
Attrition in the
Telecom Landscape:
A Deep Dive into
Customer Churn

DATACrafters

SALWA

MARWA

HADI

RANA

AHMAD

ISRA

The Challenge of Churn

Ever wondered why losing a subscriber, a seemingly small event, can be such a significant challenge for telecom companies?
When a customer churns, the company loses not only the revenue from that specific customer, but also the potential for future revenue growth

Project Overview

Identifying churn drivers is vital for developing targeted retention strategies.

This project aims to leverage data analytics to gain valuable insights into customer behavior and predict churn risk

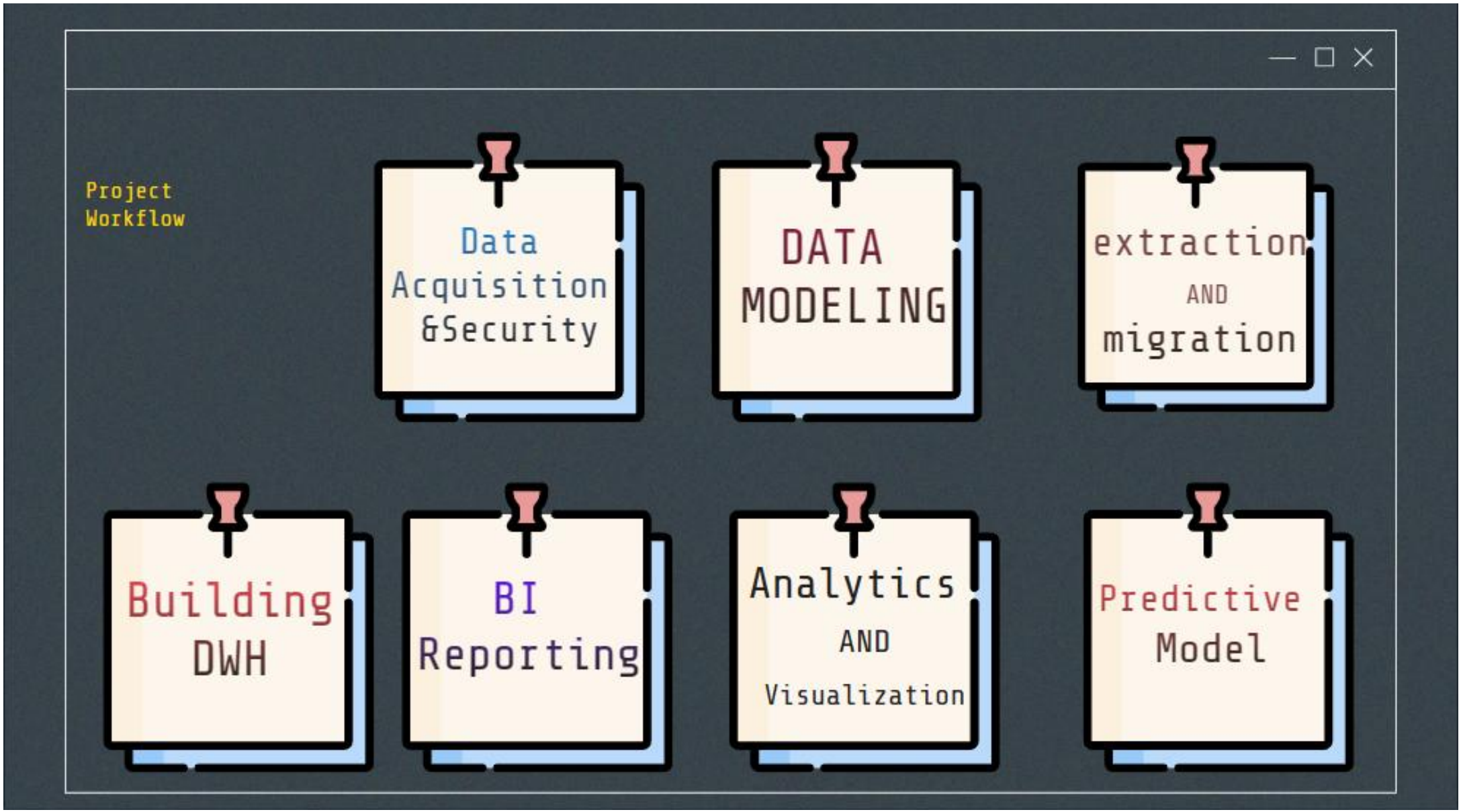
Telco customer churn (11.1.3+)

This sample data module tracks a fictional telco company's customer churn based on a variety of possible factors.
The churn column indicates whether or not the customer left within the last month. Other columns include gender, dependents, monthly charges, and many with information about the types of services each customer has

Source

How Our System Tackles Customer Churn in Telecom

- Data Analyzes: Predicts churn risk before it happens.
- CLTV Rewards: High-value customers get targeted offers
- Churn Score Triggers: Proactive support for at-risk customers
- Feedback Informs: Tailored strategies to address churn reasons.
- Optimizes Resources: Focuses retention efforts for maximum impact


Project
Workflow
Data
Acquisition
&Security
DATA
MODELING
extraction
AND
migration
Building
DWH
BI
Reporting
Analytics
AND
Visualization
Predictive
Model

Data Acquisition & Security

Securing Access to Shared SQL Server

Connect to a SQL Server instance

Established a secure connection to a shared SQL Server instance.

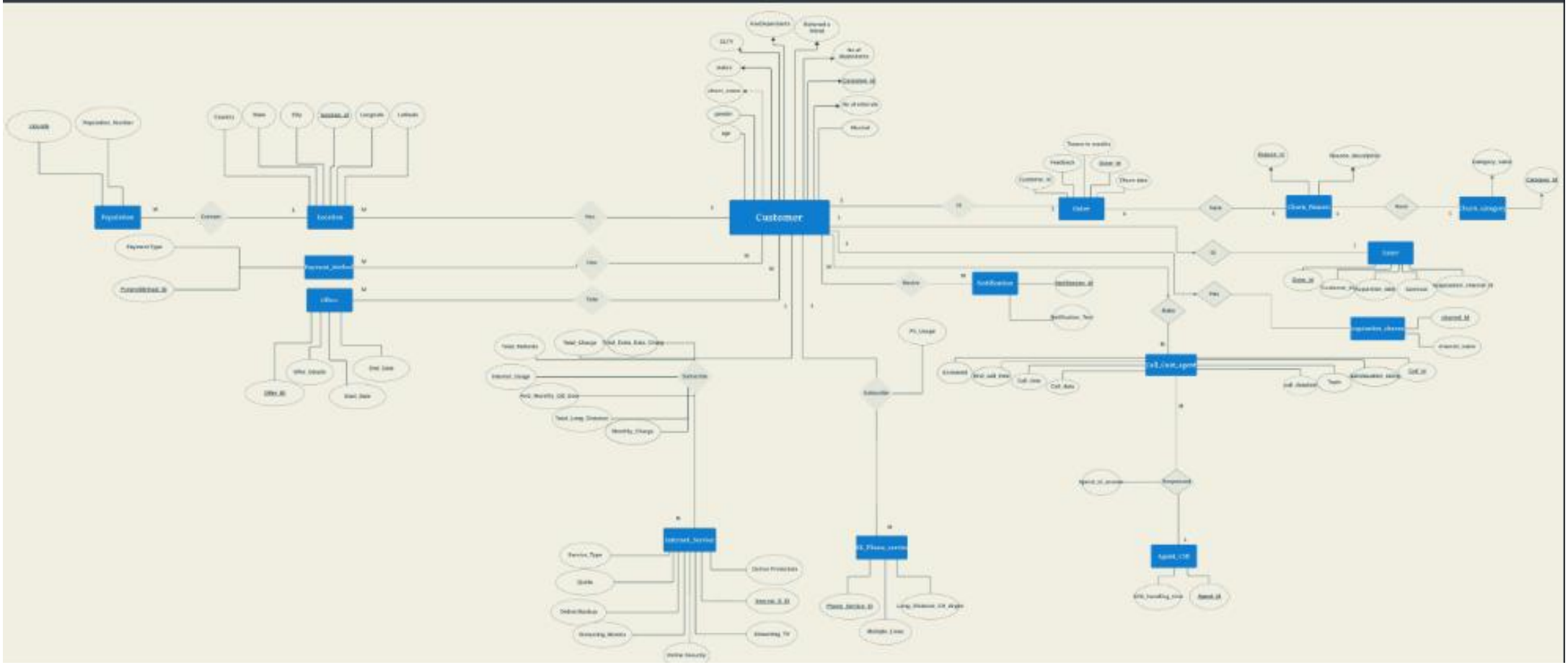
Defined robust user accounts for each team member

