PROJECT: Operation Analytics and Investigating Metric Spike

PROJECT DESCRIPTION:

Operation analytics and investigation metrics are tools and methodologies used to analyze and measure the effectiveness and efficiency of operational activities and investigations within an organization. These metrics provide insights into the performance, productivity, and success of various operations and investigations, enabling organizations to identify areas for improvement and make data-driven decisions.

In this project we are dealing with operation analytics and investigation metrics like Time Cycle measurement, Throughput, Language density, and duplicate values sorting.

APPROACH:

To work in an organizational based Project, certain areas are need to be studied thoroughly to understand the demand of the Project. Using Mysql Workbench Database is created under name Project_3. Case Study-1 table is created on Mysql using Workbench and all the queries are operated on Mysql 8.0 Command Line Prompt for ease of query power. For Case Study-2, tables given through the attachments in csv format are copied to VMware Ubuntu framework on Hadoop ecosystem and bulk loaded in to hive table and again migrated using Sqoop command from Local to Mysql database. **(A Detailed Methodology is mentioned on page no.2)**

TECH-STACK USED:

Used Mysql Workbench v8.0.31 for creating a new Database.
Used command prompt console for computation of data and deriving meaningful results.
Used VMware Ubuntu Framework: Hadoop 2.x ecosystem, hive 2.3 database for bulk loading.
Apache sqoop for data migration.

INSIGHTS:

In this project, these metrics is specified to the nature of the operations and investigations are being conducted in contrast to the goals of the organization. It essentially defines relevant metrics aligned with the organization's objectives and regularly monitor and analyze them to drive continuous improvement and informed decision-making.

RESULTS:

While working on this project, I came to know that the organizational exchange is occurred mostly concentrated in contrast of French speaking human resources management in film industry. Organizational based and Job activities centered decisions are provided and could be implemented using the data obtained flexible to their terms. In investigation metric spike the Project is subject to a mail portal which need to understand the user behavioral activities and understanding the engagement or usage from users using various segments of devices. These results may help the mail portal to improve the performance of the platform for user's dynamic experience and ease of operation.

Mentioned below are the Questions along with there Queries performed & Outputs received;

Table-2 events.csv LOADING METHODOLOGY (BULK LOADING):

STEP 1:

Copying csv file from windows to Ubuntu framework.

STEP 2: Entering into Hive console

```
hive> create database Project_3;
hive> use Project_3;
hive> create table device_usage(user_id int, occurred_at timestamp, event_type string, event_name string, location string, device string, user_type int)
        Row format delimited
        Fields terminated by ','
        lines terminated by '\n'
        stored as textfile;
hive>
hive> load data local inpath '/home/user/Table-2 events.csv' into table device_usage;
```

STEP 3: Entering to Mysql console

```
mysql> create database Project_3;
mysql> use Project_3;
mysql> create table device_usage(user_id int Primary Key,
                                  occurred_at timestamp,
                                  event_type varchar(255),
                                  event_name varchar(255),
                                  location varchar(255),
                                  device varchar(255),
                                  user_type int);
```

STEP 4: Entering to hdfs console

```
user:-$ hdfs dfs -copyToLocal /user/hive/warehouse/device_usage/
```

STEP 5: Migrating of data using Sqoop command

```
user:-$ sqoop export --connect jdbc:mysql://localhost:3306 /Project_3 –username user –password user --table device_usage -m 4 --export-dir /home/user/device_usage
```

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CASE STUDY 1:   **JOB DATA: -**

A. Number of jobs reviewed: Amount of jobs reviewed over time.

OBJECTIVE: Calculate the number of jobs reviewed per hour per day for November 2020?

ANS:-
Mysql>
select

Dates_of_Nov,

no_of_Reviewed as Jobs_Reviewed

from (

      select

      ds as Dates_of_Nov,

      round((count(job_id)*3600)/sum(time_spent)) as no_of_Reviewed

      from job_data

      where month(ds) = 11

      group by ds

      order by ds asc

)s;

OUTPUT:-

Dates_of_Nov	Jobs_Reviewed
2020-11-25	80
2020-11-26	64
2020-11-27	35
2020-11-28	218
2020-11-29	180
2020-11-30	180

NOTE:-

In this query the number of Jobs reviewed per hour per day are ordered by dates mentioned in the column ds in ascending order accordingly.
Further on to obtain the data based on maximum numbers of Jobs Reviewed we can use order by clause on Jobs_Reviewed similar to that of Dates_of_Nov.

