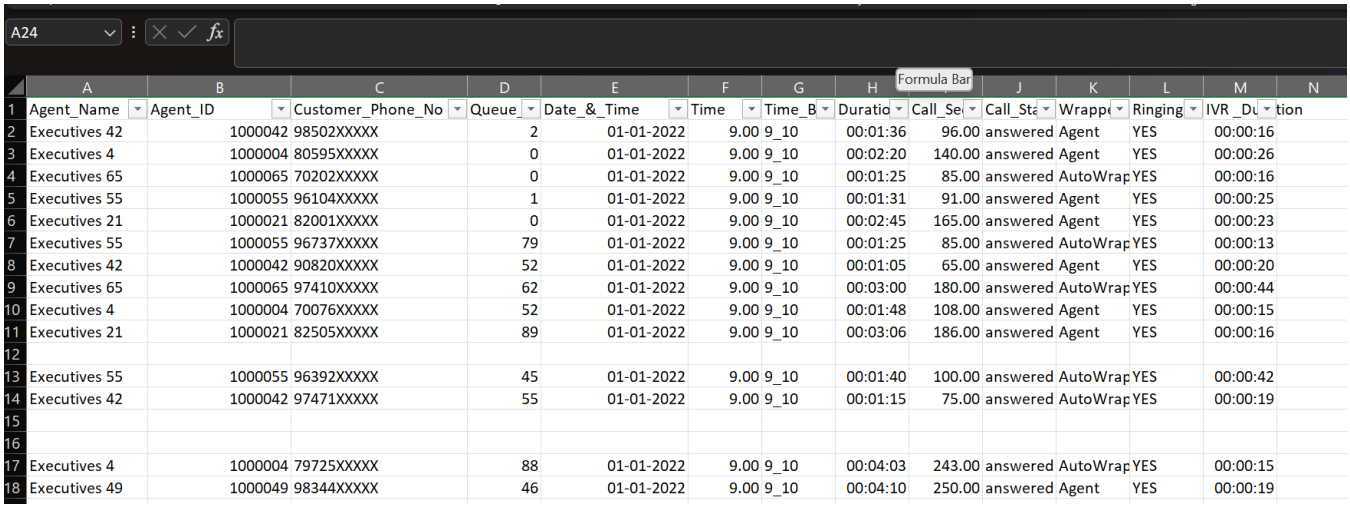
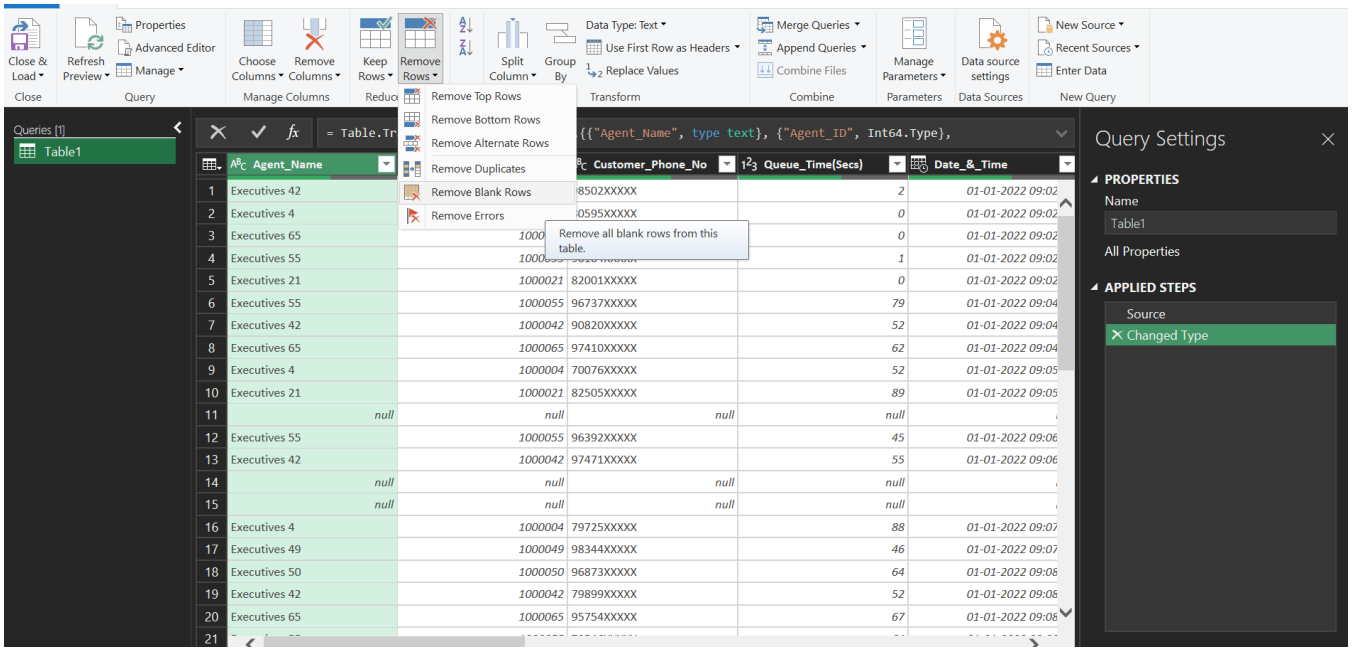
ABC Call Volume Trend Analysis