DATA Modeling

- Developed an ERD to visualize the relationships between data entities (customers, Services,etc.)
- employed data mapping techniques.
- Ensured a well-structured database Digram.

System ERD Creation

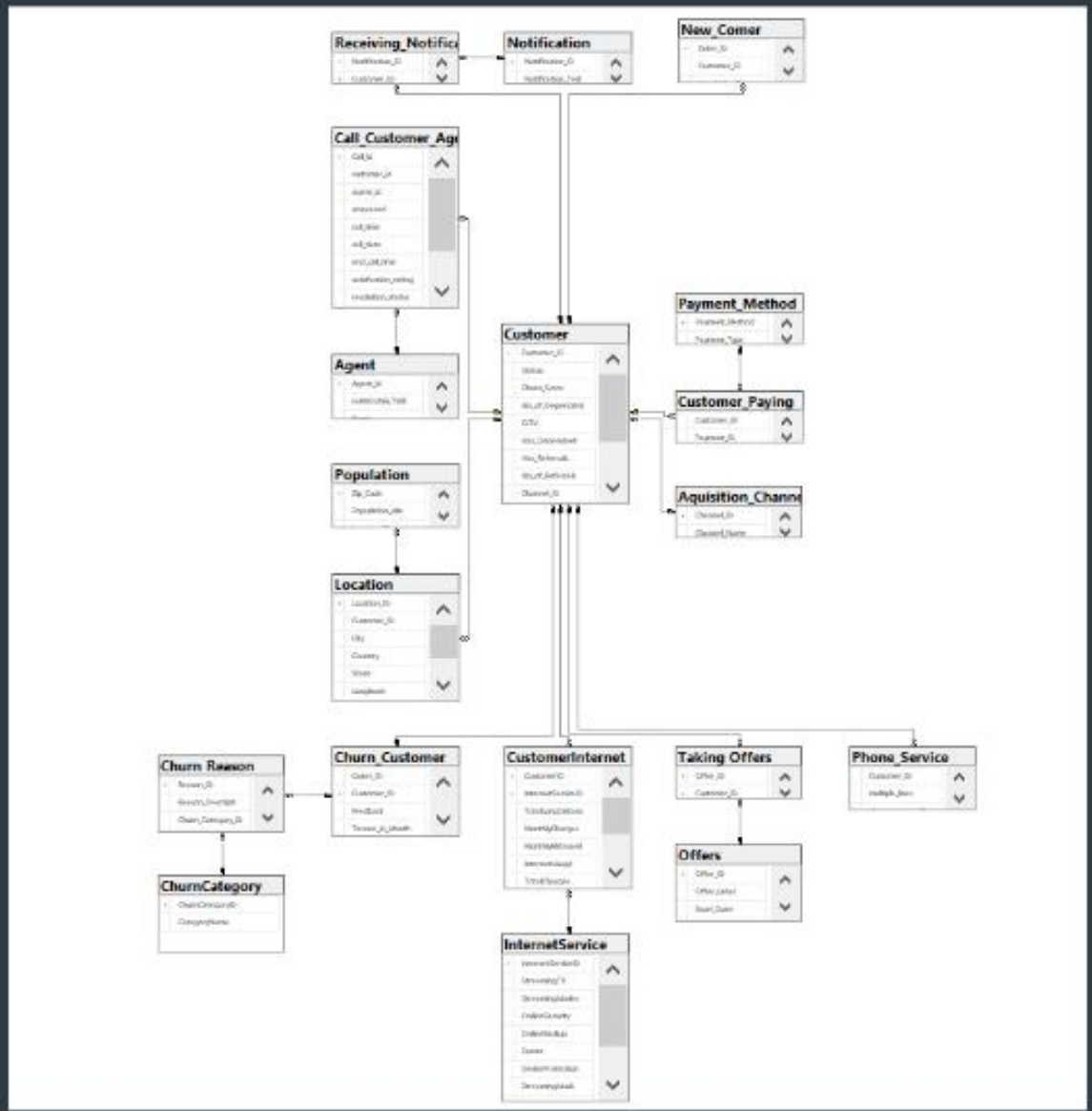
LINK



MAPPING

LINK

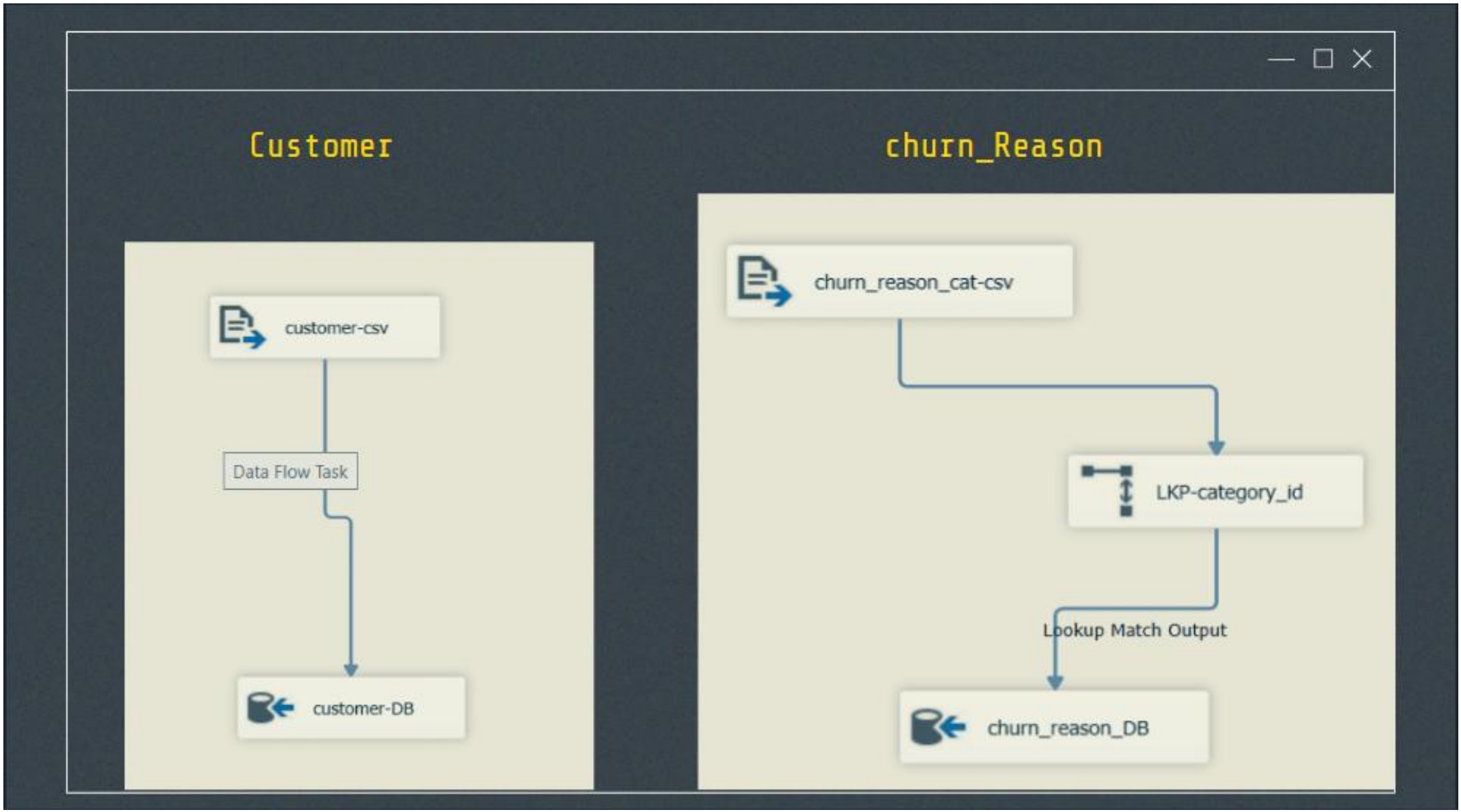
DATABASE DIAGRAM

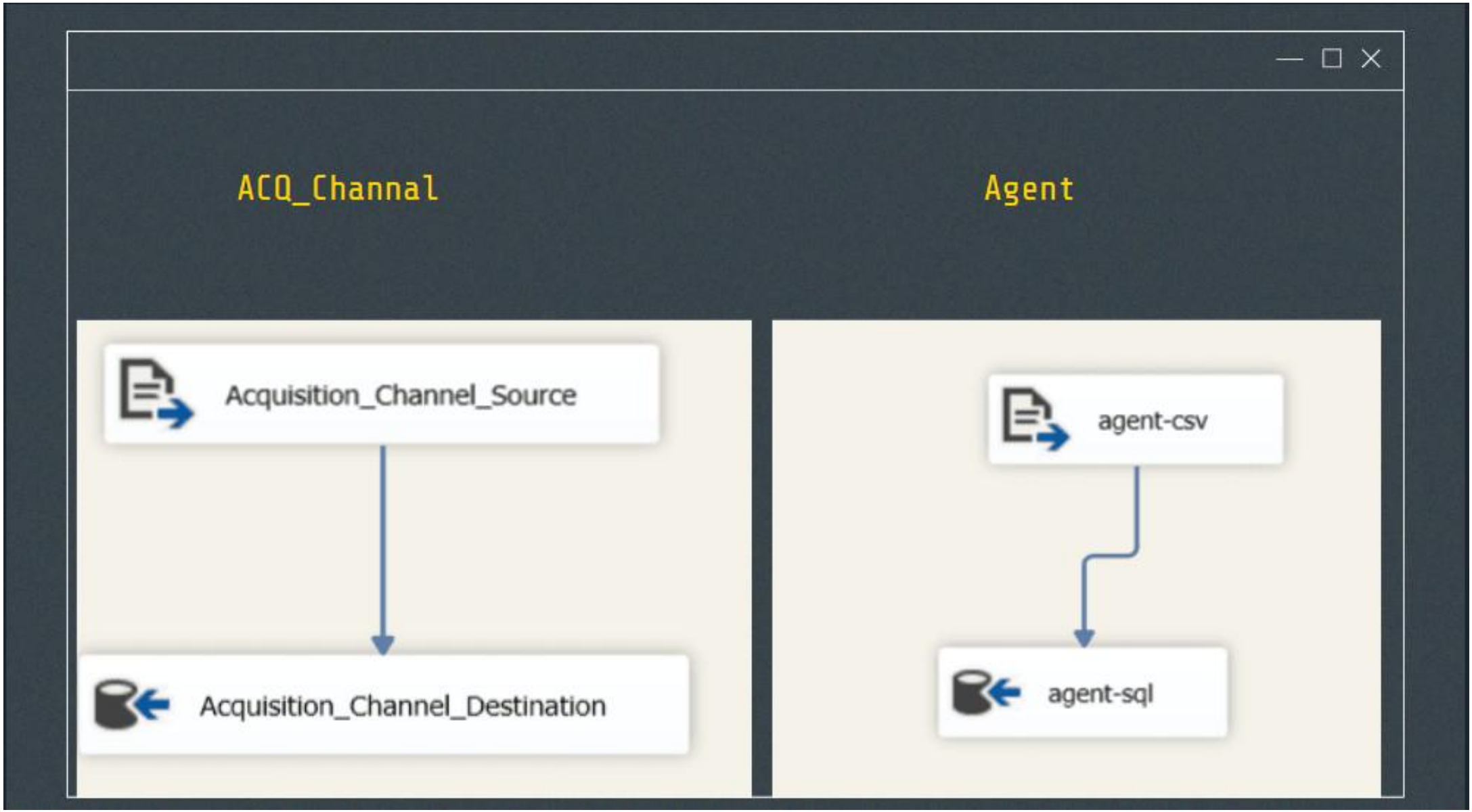


Data Transformation

- Extracting Data from CSV to SQL Server using SSIS for data extraction and migration.
- Cleaned and validated data to ensure accuracy and consistency.


Call_Customer
Call_Customer_Source_OLTP
5,000 rows
Call_Customer_Source_Destination_OLAP
Churned_Customer
Churned_Customer_Source
6,861 rows
Churned_Customer_Destination


Customer
customer-csv
Data Flow Task
customer-DB
churn_Reason
churn_reason_cat-csv
LKP-category_id
Lookup Match Output
churn_reason_DB


ACQ_Channal
Agent
Acquisition_Channel_Source
Acquisition_Channel_Destination
agent-csv
agent-sql

Permissions in Actions