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

OBJECTIVE: 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?

ANS:-

SELECT

ds AS DATE,

ROUND(COUNT(event)/SUM(time_spent),3) AS Weekly_Avg_Throughput

FROM job_data

GROUP BY ds

ORDER BY ds;

OUTPUT:-

```
+----------------+-----------------------------------+
|     DATE       | Weekly_Avg_Throughput |
+----------------+-----------------------------------+
| 2020-11-25 |          0.022              |
| 2020-11-26 |          0.018              |
| 2020-11-27 |          0.010              |
| 2020-11-28 |          0.061              |
| 2020-11-29 |          0.050              |
| 2020-11-30 |          0.050              |
+----------------+-----------------------------------+
```

NOTE:-

7-day Rolling Average is Useful for identifying long-term trends and patterns while providing a more stable metric. It can be particularly helpful when there are significant variations in throughput on different days of the week. Whereas daily metric is useful for analyzing specific daily anomalies. In a wider range of contrast Daily metric anomalies or changes are not reflected through a fair pattern.

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

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

ANS:-

```
select
language,
round((1000* num_jobs/total_jobs)/0.6,2) as Percentage_Contribution
from
        (
        select
        language,
        count(job_id) as num_jobs
        from job_data
        group by language
        )s1
cross join
        (
        select
        sum(job_id) as total_jobs
        from job_data
        )s2;
```

OUTPUT:-

language	Percentage_Contribution
English	9.92
Arabic	9.92
Persian	29.76
Hindi	9.92
French	9.92
Italian	9.92

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

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

ANS:-

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

OUTPUT:-

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

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CASE STUDY 2:   INVESTIGATING METRIC SPIKE: -

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

OBJECTIVE: Calculate the weekly user engagement?

ANS:-

```
select
extract(week from occurred_at) as Week_No,
count(distinct user_id) as User_Engagement
from email
group by Week_No;
```

OUTPUT:-

```
+--------------+-------------------------+
| Week_No | User_Engagement |
+--------------+-------------------------+
|    17    |       981       |
|    18    |      2714       |
|    19    |      2787       |
|    20    |      2874       |
|    21    |      2926       |
|    22    |      3029       |
|    23    |      3134       |
|    24    |      3254       |
|    25    |      3343       |
|    26    |      3439       |
|    27    |      3543       |
|    28    |      3641       |
|    29    |      3734       |
|    30    |      3866       |
|    31    |      3950       |
|    32    |      4023       |
|    33    |      4200       |
|    34    |      4294       |
|    35    |       48        |
+---------------+-------------------------+
```

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

OBJECTIVE: Calculate the user growth for product?

ANS:-

```
select
MONTH,
ACTIVE_USERS,
round(((ACTIVE_USERS/lag(ACTIVE_USERS, 1) over (ORDER BY MONTH) - 1)*100), 2) as
"GROWTH_RATIO_IN_%"
from
        (
        select extract(month from created_at) as MONTH,
        count(activated_at) as ACTIVE_USERS
        from users
        where activated_at is not null
        group by 1
        order by 1
        )s;
```

OUTPUT:-

MONTH	ACTIVE_USERS	GROWTH_RATIO_IN_%
1	712	NULL
2	685	-3.79
3	765	11.68
4	907	18.56
5	993	9.48
6	1086	9.37
7	1281	17.96
8	1347	5.15
9	330	-75.50
10	390	18.18
11	399	2.31
12	486	21.80