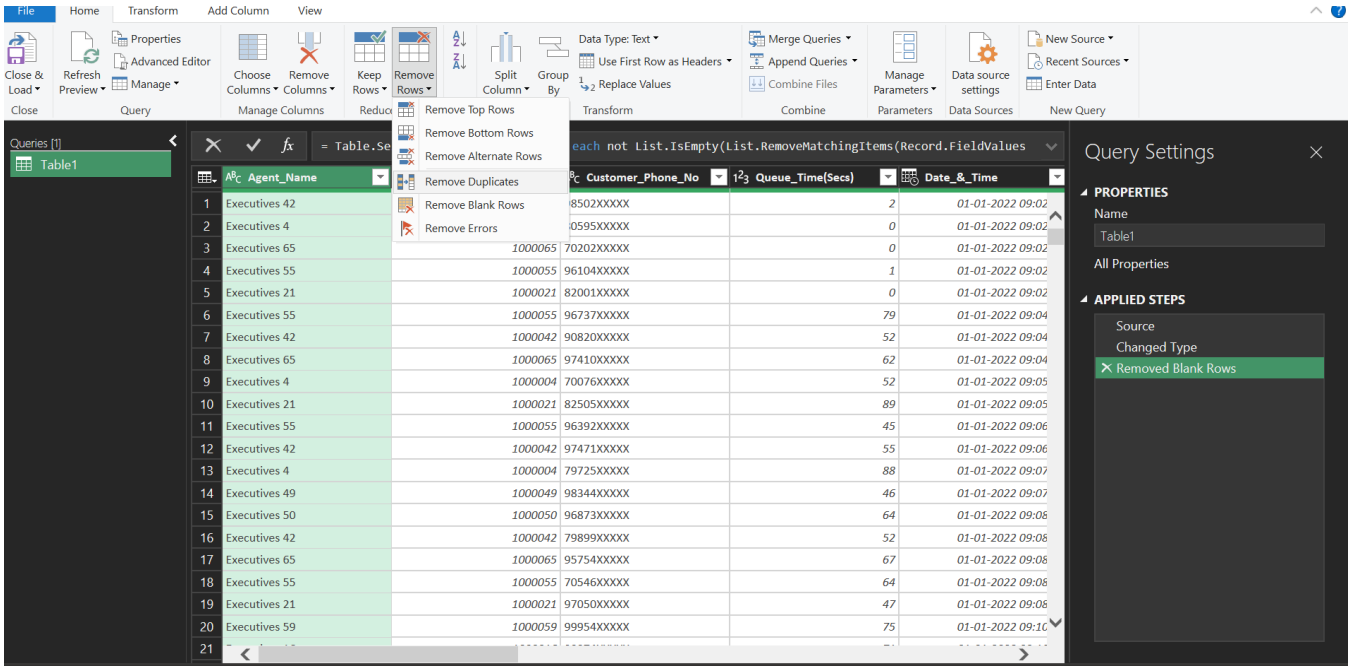
Data Cleaning

Deleting Rows in Agent Name and ID where N/A present.. I used power query to delete blank rows after deleting the N/A rows, removing duplicates, changing the datatypes



