Operation Analytics and Investigating Metric Spike

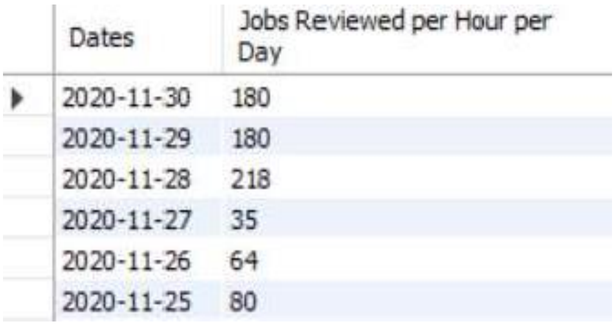
Project Description

This project focuses on analyzing the data which is provided by company. My task is to derive insights and answer the questions asked by different departments. So that these insights are then used by **ops team**, **support team**, **marketing team**, etc 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.

i. **Case Study 1 (Job Data)**

Number of jobs reviewed:

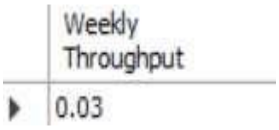
```
SELECT ds AS Dates,
ROUND((COUNT(job_id)/SUM(time_spent))*3600) AS
"Jobs Reviewed per Hour per Day"
FROM  prafull.`sql project-1 table`
WHERE ds BETWEEN '2020-11-01' AND '2020-11-30'
GROUP BY ds;
```



Dates	Jobs Reviewed per Hour per Day
2020-11-30	180
2020-11-29	180
2020-11-28	218
2020-11-27	35
2020-11-26	64
2020-11-25	80

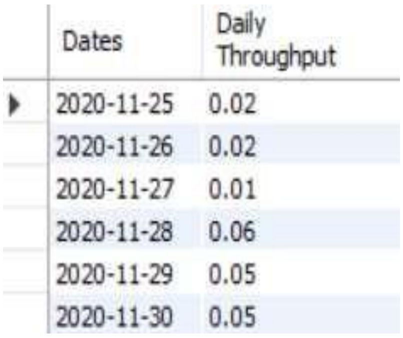
Throughput:

```
SELECT
ROUND((COUNT(event)/SUM(time_spent)),2)    AS    "Weekly
Throughput"
FROM
prafull.`sql project-1 table`;
```



Weekly Throughput
0.03

```
SELECT
ds AS date,
ROUND((COUNT(event)/SUM(time_spent)),2) AS 'Daily Throughput'
FROM
prafull.`sql project-1 table`
GROUP BY date
ORDER BY date;
```

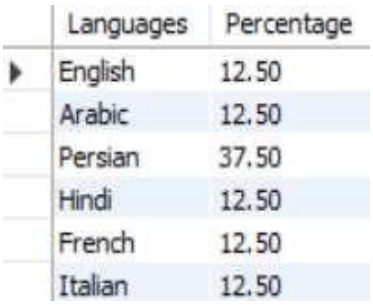


Dates	Daily Throughput
2020-11-25	0.02
2020-11-26	0.02
2020-11-27	0.01
2020-11-28	0.06
2020-11-29	0.05
2020-11-30	0.05

Metrics will always go up and down on a weekly and daily basis. . You’ll get numbers faster every day or minute if you want. As a result, rolling metrics are superb at showing if your metrics are trending up or down on a daily level.

Percentage share of each language**:**

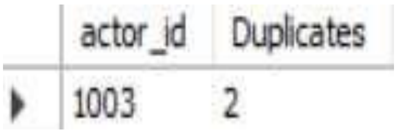
```
SELECT language AS Languages,
ROUND(100 * COUNT(*)/total, 2) AS Percentage
FROM prafull.`sql project-1 table`
JOIN (SELECT COUNT(*) AS total FROM prafull.`sql project-1 table`) sub
GROUP BY language;
```



Languages	Percentage
English	12.50
Arabic	12.50
Persian	37.50
Hindi	12.50
French	12.50
Italian	12.50

Duplicate rows**:**

```
SELECT actor_id,
COUNT(*) AS Duplicates
FROM prafull.`sql project-1 table`
GROUP BY actor_id
HAVING COUNT(*) > 1;
```