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

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

ANS:-

```
select
SIGN_UP_DURATION,
RETENTED_COHORT,
round(((RETENTED_COHORT / first_value(RETENTED_COHORT) over (order by SIGN_UP_DURATION))*100),2) as
RETENTION_PERCENT
from(
        select
        timestampdiff(week,a.activated_at,b.occurred_at) as SIGN_UP_DURATION,
        count(distinct a.user_id) as RETENTED_COHORT
        from
                (select
                user_id,
                activated_at
                from users
                where state='active' and activated_at is not null
                group by 1) a
        inner join
                (select
                user_id,
                occurred_at
                from email )b
                on a.user_id=b.user_id
                group by 1) c;
```

OUTPUT:-

SIGN_UP_DURATION	RETENTED_COHORT	RETENTION_PERCENT
0	3679	100.00
1	1568	42.62
2	1518	41.26
3	1501	40.80
4	1483	40.31
5	1444	39.25
6	1409	38.30
7	1386	37.67
8	1344	36.53
9	1311	35.63
10	1264	34.36
11	1232	33.49
12	1199	32.59
13	1176	31.97
14	1141	31.01
15	1124	30.55
16	1117	30.36
17	1100	29.90
18	1074	29.19
19	1055	28.68
20	1022	27.78
21	987	26.83
22	964	26.20
23	945	25.69
24	907	24.65
25	886	24.08
26	881	23.95

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27	855	23.24
28	820	22.29
29	795	21.61
30	760	20.66
31	760	20.66
32	739	20.09
33	722	19.62
34	699	19.00
35	680	18.48
36	672	18.27
37	657	17.86
38	637	17.31
39	633	17.21
40	620	16.85
41	599	16.28
42	587	15.96
43	568	15.44
44	543	14.76
45	529	14.38
46	520	14.13
47	501	13.62
48	479	13.02
49	456	12.39
50	446	12.12
51	444	12.07
52	449	12.20
53	441	11.99
54	415	11.28
55	401	10.90
56	390	10.60
57	380	10.33
58	366	9.95
59	353	9.59
60	351	9.54
61	347	9.43
62	344	9.35
63	339	9.21
64	329	8.94
65	336	9.13
66	346	9.40
67	338	9.19
68	325	8.83
69	301	8.18
70	277	7.53
71	258	7.01
72	244	6.63
73	226	6.14
74	211	5.74
75	192	5.22
76	179	4.87
77	156	4.24
78	143	3.89
79	125	3.40
80	107	2.91
81	85	2.31
82	69	1.88
83	45	1.22
84	27	0.73
85	11	0.30
86	3	0.08

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

OBJECTIVE: Calculate the weekly engagement per device?

ANS:-
```
  select
  distinct device_name as DEVICE,
  round(avg(no_of_users)) as WEEKLY_USERS,
  round(avg(usage_duration),1) as WEEKLY_USER_ENGAGEMENT,
  event_name as ACTIVITIES
  from
  (
        select week(occurred_at) as week,
        device as device_name ,
        count(distinct user_id) as no_of_users,
        count(device) as usage_duration,
    event_name
        from device_usage
        group by 1,2,5
        order by 1) a
  group by 1,4
order by 2 desc,3 desc;
```

OUTPUT:-

DEVICE	WEEKLY_USERS	WEEKLY_USER_ENGAGEMENT	ACTIVITIES
macbook pro	20	20.3	complete_signup
lenovo thinkpad	14	13.7	complete_signup
lenovo thinkpad	13	13.5	login
macbook pro	13	13.0	login
macbook pro	12	31.0	home_page
lenovo thinkpad	12	30.3	home_page
macbook pro	11	20.3	like_message
lenovo thinkpad	10	16.3	like_message
macbook pro	9	14.7	view_inbox
lenovo thinkpad	8	13.8	view_inbox
lenovo thinkpad	8	12.5	send_message
macbook pro	8	11.5	send_message
macbook air	8	8.8	login
iphone 5	8	8.0	complete_signup
macbook air	7	20.0	home_page
macbook pro	7	15.3	search_autocomplete
macbook air	7	13.8	view_inbox
macbook air	7	7.3	complete_signup
iphone 5s	7	7.0	login
nexus 5	7	7.0	complete_signup
samsung galaxy s4	7	7.0	complete_signup
nexus 5	7	6.5	login
ipad air	6	14.3	home_page
iphone 5s	6	13.3	home_page
nexus 5	6	13.0	home_page
macbook air	6	12.8	like_message
ipad air	6	12.0	like_message
macbook air	6	10.7	send_message
iphone 5	6	6.6	login
ipad air	6	6.0	login
iphone 5s	6	6.0	complete_signup
samsung galaxy s4	6	6.0	login
dell inspiron notebook	6	5.7	complete_signup
ipad air	6	5.7	complete_signup