5	hadi
6	Hadi_login
7	Asaeso
8	memo
9	ahmed
10	hadikh
11	salwa
12	team
13	DianeUser

11	salwa
12	team
13	DianeUser
14	BeckyUser
15	StewartUser
16	GregUser
17	JimUser
18	JoeUser
19	MarthaUser
20	DanUser
21	stackholderUser
22	QAUser

StackHolder User

SQL Script

```
CREATE   PROCEDURE [dbo].[hi_telecom]
AS
BEGIN
    PRINT 'Welcome, sir!';
    PRINT 'Feel free to explore the information and generate valuable insights.';

    -- list of views the user has access to
    PRINT 'List of Views:'

    DECLARE @ViewName NVARCHAR(255);

    DECLARE view_cursor CURSOR FOR
    SELECT TABLE_NAME
    FROM INFORMATION_SCHEMA.VIEWS
    WHERE TABLE_SCHEMA = 'dbo';

    OPEN view_cursor;

    FETCH NEXT FROM view_cursor INTO @ViewName;

    WHILE @@FETCH_STATUS = 0
    BEGIN
        PRINT @ViewName;
        FETCH NEXT FROM view_cursor INTO @ViewName;
    END

    CLOSE view_cursor
    DEALLOCATE view_cursor
END
GO
GRANT EXECUTE ON  [dbo].[hi_telecom] TO [stackholderUser]
GO
```