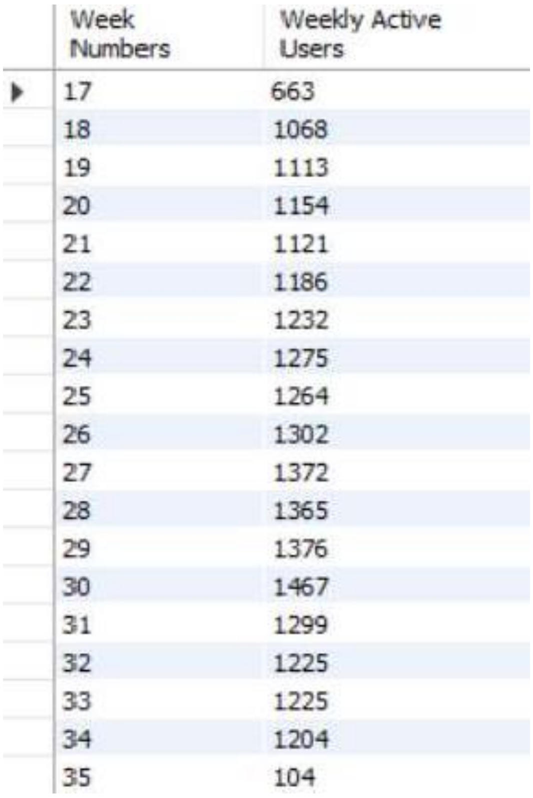


actor_id	Duplicates
1003	2

ii. **Case Study 2 (Investigating metric spike):**

User Engagement:

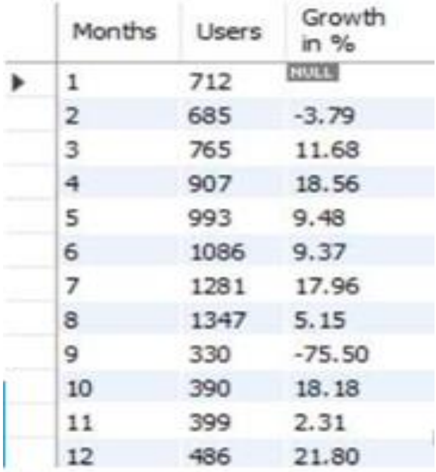
```
SELECT
EXTRACT(WEEK FROM occurred_at) AS "Week Numbers",
COUNT(DISTINCT user_id) AS "Weekly Active Users"
FROM events
WHERE event_type = 'engagement'
GROUP BY 1;
```



Week Numbers	Weekly Active Users
17	663
18	1068
19	1113
20	1154
21	1121
22	1186
23	1232
24	1275
25	1264
26	1302
27	1372
28	1365
29	1376
30	1467
31	1299
32	1225
33	1225
34	1204
35	104

User Growth**:**

```
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
WHERE activated_at NOT IN("")
GROUP BY 1
ORDER BY 1
) sub;
```