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```
| iphone 5               |      5 |      14.0 | home_page         |
| samsung galaxy s4      |      5 |      13.8 | home_page         |
| iphone 5s              |      5 |       9.3 | like_message      |
| samsung galaxy s4      |      5 |       9.0 | like_message      |
| nexus 5                |      5 |       7.5 | like_message      |
| dell inspiron notebook |      5 |       4.6 | login             |
| lenovo thinkpad        |      4 |      10.0 | search_autocomplete |
| iphone 5               |      4 |       9.6 | like_message      |
| iphone 5               |      4 |       8.6 | view_inbox        |
| dell inspiron notebook |      4 |       8.4 | home_page         |
| ipad air               |      4 |       7.3 | view_inbox        |
| iphone 5s              |      4 |       7.3 | view_inbox        |
| nexus 5                |      4 |       6.5 | view_inbox        |
| samsung galaxy s4      |      4 |       5.4 | send_message      |
| iphone 5s              |      4 |       5.0 | send_message      |
| dell inspiron notebook |      4 |       4.8 | view_inbox        |
| nexus 7                |      4 |       3.8 | login             |
| acer aspire notebook   |      4 |       3.7 | login             |
| ipad mini              |      4 |       3.7 | login             |
| ipad mini              |      4 |       3.5 | complete_signup   |
| kindle fire            |      4 |       3.5 | login             |
| ipad mini              |      3 |      10.7 | home_page         |
| hp pavilion desktop    |      3 |       8.7 | home_page         |
| samsung galaxy s4      |      3 |       8.0 | view_inbox        |
| nexus 5                |      3 |       8.0 | search_run        |
| nexus 7                |      3 |       7.3 | home_page         |
| ipad mini              |      3 |       6.3 | view_inbox        |
| ipad mini              |      3 |       6.0 | like_message      |
| kindle fire            |      3 |       6.0 | home_page         |
| acer aspire notebook   |      3 |       5.7 | home_page         |
| dell inspiron notebook |      3 |       5.4 | like_message      |
| nexus 7                |      3 |       5.3 | view_inbox        |
| ipad air               |      3 |       5.0 | send_message      |
| iphone 5               |      3 |       5.0 | send_message      |
| nexus 7                |      3 |       5.0 | like_message      |
| acer aspire notebook   |      3 |       4.7 | view_inbox        |
| ipad mini              |      3 |       4.7 | send_message      |
| nexus 7                |      3 |       4.5 | search_autocomplete |
| nexus 5                |      3 |       4.3 | send_message      |
| samsung galaxy note    |      3 |       4.3 | home_page         |
| dell inspiron notebook |      3 |       4.3 | send_message      |
| hp pavilion desktop    |      3 |       4.0 | send_message      |
| nexus 7                |      3 |       4.0 | send_message      |
| kindle fire            |      3 |       4.0 | view_inbox        |
| kindle fire            |      3 |       3.5 | like_message      |
| nexus 7                |      3 |       3.3 | complete_signup   |
| acer aspire desktop    |      3 |       3.0 | complete_signup   |
| hp pavilion desktop    |      3 |       3.0 | complete_signup   |
| hp pavilion desktop    |      3 |       3.0 | login             |
| kindle fire            |      3 |       3.0 | complete_signup   |
| asus chromebook        |      3 |       2.7 | complete_signup   |
| iphone 4s              |      3 |       2.7 | complete_signup   |
| samsung galaxy note    |      3 |       2.7 | login             |
| macbook air            |      2 |       7.5 | search_run        |
| iphone 5s              |      2 |       6.0 | search_run        |
| dell inspiron notebook |      2 |       5.7 | search_autocomplete |
| amazon fire phone      |      2 |       5.5 | like_message      |
| mac mini               |      2 |       5.5 | like_message      |
| iphone 4s              |      2 |       5.4 | home_page         |
| acer aspire notebook   |      2 |       5.0 | search_autocomplete |
| ipad mini              |      2 |       5.0 | search_run        |
| nokia lumia 635        |      2 |       5.0 | search_autocomplete |
| amazon fire phone      |      2 |       4.5 | view_inbox        |
| asus chromebook        |      2 |       4.4 | home_page         |