AgentUser

Type	Action	Owning Principal
Grant	EXECUTE	DianeUser
Grant	EXECUTE	BeckyUser
Grant	EXECUTE	StewartUser
Grant	EXECUTE	GregUser
Grant	EXECUTE	JimUser
Grant	EXECUTE	JoeUser
Grant	EXECUTE	MarthaUser
Grant	EXECUTE	DanUser

SQL Script

```
CREATE   PROCEDURE [dbo].[GET_CUSTOMER_INFO]
    @customer_id INT
AS
BEGIN
    -- Check if the customer ID exists
    IF NOT EXISTS (SELECT 1 FROM dbo.Customer WHERE Customer_ID = @customer_id)
    BEGIN
        PRINT 'Oops! Customer not found. Maybe they''re on a secret mission!';
        RETURN;
    END

    -- Your existing query here
    SELECT
        c.*,
        ci.*,
        isv.*,
        ps.*
    FROM
```

QAUser

Permissions

Type	Action	Owning Principal
Grant	EXECUTE	QAUser

SQL Script

```
CREATE   PROCEDURE [dbo].[HI_QA]
AS
BEGIN
    PRINT 'Welcome, QA Team!';
    PRINT 'Feel free to query the allowed views and gather valuable insights.';
END;
GO
ALTER AUTHORIZATION ON [dbo].[HI_QA] TO [dbo]
GO
GRANT EXECUTE ON  [dbo].[HI_QA] TO [QAUser]
GO
```

Stored Procedures in Action

	Procedure Name	Procedure Definition
15	Churned_Customer_Form	CREATE PROC Churned_Customer_Form (@Customer_I...
16	SelectAllCustomers	CREATE PROCEDURE SelectAllCustomers AS BEGIN S...
17	SelectCustomersByChurnStatus	CREATE PROCEDURE SelectCustomersByChurnStatus ...
18	DisplayChurnCustomerWithReason	CREATE PROCEDURE DisplayChurnCustomerWithReason...
19	CreateNewcomerForm	CREATE PROCEDURE CreateNewcomerForm @No_of...
20	ViewCustomerInfoPayment_Proc	CREATE PROC ViewCustomerInfoPayment_Proc AS BE...
21	GetServiceCustomer	CREATE PROC GetServiceCustomer (@Customer_ID I...
22	GetCountCallsALLTopic	CREATE PROC GetCountCallsALLTopic AS BEGIN SELE...
23	GetResolved	CREATE PROCEDURE GetResolved @agent_id INT AS...
24	GetCustomer	CREATE PROCEDURE GetCustomer @customer_id INT ...
25	GetCustomer_loc	CREATE PROCEDURE GetCustomer_loc @location_id IN...
26	NewcomersByContract	CREATE PROC NewcomersByContract @ContractTyp...
27	HighValueCustomers	CREATE PROC HighValueCustomers AS BEGIN SE...
28	GetRiskLevelCustomer_Proc	CREATE PROC GetRiskLevelCustomer_Proc (@Custom...

	Procedure Name	Procedure Definition
21	GetServiceCustomer	CREATE PROC GetServiceCustomer (@Customer_ID I...
22	GetCountCallsALLTopic	CREATE PROC GetCountCallsALLTopic AS BEGIN SELE...
23	GetResolved	CREATE PROCEDURE GetResolved @agent_id INT AS...
24	GetCustomer	CREATE PROCEDURE GetCustomer @customer_id INT ...
25	GetCustomer_loc	CREATE PROCEDURE GetCustomer_loc @location_id IN...
26	NewcomersByContract	CREATE PROC NewcomersByContract @ContractTyp...
27	HighValueCustomers	CREATE PROC HighValueCustomers AS BEGIN SE...
28	GetRiskLevelCustomer_Proc	CREATE PROC GetRiskLevelCustomer_Proc (@Custom...
29	GetCountCallsTopic	CREATE PROC GetCountCallsTopic (@topic varchar(30...
30	Agent_Success	CREATE PROCEDURE Agent_Success @agent_id INT ...
31	CallsHandledByAgent	CREATE PROC CallsHandledByAgent @AgentID INT A...
32	TAKING_OFFER	CREATE PROC TAKING_OFFER @OFFER_ID INT,@CUSTO...
33	GET_CUSTOMER_INFO	CREATE PROCEDURE GET_CUSTOMER_INFO @custo...
34	hi_telecom	CREATE PROCEDURE hi_telecom AS BEGIN PRIN...

CreateNewcomerForm

```sql
CREATE   PROCEDURE [dbo].[CreateNewcomerForm]
    @No_of_Dependent INT,
    @age int,
    @Has_Dependent BIT,
    @Has_Referrals BIT,
    @No_of_Referrals INT,
    @ChannelName VARCHAR(50),
    @Contract_Type VARCHAR(30),
    @gender varchar(20),
    @married BIT
AS
BEGIN
    DECLARE @Customer_ID INT = (SELECT MAX([Customer_ID]) FROM [dbo].[Customer]);
    SET @Customer_ID += 1
    DECLARE @channelID INT = (SELECT [Channel_ID] FROM [dbo].[Aquisition_Channel] WHERE
[Channel_Name] = @ChannelName)

    INSERT INTO [Customer] ([Customer_ID], [CLTV],[Gender], [Married], [No_of_Dependent],
[Has_Dependent],
    [Has_Referrals], [No_of_Referrals], [contract_type], [Age], [Channel_ID], [Status])
    VALUES
    (@Customer_ID, 0, @gender, @married, @No_of_Dependent, @Has_Dependent,
    @Has_Referrals, @No_of_Referrals, @Contract_Type, @age, @channelID, 'Joined');
```

Churned_Customer_Form

```
CREATE   PROC [dbo].[Churned_Customer_Form] (@Customer_ID int, @Feedback varchar(max), @Tenure
int, @Churn_Date date, @Reason varchar(max))
AS
BEGIN
    INSERT INTO [Churn_Customer] (Customer_ID,Feedback,Tenure_in_Month,Churn_Date)
    VALUES (@Customer_ID,@Feedback,@Tenure,@Churn_Date);

    INSERT INTO [Churn_Reason] (Reason_Description,Churned_ID,Churn_Category_ID)

    Select @Reason, @Customer_ID,
        CASE @Reason
        when 'Attitude of support person' then 1
        when 'Attitude of service provider' then 1
        when 'Competitor made better offer' then 2
        when 'Competitor had better devices' then 2
        when 'Competitor offered higher download speeds' then 2
        when 'Competitor offered more data' then 2
        when 'Lack of self-service on Website' then 3
        when 'Network reliability' then 3
        when 'Product dissatisfaction' then 3
        when 'Poor expertise of online support' then 3
        when 'Poor expertise of phone support' then 3
        when 'Limited range of services' then 3
        when 'Service dissatisfaction' then 3
        when 'Price too high' then 4
        when 'Lack of affordable download/upload speed' then 4
        when 'Long distance charges' then 4
        when 'Extra data charges' then 4
        else 'Other'
```

Triggers

Results | Messages

	Trigger Name	Trigger Definition
1	trg_offers_churnnn	CREATE TRIGGER trg_offers_churnnn ON [Custome...
2	trgCalculteDuration	CREATE TRIGGER trgCalculteDuration ON [dbo].[Call...
3	trg_offers_cltv	create trigger trg_offers_cltv on [Customer] AFTER I...
4	trg_UsagePct	CREATE TRIGGER trg_UsagePct ON CustomerIntern...
5	trg_UsageNoti	CREATE TRIGGER trg_UsageNoti ON [CustomerInter...
6	trg_MonthlyGBOffer	CREATE TRIGGER trg_MonthlyGBOffer ON [Customer...
7	trg_TotalExtraDataOffer	CREATE TRIGGER trg_TotalExtraDataOffer ON [Cust...