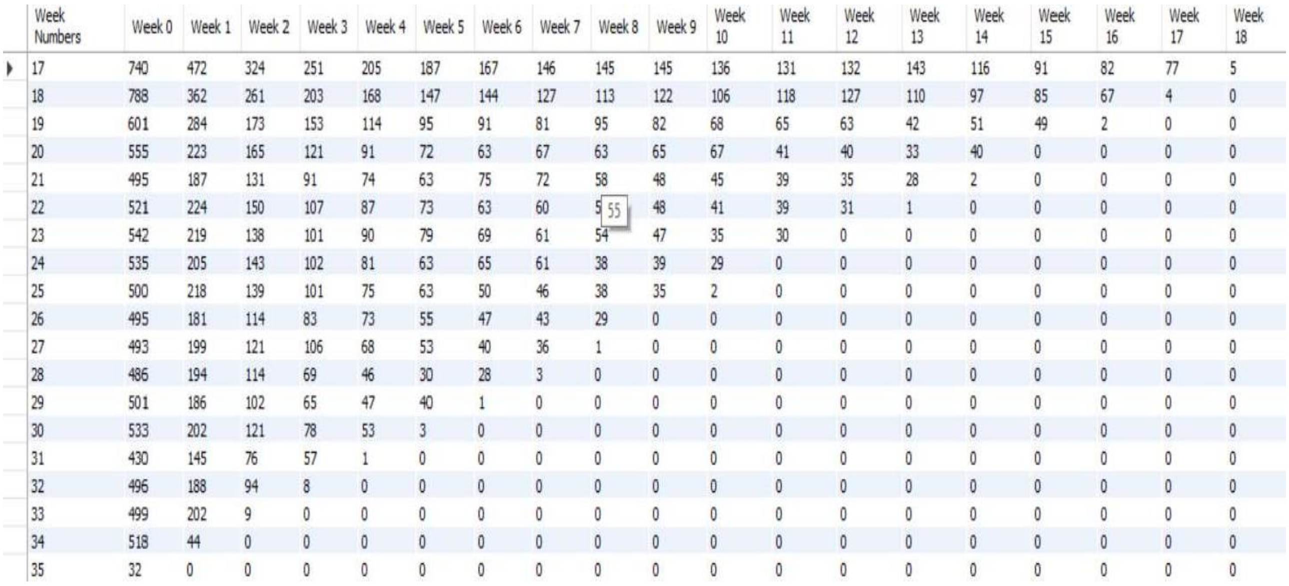


Months	Users	Growth in %
1	712	NULL
2	685	-3.79
3	765	11.68
4	907	18.56
5	993	9.48
6	1086	9.37
7	1281	17.96
8	1347	5.15
9	330	-75.50
10	390	18.18
11	399	2.31
12	486	21.80

Weekly Retention:

```
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",
SUM(CASE WHEN week_number = 13 THEN 1 ELSE 0 END)
AS "Week 13",
SUM(CASE WHEN week_number = 14 THEN 1 ELSE 0 END)
AS "Week 14",
SUM(CASE WHEN week_number = 15 THEN 1 ELSE 0 END)
AS "Week 15",
SUM(CASE WHEN week_number = 16 THEN 1 ELSE 0 END)
AS "Week 16",
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;
```

