_open' then user_id else null end)as email_opens,
count(case when action='email_clickthrough' then user_id else null end)as email_clickthroughs,
count(case when action='sent_reengagement_email' then user_id else null end)as reengagement_emails,
count(user_id)as total
from email.email_events
group by 1
)sub
group by 1
order by 1;
```

| week | weekly digest rate | email open rate | email clickthrough rate | reengagement email rate |
|---|---|---|---|---|
| 17 | 62.32 | 21.28 | 11.39 | 5.01 |
| 18 | 63.45 | 22.24 | 10.49 | 3.83 |
| 19 | 62.16 | 22.67 | 11.13 | 4.04 |
| 20 | 61.62 | 22.64 | 11.43 | 4.31 |

```
#   Time      Action                                                                               Message                                                          Duration / Fetch
30  16:06:48  SELECT * FROM email.email_events LIMIT 0, 1000                                       1000 row(s) returned                                             0.000 sec / 0.000 sec
31  16:15:50  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  Error Code: 1146. Table 'email.emamil_events' doesn't exist  0.000 sec
32  16:16:25  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  Error Code: 1054. Unknown column 'reengagement_emails' in 'field list'  0.000 sec
33  16:16:53  SELECT * FROM email.email_events LIMIT 0, 1000                                       1000 row(s) returned                                             0.000 sec / 0.000 sec
34  16:17:24  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  19 row(s) returned  0.375 sec / 0.000 sec
35  16:18:11  select week, round((weekly_digest/total*100),2)as"weekly digest rate", round((email_opens/total*100),2)as"em...  19 row(s) returned  0.360 sec / 0.000 sec
```

This project operation analytics and investigating metric spike is bit tricky and bit challenging, this project improved my critical thinking, analytical skill and logical too. Whenever I got struck I approached the ask doubt form and some trainity videos for concept doubts.