Views

Objects

Name
dbo.Acqclthionchanelwithnumberofcustomer
dbo.ahmed
dbo.AVGChargeService
dbo.countGenderCustomer
dbo.CustomerInternetInfo
dbo.ex
dbo.m
dbo.mx
dbo.TotalRevenueLossChurn
dbo.TotalRevenueStatus
dbo.V_#CallsAnswered_AndSatisfactionRate_PerCustomer
dbo.V_Number_Of_Customers_Per_City
dbo.V_Total_Revenue_Per_City
dbo.vw_AgentPerformance
dbo.vw_AvgMonthlyCharge
dbo.vw_CustByAgeGroup
dbo.vw_CustomerSatisfaction
dbo.vw_TopPerformingAgents

Building the Data Warehouse

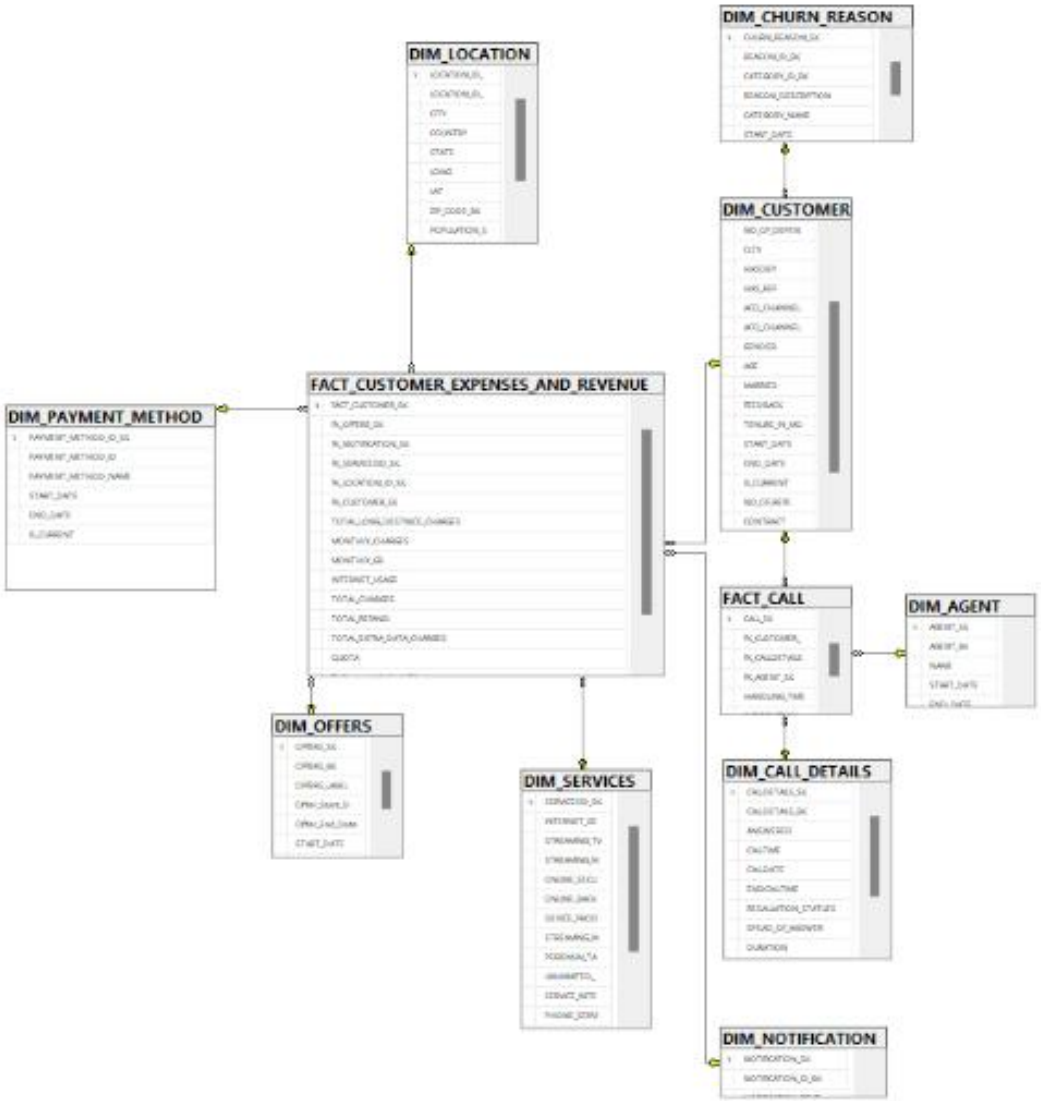
Designed and implemented a Galaxy schema DWH model for Telecom Customer Data

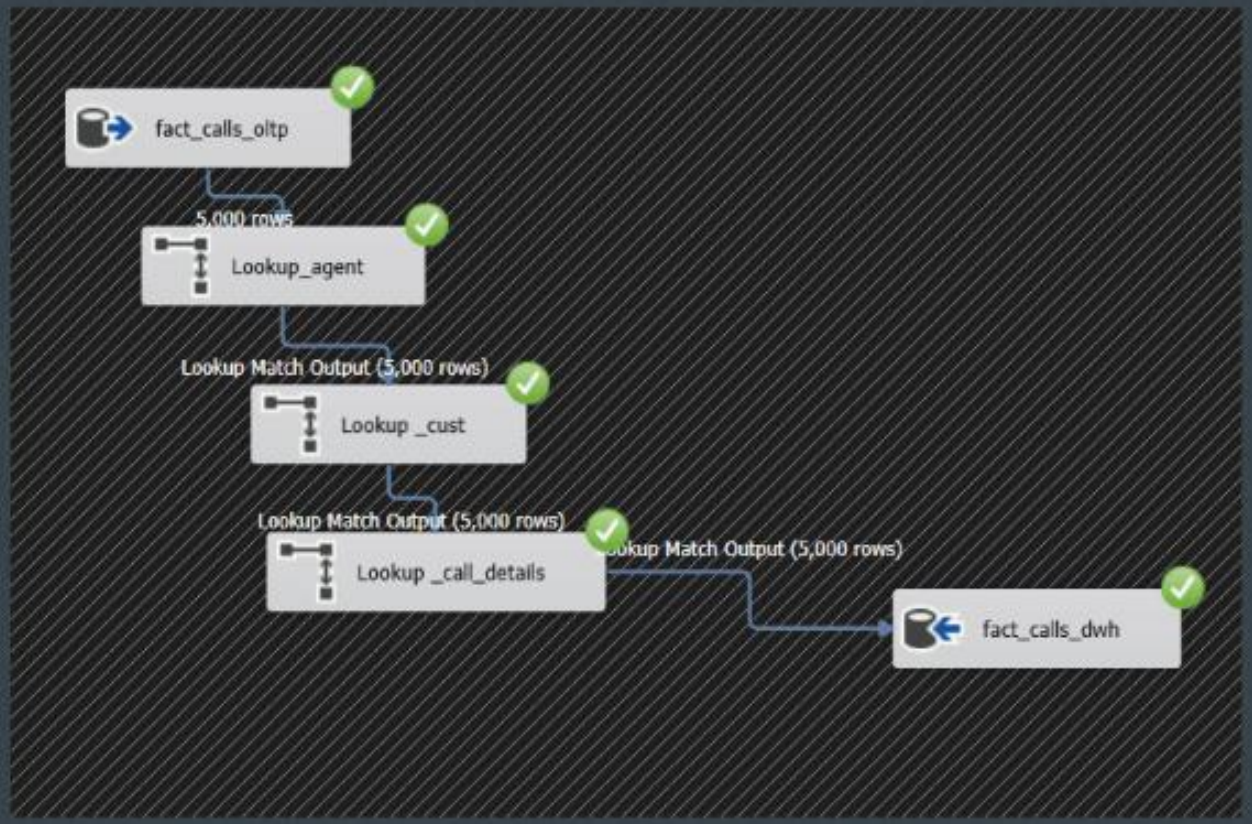
Optimized data storage for efficient querying and analysis.