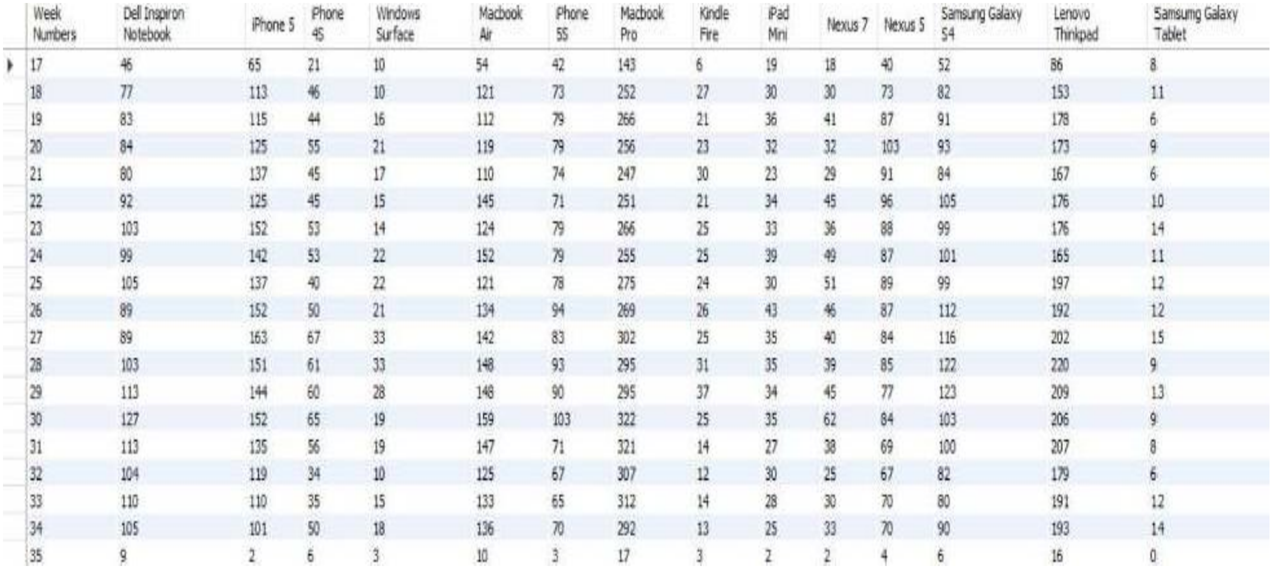


Week Numbers	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18
17	740	472	324	251	205	187	167	146	145	145	136	131	132	143	116	91	82	77	5
18	788	362	261	203	168	147	144	127	113	122	106	118	127	110	97	85	67	4	0
19	601	284	173	153	114	95	91	81	95	82	68	65	63	42	51	49	2	0	0
20	555	223	165	121	91	72	63	67	63	65	67	41	40	33	40	0	0	0	0
21	495	187	131	91	74	63	75	72	58	48	45	39	35	28	2	0	0	0	0
22	521	224	150	107	87	73	63	60	55	48	41	39	31	1	0	0	0	0	0
23	542	219	138	101	90	79	69	61	54	47	35	30	0	0	0	0	0	0	0
24	535	205	143	102	81	63	65	61	38	39	29	0	0	0	0	0	0	0	0
25	500	218	139	101	75	63	50	46	38	35	2	0	0	0	0	0	0	0	0
26	495	181	114	83	73	55	47	43	29	0	0	0	0	0	0	0	0	0	0
27	493	199	121	106	68	53	40	36	1	0	0	0	0	0	0	0	0	0	0
28	486	194	114	69	46	30	28	3	0	0	0	0	0	0	0	0	0	0	0
29	501	186	102	65	47	40	1	0	0	0	0	0	0	0	0	0	0	0	0
30	533	202	121	78	53	3	0	0	0	0	0	0	0	0	0	0	0	0	0
31	430	145	76	57	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	496	188	94	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	499	202	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	518	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

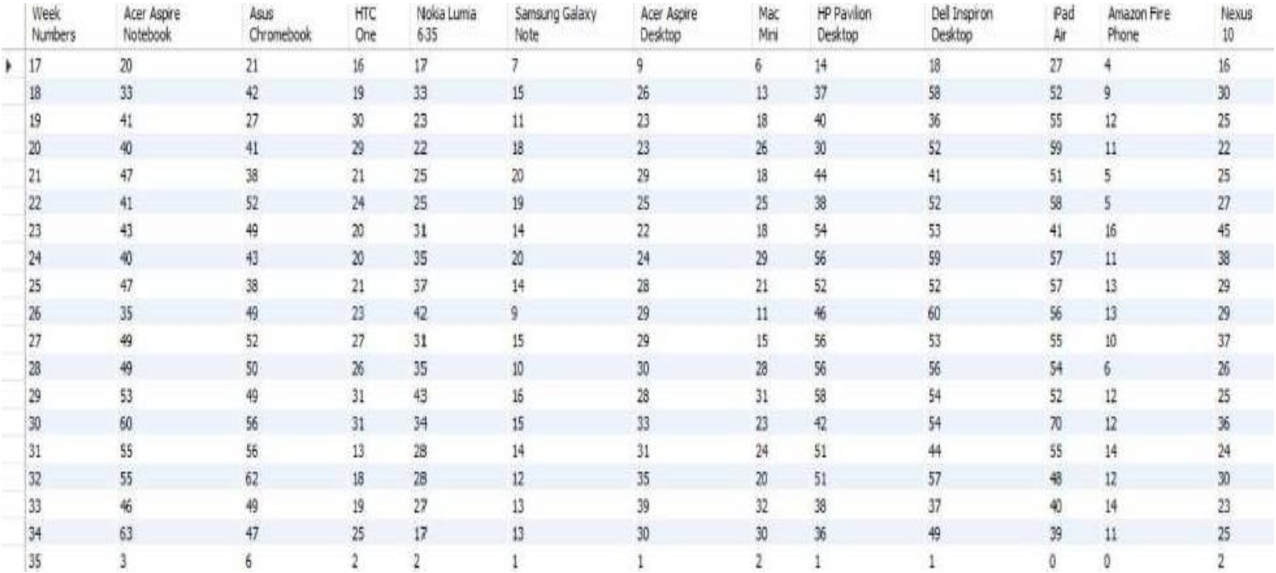
Weekly Engagement:

```
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",
COUNT(DISTINCT CASE WHEN device IN('samsumg galaxy
tablet') THEN user_id ELSE NULL END) AS "Samsumg Galaxy
Tablet",
COUNT(DISTINCT CASE WHEN device IN('acer aspire
notebook') THEN user_id ELSE NULL END) AS "Acer Aspire
Notebook",
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 635",
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('acer aspire desktop')
THEN user_id ELSE NULL END) AS "Acer Aspire Desktop",
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",
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;
```