| dell inspiron desktop  |      2 |       4.3 | home_page         |
| hp pavilion desktop    |      2 |       4.3 | view_inbox        |
| iphone 4s              |      2 |       4.3 | like_message      |
| macbook air            |      2 |       4.3 | search_autocomplete |
| dell inspiron desktop  |      2 |       4.0 | like_message      |
```

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```
| hp pavilion desktop  |      2 |        4.0 | like_message      |
| htc one        |    2 |   4.0 | home_page      |
| nokia lumia 635    |     2 |     4.0 | home_page       |
| mac mini      |    2 |   4.0 | send_message      |
| iphone 5       |    2 |    3.8 | search_autocomplete  |
| windows surface    |    2 |    3.7 | home_page       |
| acer aspire desktop  |    2 |    3.5 | like_message      |
| mac mini      |    2 |   3.5 | view_inbox      |
| samsumg galaxy tablet |     2 |      3.5 | home_page       |
| iphone 4s      |    2 |   3.4 | view_inbox      |
| asus chromebook    |    2 |    3.3 | view_inbox       |
| dell inspiron desktop |    2 |    3.3 | view_inbox       |
| macbook pro      |    2 |    3.3 | search_run       |
| acer aspire desktop  |    2 |    3.0 | home_page       |
| acer aspire notebook  |    2 |     3.0 | like_message      |
| asus chromebook    |    2 |     3.0 | like_message      |
| ipad air      |   2 |   3.0 | search_autocomplete  |
| ipad mini      |   2 |   3.0 | search_autocomplete  |
| nokia lumia 635    |    2 |     3.0 | send_message      |
| samsung galaxy s4   |    2 |     3.0 | search_autocomplete  |
| acer aspire desktop  |    2 |     3.0 | search_autocomplete  |
| asus chromebook    |    2 |     3.0 | send_message      |
| htc one        |   2 |   3.0 | search_autocomplete  |
| nexus 5       |   2 |   3.0 | search_click_result_5 |
| windows surface    |    2 |    3.0 | send_message      |
| iphone 5s      |    2 |   2.7 | search_autocomplete  |
| nokia lumia 635    |    2 |    2.7 | view_inbox      |
| iphone 4s      |    2 |   2.5 | send_message      |
| htc one        |   2 |   2.5 | view_inbox      |
| asus chromebook    |    2 |    2.4 | login        |
| acer aspire desktop  |    2 |    2.3 | login        |
| acer aspire notebook  |    2 |     2.3 | complete_signup    |
| htc one        |   2 |  2.3 | login        |
| iphone 4s      |    2 |   2.3 | login        |
| nokia lumia 635    |    2 |     2.3 | complete_signup    |
| samsung galaxy note  |    2 |     2.3 | complete_signup    |
| samsung galaxy note  |    2 |     2.3 | like_message      |
| acer aspire desktop  |    2 |    2.0 | view_inbox      |
| dell inspiron desktop |    2 |    2.0 | login        |
| hp pavilion desktop  |    2 |    2.0 | search_autocomplete  |
| htc one        |   2 |   2.0 | complete_signup     |
| nokia lumia 635    |    2 |    2.0 | login        |
| samsumg galaxy tablet |     2 |     2.0 | login        |
| samsung galaxy note  |    2 |    2.0 | send_message      |
| samsung galaxy note  |    2 |    2.0 | view_inbox      |
| asus chromebook    |    2 |    2.0 | search_autocomplete  |
| nexus 10       |    2 |   2.0 | complete_signup    |
| nexus 10       |    2 |   2.0 | home_page       |
| nexus 10       |    2 |   2.0 | like_message      |
| nexus 10       |    2 |   2.0 | login        |
| nexus 5       |    2 |   2.0 | search_autocomplete  |
| windows surface    |    2 |    2.0 | login        |
| nexus 5       |    2 |   2.0 | search_click_result_4 |
| dell inspiron desktop |    2 |    1.7 | complete_signup     |
| samsumg galaxy tablet |     2 |     1.5 | view_inbox       |
| kindle fire      |   2 |   1.5 | send_message      |
| windows surface    |    2 |    1.5 | complete_signup     |
| samsung galaxy note  |    1 |     10.0 | search_run      |
| mac mini      |   1 |  5.7 | home_page      |
| iphone 5       |   1 |   5.5 | search_run      |
| amazon fire phone   |    1 |    5.3 | home_page       |
| amazon fire phone   |    1 |    5.0 | search_autocomplete  |
| samsumg galaxy tablet |     1 |     4.0 | search_autocomplete  |
| lenovo thinkpad    |    1 |   3.5 | search_run      |
| asus chromebook    |    1 |    3.5 | search_run      |
| dell inspiron notebook |     1 |   3.0 | search_run       |
| nexus 7       |   1 |  3.0 | search_run       |
| asus chromebook    |    1 |     3.0 | search_click_result_3 |
| windows surface    |    1 |    3.0 | view_inbox      |
```