Facilitated historical data aggregation for trend analysis.

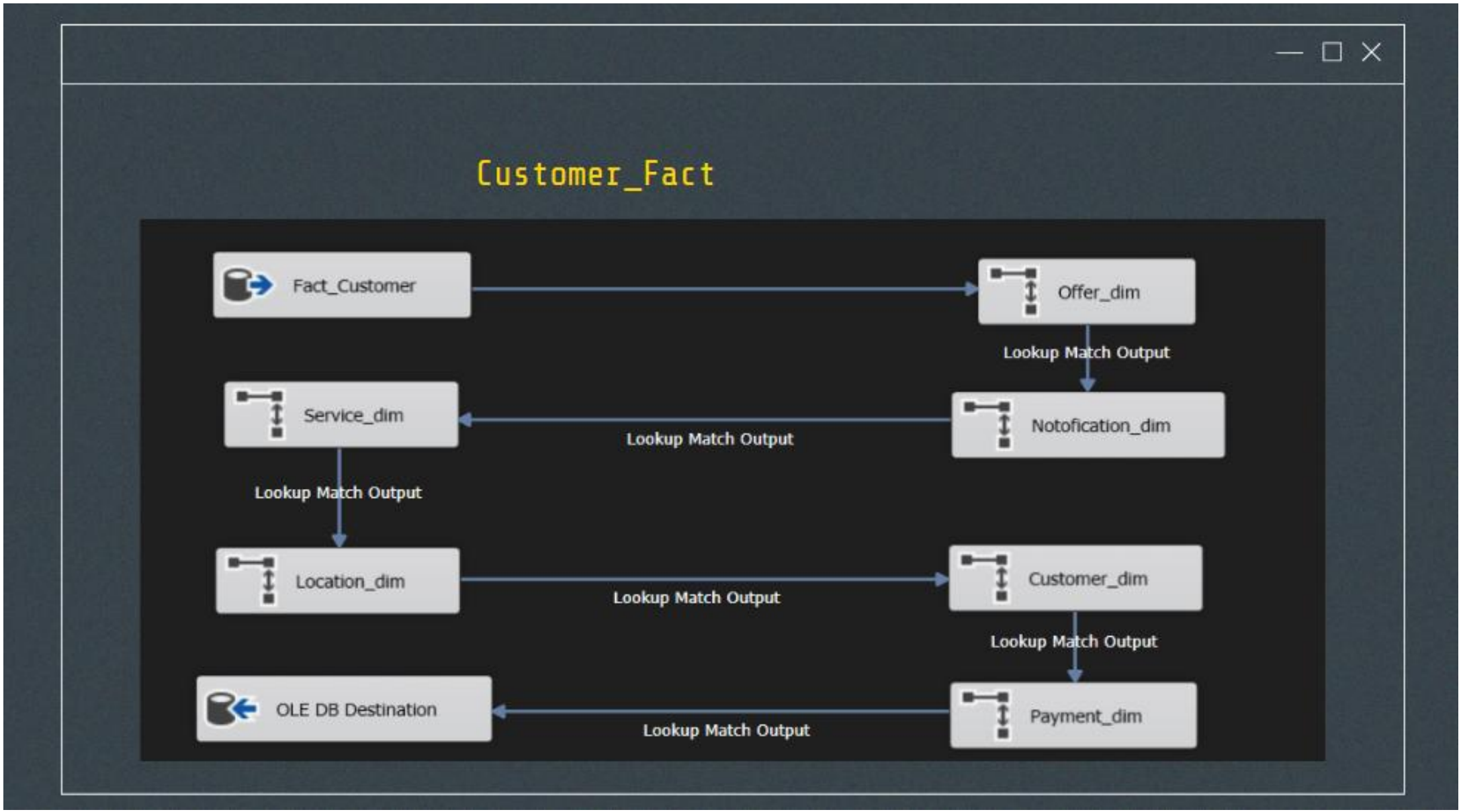
DWH MODEL

This GALAXY schema centralizes TWO fact (containing core metrics) surrounded by dimensions

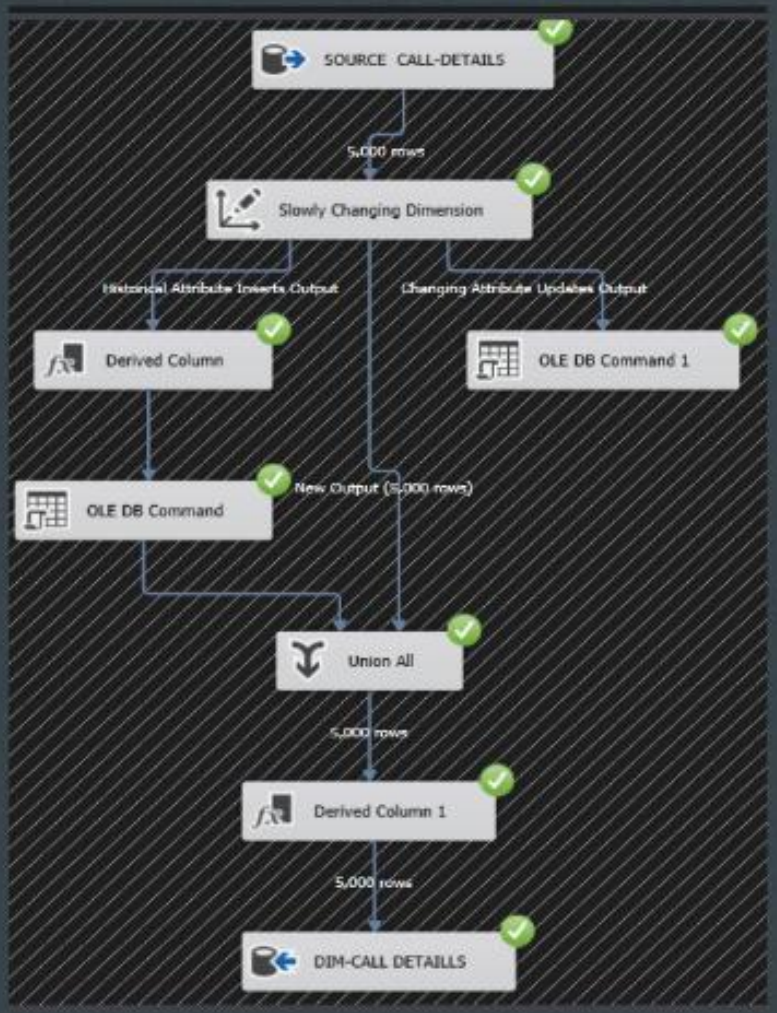



fact_calls_oltp
5,000 rows
Lookup_agent
Lookup Match Output (5,000 rows)
Lookup _cust
Lookup Match Output (5,000 rows)
Lookup _call_details
ookup Match Output (5,000 rows)
fact_calls_dwh