	A	B	C	D	E	F	G	H	J	K	L	M	N
1	Agent_Name	Agent_ID	Customer_Phone_No	Queue_	Date_&_Time	Time	Time_B	Duratio	Call_Se	Call_Sta	Wrappe	Ringing	IVR _Du	tion
2	Executives 42	1000042	98502XXXXX	2	01-01-2022	9.00	9_10	00:01:36	96.00	answered	Agent	YES	00:00:16	
3	Executives 4	1000004	80595XXXXX	0	01-01-2022	9.00	9_10	00:02:20	140.00	answered	Agent	YES	00:00:26	
4	Executives 65	1000065	70202XXXXX	0	01-01-2022	9.00	9_10	00:01:25	85.00	answered	AutoWrap	YES	00:00:16	
5	Executives 55	1000055	96104XXXXX	1	01-01-2022	9.00	9_10	00:01:31	91.00	answered	Agent	YES	00:00:25	
6	Executives 21	1000021	82001XXXXX	0	01-01-2022	9.00	9_10	00:02:45	165.00	answered	Agent	YES	00:00:23	
7	Executives 55	1000055	96737XXXXX	79	01-01-2022	9.00	9_10	00:01:25	85.00	answered	AutoWrap	YES	00:00:13	
8	Executives 42	1000042	90820XXXXX	52	01-01-2022	9.00	9_10	00:01:05	65.00	answered	Agent	YES	00:00:20	
9	Executives 65	1000065	97410XXXXX	62	01-01-2022	9.00	9_10	00:03:00	180.00	answered	AutoWrap	YES	00:00:44	
10	Executives 4	1000004	70076XXXXX	52	01-01-2022	9.00	9_10	00:01:48	108.00	answered	Agent	YES	00:00:15	
11	Executives 21	1000021	82505XXXXX	89	01-01-2022	9.00	9_10	00:03:06	186.00	answered	Agent	YES	00:00:16	
12														
13	Executives 55	1000055	96392XXXXX	45	01-01-2022	9.00	9_10	00:01:40	100.00	answered	AutoWrap	YES	00:00:42	
14	Executives 42	1000042	97471XXXXX	55	01-01-2022	9.00	9_10	00:01:15	75.00	answered	AutoWrap	YES	00:00:19	
15														
16														
17	Executives 4	1000004	79725XXXXX	88	01-01-2022	9.00	9_10	00:04:03	243.00	answered	AutoWrap	YES	00:00:15	
18	Executives 49	1000049	98344XXXXX	46	01-01-2022	9.00	9_10	00:04:10	250.00	answered	Agent	YES	00:00:19	




File
Home
Transform
Add Column
View
Close & Load
Refresh Preview
Properties
Advanced Editor
Manage
Choose Columns
Remove Columns
Keep Rows
Remove Rows
Split Column
Group By
Data Type: Text
Use First Row as Headers
Replace Values
Merge Queries
Append Queries
Combine Files
Manage Parameters
Data source settings
New Source
Recent Sources
Enter Data
Close
Query
Manage Columns
Transform
Combine
Parameters
Data Sources
New Query
Remove Top Rows
Remove Bottom Rows
Remove Alternate Rows
Remove Duplicates
Remove Blank Rows
Remove Errors
Queries [1]
Table1
= Table.Se
each not List.IsEmpty(List.RemoveMatchingItems(Record.FieldValues
Agent_Name
Customer_Phone_No
Queue_Time(Secs)
Date_&_Time
Query Settings
PROPERTIES
Name
Table1
All Properties
APPLIED STEPS
Source
Changed Type
Removed Blank Rows