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```
| mac mini              |      1 |          3.0 | search_run           |
| nokia lumia 635       |         1 |       2.7 | like_message         |
| acer aspire notebook  |         1 |         2.3 | send_message         |
| windows surface       |      1 |          2.3 | like_message         |
| amazon fire phone     |      1 |          2.0 | send_message         |
| dell inspiron desktop |      1 |          2.0 | send_message         |
| samsumg galaxy tablet |         1 |       2.0 | like_message         |
| samsumg galaxy tablet |         1 |       2.0 | send_message         |
| samsung galaxy s4     |      1 |          2.0 | search_run           |
| dell inspiron notebook |        1 |          2.0 | search_click_result_3 |
| dell inspiron notebook |        1 |          2.0 | search_click_result_5 |
| dell inspiron notebook |        1 |          2.0 | search_click_result_8 |
| iphone 5              |      1 |       2.0 | search_click_result_1 |
| iphone 5              |      1 |       2.0 | search_click_result_4 |
| iphone 5              |      1 |       2.0 | search_click_result_9 |
| nexus 5               |      1 |       2.0 | search_click_result_6 |
| iphone 4s             |      1 |       1.8 | search_autocomplete  |
| samsung galaxy note   |         1 |          1.5 | search_autocomplete  |
| amazon fire phone     |      1 |          1.3 | complete_signup      |
| amazon fire phone     |      1 |          1.3 | login                |
| dell inspiron desktop |      1 |          1.3 | search_autocomplete  |
| htc one               |      1 |       1.3 | send_message         |
| mac mini              |      1 |       1.3 | login                |
| mac mini              |      1 |       1.0 | complete_signup      |
| samsumg galaxy tablet |         1 |          1.0 | complete_signup      |
| acer aspire desktop   |      1 |          1.0 | send_message         |
| asus chromebook       |      1 |          1.0 | search_click_result_1 |
| asus chromebook       |      1 |          1.0 | search_click_result_4 |
| asus chromebook       |      1 |          1.0 | search_click_result_5 |
| asus chromebook       |      1 |          1.0 | search_click_result_6 |
| asus chromebook       |      1 |          1.0 | search_click_result_7 |
| asus chromebook       |      1 |          1.0 | search_click_result_8 |
| asus chromebook       |      1 |          1.0 | search_click_result_9 |
| htc one               |      1 |       1.0 | like_message         |
| ipad mini             |      1 |       1.0 | search_click_result_1 |
| ipad mini             |      1 |       1.0 | search_click_result_3 |
| ipad mini             |      1 |       1.0 | search_click_result_7 |
| ipad mini             |      1 |       1.0 | search_click_result_8 |
| iphone 5s             |      1 |       1.0 | search_click_result_3 |
| iphone 5s             |      1 |       1.0 | search_click_result_6 |
| iphone 5s             |      1 |       1.0 | search_click_result_8 |
| iphone 5s             |      1 |       1.0 | search_click_result_9 |
| lenovo thinkpad       |      1 |          1.0 | search_click_result_1 |
| lenovo thinkpad       |      1 |          1.0 | search_click_result_2 |
| lenovo thinkpad       |      1 |          1.0 | search_click_result_3 |
| lenovo thinkpad       |      1 |          1.0 | search_click_result_6 |
| macbook air           |      1 |       1.0 | search_click_result_10 |
| nexus 10              |      1 |       1.0 | view_inbox           |
| samsung galaxy s4     |      1 |          1.0 | search_click_result_2 |
| samsung galaxy s4     |      1 |          1.0 | search_click_result_5 |
| samsung galaxy s4     |      1 |          1.0 | search_click_result_6 |
| samsung galaxy s4     |      1 |          1.0 | search_click_result_8 |
| dell inspiron notebook |        1 |          1.0 | search_click_result_10 |
| dell inspiron notebook |        1 |          1.0 | search_click_result_4 |
| dell inspiron notebook |        1 |          1.0 | search_click_result_7 |
| dell inspiron notebook |        1 |          1.0 | search_click_result_9 |
| ipad air              |      1 |       1.0 | search_run           |
| iphone 5              |      1 |       1.0 | search_click_result_5 |
| iphone 5              |      1 |       1.0 | search_click_result_7 |
| mac mini              |      1 |       1.0 | search_autocomplete  |
| mac mini              |      1 |       1.0 | search_click_result_10 |
| nexus 5               |      1 |       1.0 | search_click_result_1 |
| nexus 5               |      1 |       1.0 | search_click_result_2 |
| nexus 5               |      1 |       1.0 | search_click_result_3 |
| nexus 5               |      1 |       1.0 | search_click_result_7 |
| nexus 5               |      1 |       1.0 | search_click_result_8 |
| nexus 5               |      1 |       1.0 | search_click_result_9 |
| windows surface       |      1 |          1.0 | search_autocomplete  |
+----------------------+-------------+----------------------+----------------------+
```

15 Operation Analytics and Investigating Metric Spike

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E.   Email Engagement: Users engaging with the email service.

OBJECTIVE: Calculate the email engagement metrics?

ANS:-