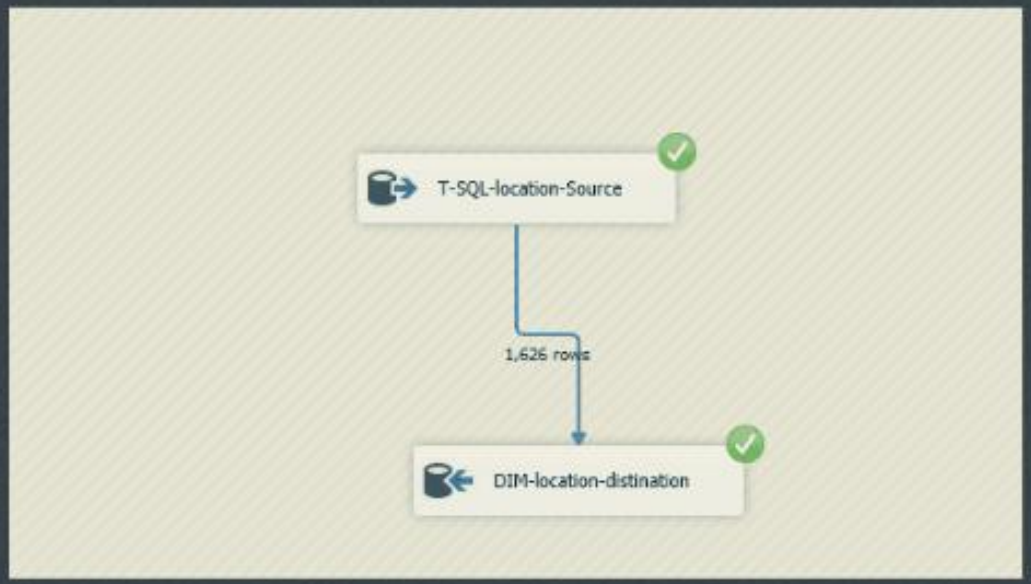
Calls Fact


Customer_Fact
Fact_Customer
Offer_dim
Lookup Match Output
Service_dim
Notofication_dim
Lookup Match Output
Lookup Match Output
Location_dim
Customer_dim
Lookup Match Output
Lookup Match Output
OLE DB Destination
Payment_dim
Lookup Match Output

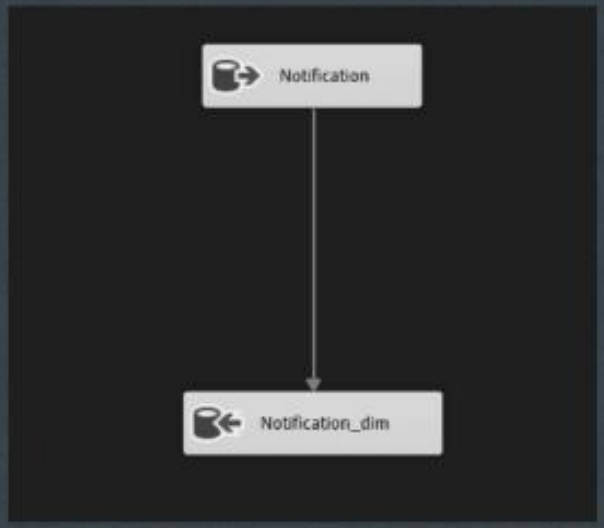
Services-Dim & CallDetails_Dim



Location_Dim



Notification_Dim



Business Intelligence & Reporting

Data analysis is only valuable if it translates into actionable insights.

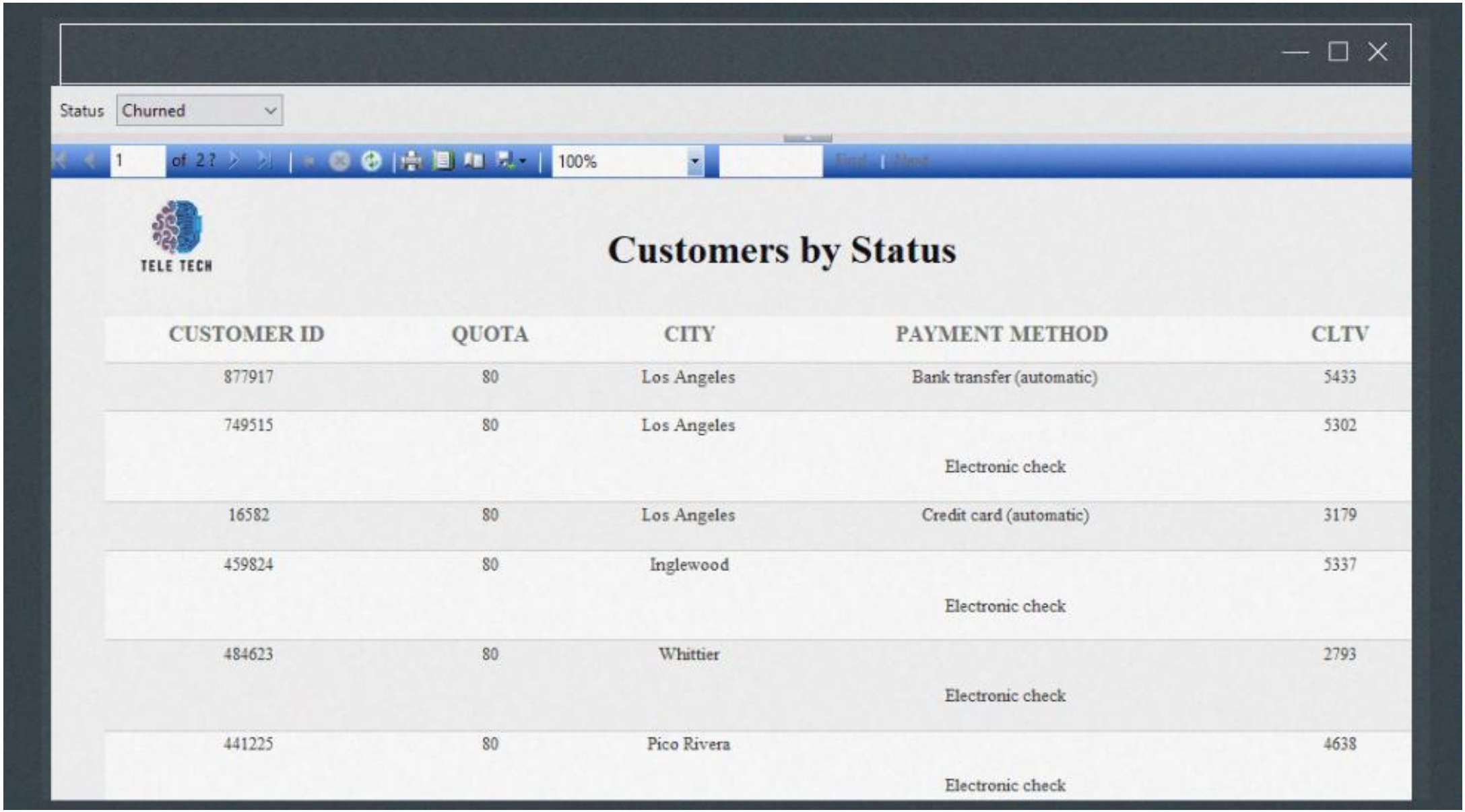
We utilized SSRS to create customized reports presented key metrics, trends and insights derived from the telecom customer data