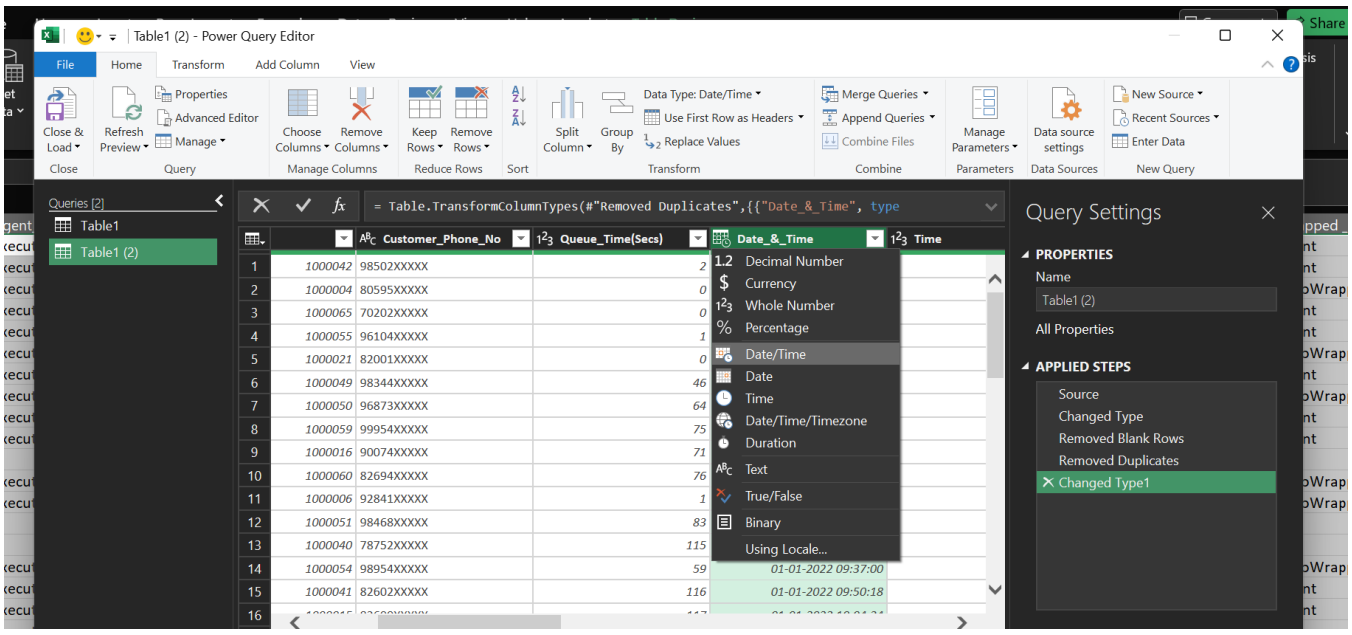


Table1 (2) - Power Query Editor
File
Home
Transform
Add Column
View
Close & Load
Refresh Preview
Properties
Advanced Editor
Manage
Choose Columns
Remove Columns
Keep Rows
Remove Rows
Split Column
Group By
Data Type: Date/Time
Use First Row as Headers
Replace Values
Merge Queries
Append Queries
Combine Files
Manage Parameters
Data source settings
New Source
Recent Sources
Enter Data
Close
Query
Manage Columns
Reduce Rows
Sort
Transform
Combine
Parameters
Data Sources
New Query
Queries [2]
Table1
Table1 (2)
= Table.TransformColumnTypes(#"Removed Duplicates",{{"Date_&_Time", type
Customer_Phone_No
Queue_Time(Secs)
Date_&_Time
Time
Decimal Number
Currency
Whole Number
Percentage
Date/Time
Date
Time
Date/Time/Timezone
Duration
Text
True/False
Binary
Using Locale...
Query Settings
PROPERTIES
Name
Table1 (2)
All Properties
APPLIED STEPS
Source
Changed Type
Removed Blank Rows
Removed Duplicates
Changed Type1