```
SELECT
WEEK,
ROUND((weekly_digest/total*100)) AS "Weekly Digest Activity",
ROUND((email_opened/total*100)) AS "Email Open Activity",
ROUND((email_clickthrough/total*100)) AS "Email Clickthrough Activity",
ROUND((reengagement_email/total*100)) AS "Reengagement Email Activity"
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_opened,
     COUNT(CASE WHEN action = 'email_clickthrough' THEN user_id ELSE NULL END) AS
     email_clickthrough,
     COUNT(CASE WHEN action = 'sent_reengagement_email' THEN user_id ELSE NULL END)
     AS reengagement_email,
     COUNT(user_id) AS total
     FROM email
     GROUP BY 1
     ) s
GROUP BY 1
ORDER BY 1;
```

OUTPUT:-

WEEK	Weekly Digest Activity	Email Open Activity	Email Clickthrough Activity	Reengagement Email Activity
17	62	21	11	5
18	63	22	10	4
19	62	23	11	4
20	62	23	11	4
21	64	23	10	4
22	64	22	11	4
23	62	22	11	4
24	62	23	11	4
25	64	22	11	4
26	63	22	11	4
27	62	22	11	4
28	63	22	11	4
29	64	22	11	4
30	62	23	11	4
31	65	23	8	4
32	67	23	7	3
33	65	23	8	4
34	64	24	8	4
35	0	32	30	38

-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x---END-OF-DOCUMENT---x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-