Week Numbers	Dell Inspiron Notebook	iPhone 5	Phone 4S	Windows Surface	Macbook Air	Phone 5S	Macbook Pro	Kindle Fire	iPad Mini	Nexus 7	Nexus 5	Samsung Galaxy S4	Lenovo Thinkpad	Samsumg Galaxy Tablet
17	46	65	21	10	54	42	143	6	19	18	40	52	86	8
18	77	113	46	10	121	73	252	27	30	30	73	82	153	11
19	83	115	44	16	112	79	266	21	36	41	87	91	178	6
20	84	125	55	21	119	79	256	23	32	32	103	93	173	9
21	80	137	45	17	110	74	247	30	23	29	91	84	167	6
22	92	125	45	15	145	71	251	21	34	45	96	105	176	10
23	103	152	53	14	124	79	266	25	33	36	88	99	176	14
24	99	142	53	22	152	79	255	25	39	49	87	101	165	11
25	105	137	40	22	121	78	275	24	30	51	89	99	197	12
26	89	152	50	21	134	94	269	26	43	46	87	112	192	12
27	89	163	67	33	142	83	302	25	35	40	84	116	202	15
28	103	151	61	33	148	93	295	31	35	39	85	122	220	9
29	113	144	60	28	148	90	295	37	34	45	77	123	209	13
30	127	152	65	19	159	103	322	25	35	62	84	103	206	9
31	113	135	56	19	147	71	321	14	27	38	69	100	207	8
32	104	119	34	10	125	67	307	12	30	25	67	82	179	6
33	110	110	35	15	133	65	312	14	28	30	70	80	191	12
34	105	101	50	18	136	70	292	13	25	33	70	90	193	14
35	9	2	6	3	10	3	17	3	2	2	4	6	16	0