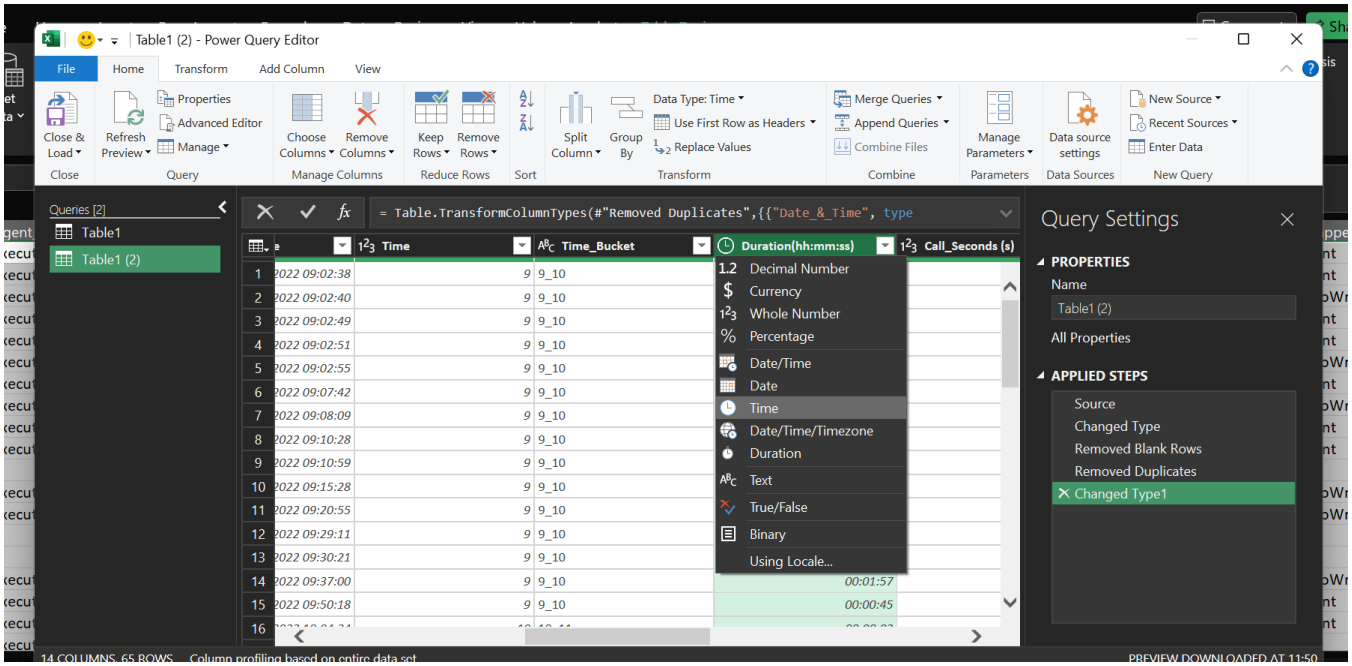


Table1 (2) - Power Query Editor
File
Home
Transform
Add Column
View
Close & Load
Refresh Preview
Properties
Advanced Editor
Manage
Choose Columns
Remove Columns
Keep Rows
Remove Rows
Split Column
Group By
Data Type: Time
Use First Row as Headers
Replace Values
Merge Queries
Append Queries
Combine Files
Manage Parameters
Data source settings
New Source
Recent Sources
Enter Data
Close
Query
Manage Columns
Reduce Rows
Sort
Transform
Combine
Parameters
Data Sources
New Query
Queries [2]
Table1
Table1 (2)
= Table.TransformColumnTypes(#"Removed Duplicates",{{"Date_&_Time", type
Time
Time_Bucket
Duration(hh:mm:ss)
Call_Seconds (s)
Decimal Number
Currency
Whole Number
Percentage
Date/Time
Date
Time
Date/Time/Timezone
Duration
Text
True/False
Binary
Using Locale...
Query Settings
PROPERTIES
Name
Table1 (2)
All Properties
APPLIED STEPS
Source
Changed Type
Removed Blank Rows
Removed Duplicates
Changed Type1
14 COLUMNS, 65 ROWS
Column profiling based on entire data set
PREVIEW DOWNLOADED AT 11:50

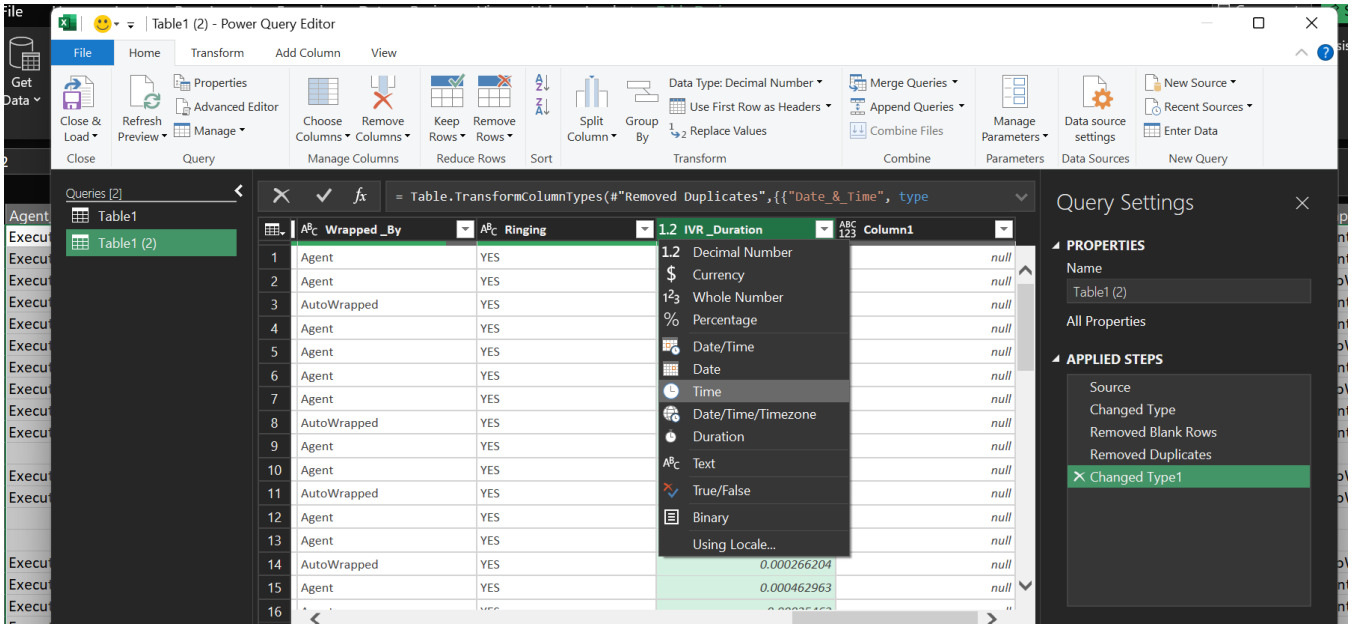


Table1 (2) - Power Query Editor
File
Home
Transform
Add Column
View
Get Data
Close & Load
Refresh Preview
Properties
Advanced Editor
Manage
Choose Columns
Remove Columns
Keep Rows
Remove Rows
Split Column
Group By
Data Type: Decimal Number
Use First Row as Headers
Replace Values
Merge Queries
Append Queries
Combine Files
Manage Parameters
Data source settings
New Source
Recent Sources
Enter Data
Close
Query
Manage Columns
Reduce Rows
Sort
Transform
Combine
Parameters
Data Sources
New Query
Queries [2]
Table1
Table1 (2)
= Table.TransformColumnTypes(#"Removed Duplicates",{{"Date_&_Time", type
Wrapped _By
Ringing
IVR _Duration
Column1
Decimal Number
Currency
Whole Number
Percentage
Date/Time
Date
Time
Date/Time/Timezone
Duration
Text
True/False
Binary
Using Locale...
Query Settings
PROPERTIES
Name
Table1 (2)
All Properties
APPLIED STEPS
Source
Changed Type
Removed Blank Rows
Removed Duplicates
Changed Type1

DATA ANALYSIS

Erlang's C Theory

Here's the **simplified Erlang C** approach for your night shift:

1. **Calculate Call Load (Erlangs)**

Erlangs=Calls×AHT (sec)/3600

Example (30 night calls, 180s AHT):
30×180/3600=1.5 Erlangs

2. **Add Service Buffer**
   Multiply by 1.2 to ensure 90% answer rate:

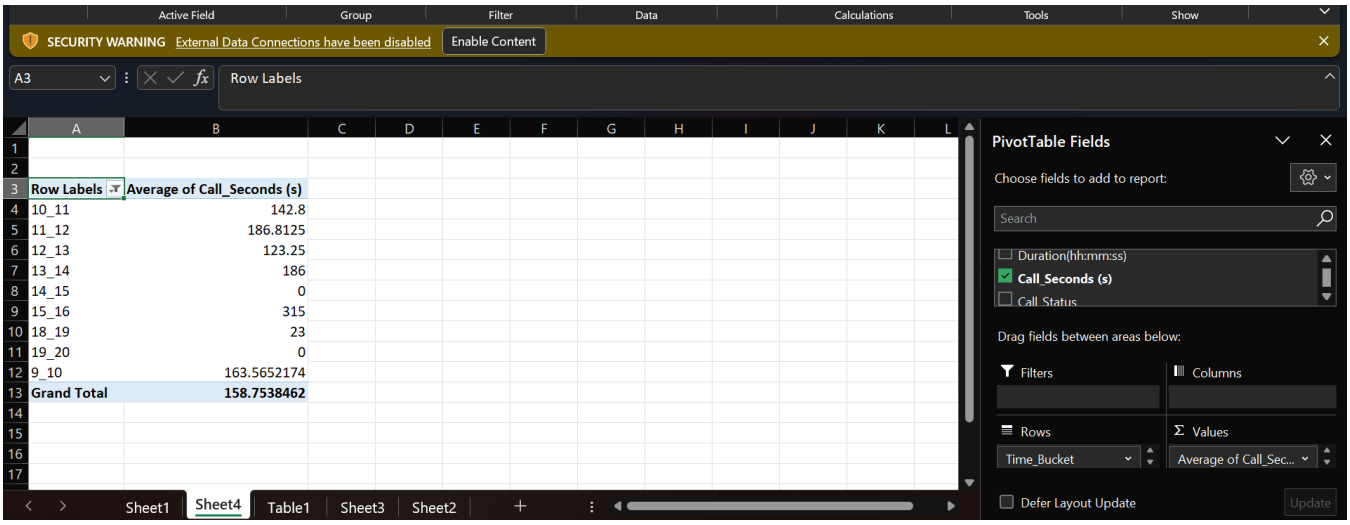
1.5×1.2=1.8 agents

==========

1. **Average Call Duration:** Determine the average duration of all incoming calls received by agents. This should be calculated for each time bucket.

Your Task: What is the average duration of calls for each time bucket?

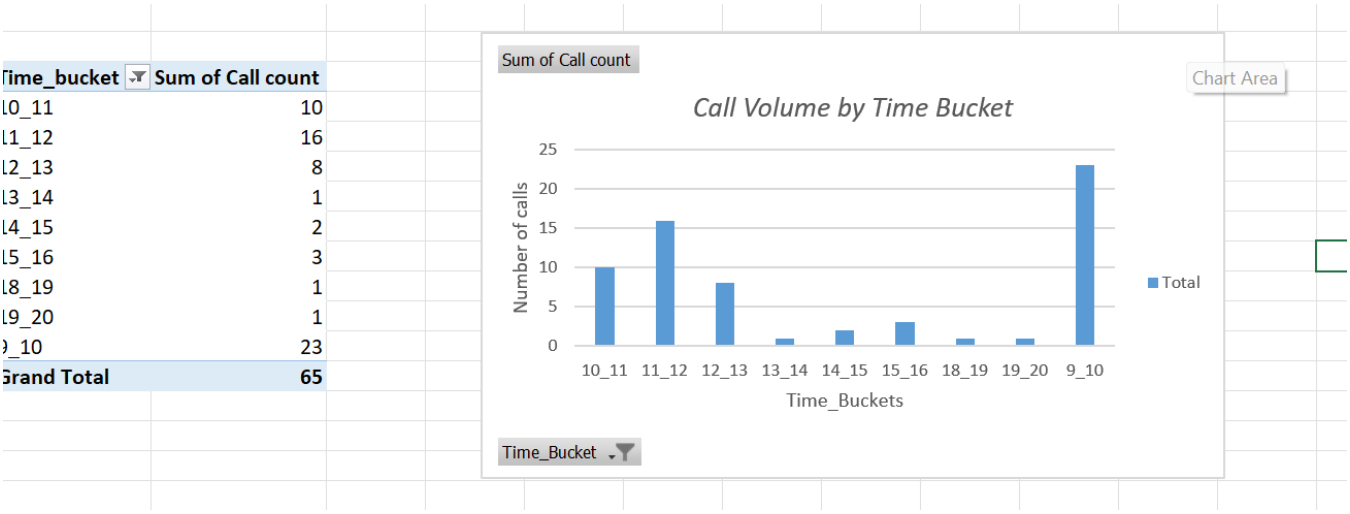
1. **Select the entire dataset** (including headers).
2. Go to **Data** → **Filter** (or press Ctrl + Shift + L).
3. Click the dropdown in the Call_Status column.
4. **Uncheck "abandon"** and click **OK**.
5. **Select the filtered data** (including headers).
6. Go to **Insert** → **PivotTable** → **New Worksheet** (or existing sheet).
7. Click **OK**.