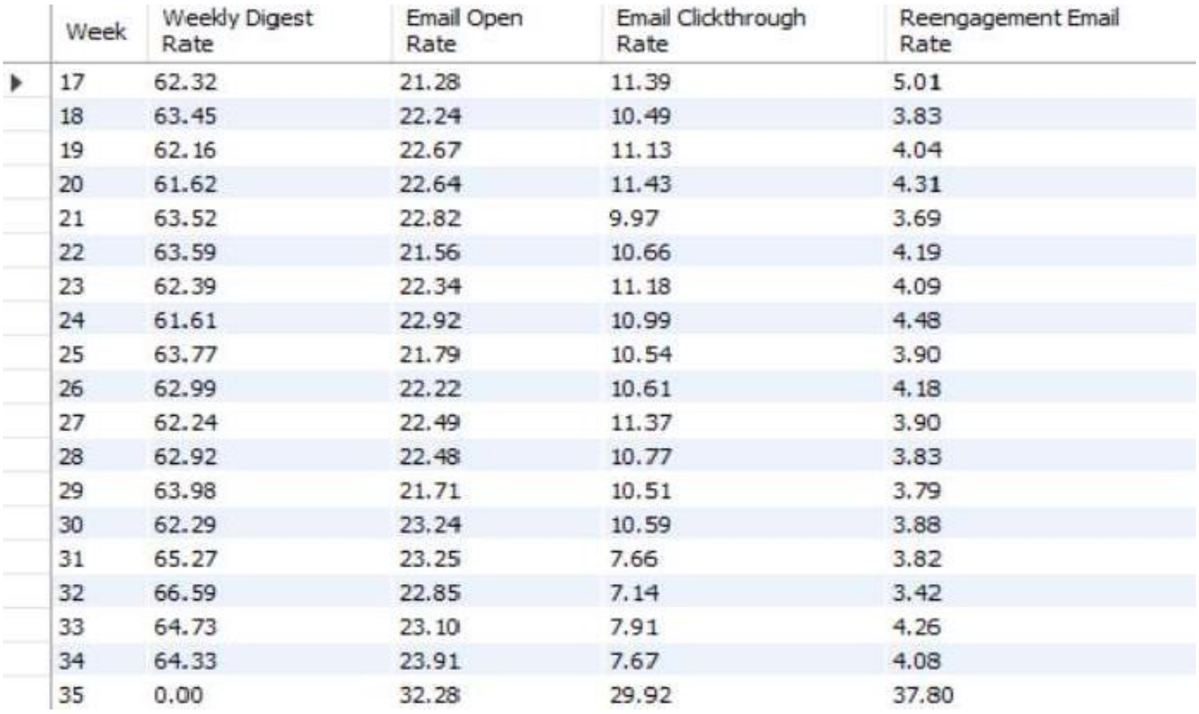


Week Numbers	Acer Aspire Notebook	Asus Chromebook	HTC One	Nokia Lumia 635	Samsung Galaxy Note	Acer Aspire Desktop	Mac Mini	HP Pavilion Desktop	Dell Inspiron Desktop	iPad Air	Amazon Fire Phone	Nexus 10
17	20	21	16	17	7	9	6	14	18	27	4	16
18	33	42	19	33	15	26	13	37	58	52	9	30
19	41	27	30	23	11	23	18	40	36	55	12	25
20	40	41	29	22	18	23	26	30	52	59	11	22
21	47	38	21	25	20	29	18	44	41	51	5	25
22	41	52	24	25	19	25	25	38	52	58	5	27
23	43	49	20	31	14	22	18	54	53	41	16	45
24	40	43	20	35	20	24	29	56	59	57	11	38
25	47	38	21	37	14	28	21	52	52	57	13	29
26	35	49	23	42	9	29	11	46	60	56	13	29
27	49	52	27	31	15	29	15	56	53	55	10	37
28	49	50	26	35	10	30	28	56	56	54	6	26
29	53	49	31	43	16	28	31	58	54	52	12	25
30	60	56	31	34	15	33	23	42	54	70	12	36
31	55	56	13	28	14	31	24	51	44	55	14	24
32	55	62	18	28	12	35	20	51	57	48	12	30
33	46	49	19	27	13	39	32	38	37	40	14	23
34	63	47	25	17	13	30	30	36	49	39	11	25
35	3	6	2	2	1	1	2	1	1	0	0	2

Email Engagement:

```
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,
COUNT(user_id) AS total FROM 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
21	63.52	22.82	9.97	3.69
22	63.59	21.56	10.66	4.19
23	62.39	22.34	11.18	4.09
24	61.61	22.92	10.99	4.48
25	63.77	21.79	10.54	3.90
26	62.99	22.22	10.61	4.18
27	62.24	22.49	11.37	3.90
28	62.92	22.48	10.77	3.83
29	63.98	21.71	10.51	3.79
30	62.29	23.24	10.59	3.88
31	65.27	23.25	7.66	3.82
32	66.59	22.85	7.14	3.42
33	64.73	23.10	7.91	4.26
34	64.33	23.91	7.67	4.08
35	0.00	32.28	29.92	37.80

- **Approach:**
  There is a Data set related to users which is given in the project. Taking the data set and cloning the data set into MySQL workbench. By creating database in MySQL. Creating the tables which were required and inserting the values into that tables. With the help of the SQL fundamentals solving the problems which were given in project.

- **Tech-Stack:**
  MYSQL WORKBENCH 8.0.32

- **Used:**
  MYSQL database has been used throughout this project. Writing the queries and configuring the query to get the desired output as per questions mentioned in the project. And the purpose of using this tool is because only MySQL is required for me to figure out the problems related to this project.

- **Insights**:
  By this project I came across to learn about JOINS and fundamentals of SQL. How to analyse the given problem statement what are the functions we can use in SQL and write the queries to get desired output.

  The challenge here is that the data in **case study 2** is very huge, as the huge amount of data SQL Workbech is very slow to import it. To tackle this situation I have to use **LOAD DATA** statements. Now, there is another problem arises in the column **user_type** in **events** table that has datatype **int** which is stopping the process of importing. First I need to change its datatype to **text** then restart the process of loading the data into **events** table.

- **Result:**
  By this project I have achieved and gain knowledge how to clean the data with help of MySQL. And how to interact with database and how to customize the query to get the desired output.