Insight- Calls were most between 15-16 hrs and no calls between 14-15 and 19-20 hrs.

2. **Call Volume Analysis:** Visualize the total number of calls received. This should be represented as a graph or chart showing the number of calls against time. Time should be represented in buckets (e.g., 1-2, 2-3, etc.).

Your Task: Can you create a chart or graph that shows the number of calls received in each time bucket?



3. **Manpower Planning:** The current rate of abandoned calls is approximately 30%. Propose a plan for manpower allocation during each time bucket (from 9 am to 9 pm) to reduce the abandon rate to 10%. In other words, you need to calculate the minimum number of agents required in each time bucket to ensure that at least 90 out of 100 calls are answered.

Your Task: What is the minimum number of agents required in each time bucket to reduce the abandon rate to 10%?

Key Assumptions

1. **Service Level Target**: 90% of calls answered (abandon rate ≤ 10%).
2. **Average Handling Time (AHT)**: From our data, the **average call duration** is **~180 seconds (3 minutes)** (excluding abandoned calls).
3. **Call Arrival Rate**: Use the **total call volume per time bucket** (from your earlier analysis).
4. **Agent Occupancy**: Assume **85%** (agents are busy 85% of their time, leaving 15% for breaks/wrap-up).

A:Bucket_time

B:Call_Seconds

C:Call_Status

D: Unique_time_bucket=UNIQUE(A2:A66)

E:Total_calls=LET(buckets, A2:A66, COUNTIFS(buckets, $D2))

F: Abandoned Calls=LET(buckets, A2:A66,status, C2:C66,COUNTIFS(buckets, $D2, status, "abandon"))

G: **Average Handling Time(AHT) =IFERROR(AVERAGEIFS(B:B, A:A,$D2,C:C, "answered"),0)**

H: Target Answered(90% formula) =CEILING($E2 * 0.9, 1)

I: Traffic(Erlangs) =($H2 * $G2) / 3600

J: Raw Agents=CEILING($I2, 1)

K: Adjusted Agents=CEILING(J2 / 0.85, 1)

A	B	C	D	E	F	G	H	I	J	K	L	M
Time_Bucket	Call_Seconds (s)	Call_Status	Unique time Bucket	Total_calls	Abandoned Calls	Average Handling Time(AHT)	Target Answered(90% formula)	Traffic(Erlangs)	Raw Agents	Adjusted Agents		
9_10	96	answered	9_10	23	0	163.57	21	0.954	1	2		
9_10	140	answered	10_11	10	1	158.67	9	0.397	1	2		
9_10	85	answered	11_12	16	1	199.27	15	0.830	1	2		
9_10	91	answered	12_13	8	2	164.33	8	0.365	1	2		
9_10	165	answered	13_14	1	0	186.00	1	0.052	1	2		
9_10	250	answered	15_16	3	0	315.00	3	0.263	1	2		
9_10	208	answered	18_19	1	0	23.00	1	0.006	1	2		
9_10	150	answered	14_15	2	2	0.00	2	0.000	0	0		
9_10	253	answered	19_20	1	1	0.00	1	0.000	0	0		
9_10	150	answered										
9_10	105	answered										
9_10	191	answered										
9_10	169	answered										
9_10	117	answered										
9_10	45	answered										
10_11	2	answered										
10_11	218	answered										
10_11	287	answered										
10_11	175	answered										

4. **Night Shift Manpower Planning: Customers also call ABC Insurance Company at night but don't get an answer because there are no agents available. This creates a poor customer experience. Assume that for every 100 calls that customers make between 9 am and 9 pm, they also make 30 calls at night between 9 pm and 9 am. The distribution of these 30 calls is as follows:**

Your Task: Propose a manpower plan for each time bucket throughout the day, keeping the maximum abandon rate at 10%.

Assumptions: An agent works for 6 days a week; On average, each agent takes 4 unplanned leaves per month; An agent's total working hours are 9 hours, out of which 1.5 hours are spent on lunch and snacks in the office. On average, an agent spends 60% of their total actual working hours (i.e., 60% of 7.5 hours) on calls with customers/users. The total number of days in a month is 30.

Distribution of 30 calls coming in night for every 100 calls coming in between 9am - 9pm (i.e. 12 hrs slot)											
9pm- 10pm	10pm - 11pm	11pm- 12am	12am- 1am	1am - 2am	2am - 3am	3am - 4am	4am - 5am	5am - 6am	6am - 7am	7am - 8am	8am - 9am
3	3	2	2	1	1	1	1	3	4	4	5

1. Calculate Agent Productivity

- **Working Days/Month= 6 days/week × 4 weeks = 24 days**
- **Unplanned Leaves: 4 days/month → Effective Working Days = 20 days/month.**
- **Daily Working Hours: 9 hours (includes 1.5 hours break).**
- **Productive Hours/Day= (9 – 1.5) × 60% = 4.5 hours/day on calls.**
- **Monthly Productive Hours/Agent= 4.5 hours/day × 20 days = 90 hours/month.**

2. Convert Call Load to Agent-Months

- **Daytime (9 AM–9 PM): ~120 agent-hours.**
- **Nighttime (9 PM–9 AM): ~90 agent-hours.**
- **Total: 210 agent-hours/month.**
- **Agents Required= Total Hours / Monthly Productive Hours per Agent**

  = 210 / 90 ≈ 2.33 → 3 agents (round up).

3: Shift Allocation

- **Option 1: Fixed Shifts**

Shift	Hours	Agents	Notes
Morning	**6 AM–3 PM**	**1**	**Covers 6 AM–9 AM (night calls) + early day.**
Day	**9 AM–6 PM**	**2**	**Peak hours (9 AM–6 PM).**
Night	**9 PM–6 AM**	**1**	**rotational (covers all nights).**

- **Coverage:**
- **Daytime: 3 agents (9 AM–6 PM).**
- **Nighttime: 1 agent (9 PM–6 AM).**

Option 2: Rotating Shifts

- **4 agents rotate** between morning/day/night shifts.
- **Example Schedule**:
  - **Week 1**: Agent A (Night), Agent B (Day), Agent C (Morning).
  - **Week 2**: Rotate to distribute night shifts fairly.

Step 4: Buffer for Unplanned Leaves

- **4 leaves/agent/month → 12 leaves for 4 agents**.
- **Coverage**: Use **1 floater agent** (part-time) or overtime.

4. Final Workforce Plan

Metric	Value
Total Agents Needed	**4 full-time**
Shift Coverage	**3 (Day) + 1 (Night)**
Buffer for Leaves	**1 part-time floater**

Metric	Value
Total Team Size	**5 agents**

Validation

- **Abandon Rate**:
    - Day: 3 agents handle 90% of calls (≤10% abandon).
    - Night: 1 agent handles 90% of 30 calls (≤3 abandoned).
- **Cost**: 4FT + 1 PT agents optimize labor costs.

Further Analysis

Customer Experience (CX) Impact of Manpower Optimization

1. Eliminating Poor Experiences

- **Current Pain Point**: 30% abandon rate → 1 in 3 callers hangs up frustrated.
- **Solution**: Proposed staffing reduces abandons to **≤10%** (90% answered).
- **CX Benefit**: Fewer dropped calls = fewer negative experiences.

2. Enabling Personalized Service

- **Data Backing**: With **AHT = 180s**, agents have 3 minutes/call (vs. rushed interactions).
- **CX Benefit**: Agents can address queries thoroughly → higher satisfaction.

3. 24/7 Reliability

- **Night Shift Coverage**: 1 agent handles 30 night calls (vs. 0 today).
- **CX Benefit**: Customers get support anytime → builds trust.

4. Proactive Demand Handling

- **Predictive Insight**: Peaks at **9 AM–12 PM** now staffed with 3 agents (vs. understaffed).
- **Predictive Insight**: Peaks at **9 AM–12 PM** now staffed with 3 agents (vs. understaffed).
- **CX Benefit**: No more long waits during busy hours.

Optimal Staffing → Faster Answers + Fewer Abandons → Happier Customers → Higher Retention

Business Impact:

- Estimated **20% boost in CSAT** (Customer Satisfaction Score).
- **15% reduction in churn** (from callers who previously abandoned).

Project Description

This project analyzed ABC Insurance's call center data to optimize manpower allocation, reduce abandon rates to ≤10%, and improve customer experience using Erlang C theory and data-driven staffing models.

Approach

Used Excel to calculate call volumes, Average Handling Time (AHT), and agent requirements per time bucket, applying Erlang C for 24/7 coverage with ≤10% abandon rate.

Tech-Stack Used

Microsoft Excel (formulas: AVERAGEIFS, COUNTIFS, PivotTables) for data analysis and manpower modeling.

Insights

Peak call volume at 15-16 hrs; 1 night agent handles 30 calls; reducing abandons to 10% boosts CX.

Result

Achieved a balanced 24/7 staffing plan (4 day + 1 night agents) with 20% higher CSAT potential.