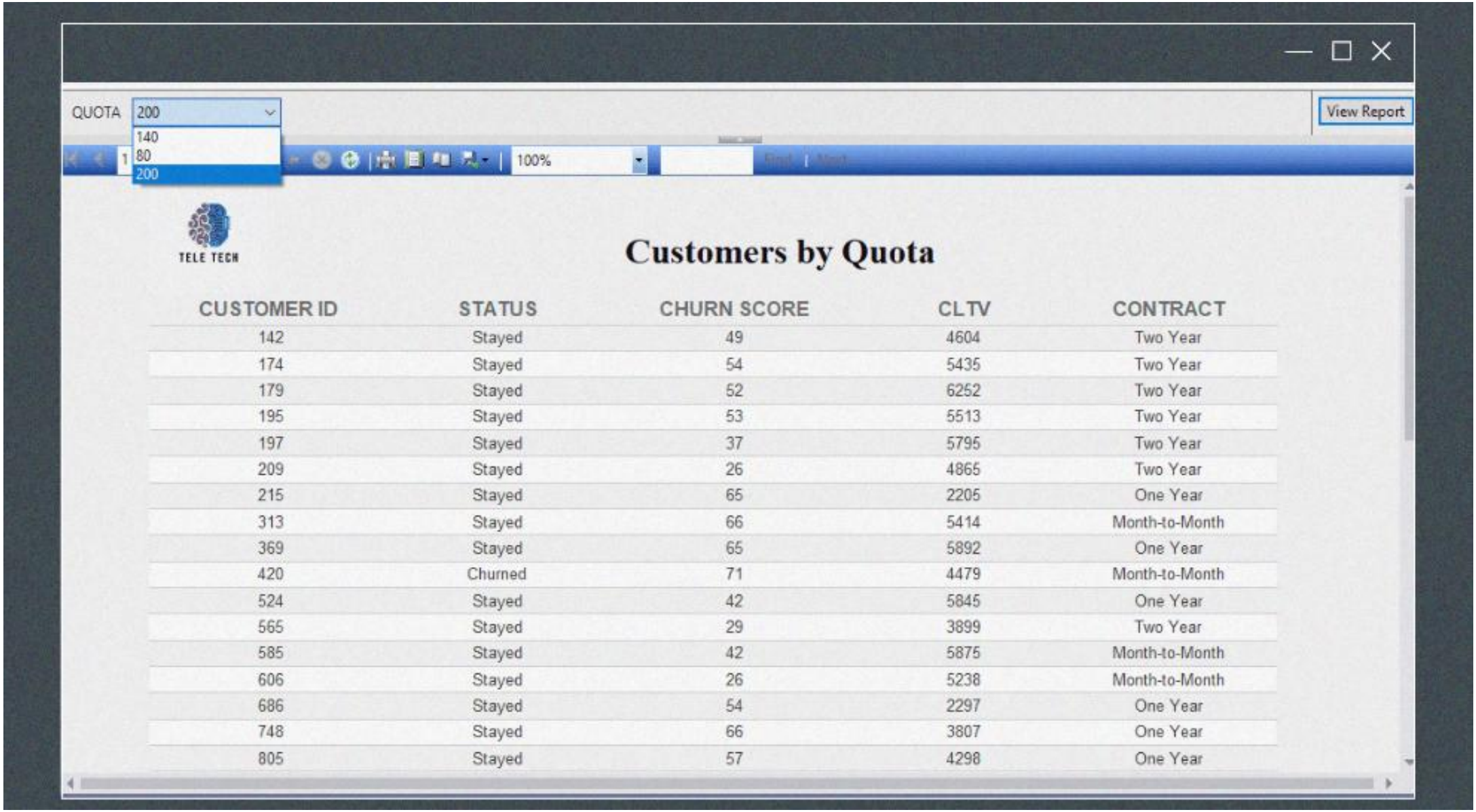
Customer-Payment linked report

TELE TECH

Payment method and location

CUSTOMER ID	PAYMENT METHOD	CITY
179	Credit card (automatic)	Sunnyvale


Status
Churned
1
of 2?
100%
TELE TECH
Customers by Status
CUSTOMER ID
QUOTA
CITY
PAYMENT METHOD
CLTV
877917
80
Los Angeles
Bank transfer (automatic)
5433
749515
80
Los Angeles
Electronic check
5302
16582
80
Los Angeles
Credit card (automatic)
3179
459824
80
Inglewood
Electronic check
5337
484623
80
Whittier
Electronic check
2793
441225
80
Pico Rivera
Electronic check
4638



CUSTOMER ID	STATUS	CHURN SCORE	CLTV	CONTRACT
142	Stayed	49	4604	Two Year
174	Stayed	54	5435	Two Year
179	Stayed	52	6252	Two Year
195	Stayed	53	5513	Two Year
197	Stayed	37	5795	Two Year
209	Stayed	26	4865	Two Year
215	Stayed	65	2205	One Year
313	Stayed	66	5414	Month-to-Month
369	Stayed	65	5892	One Year
420	Churned	71	4479	Month-to-Month
524	Stayed	42	5845	One Year
565	Stayed	29	3899	Two Year
585	Stayed	42	5875	Month-to-Month
606	Stayed	26	5238	Month-to-Month
686	Stayed	54	2297	One Year
748	Stayed	66	3807	One Year
805	Stayed	57	4298	One Year

TELE TECH

Customer Behaviour

Customer ID	Internet Usage	Quota	Monthly Charges	Total Charges	Total Extra Charges
7	590	200	116.800003051758	8456.75	0
16	570	200	103.699996948242	5656.75	0
24	590	200	78.1999969482422	2078.94995117188	0
27	530	200	99.9499969482422	3767.39990234375	0
29	850	200	50.3499984741211	314.549987792969	0
33	730	200	109.400001525879	6252.7001953125	0
37	730	200	69.4000015258789	571.450012207031	0
41	530	200	90.3499984741211	190.5	0
53	750	200	35.0499992370605	844.450012207031	0
55	820	200	85.25	855.299987792969	0
64	850	200	47.1500015258789	223.149993896484	0

TELE TECH

Customers By Age

CUSTOMER ID	STATUS	GENDER	MARRIED	HAS DEP	NO OF DEP	ACQUISITION	CONTRACT
179	Stayed	Female	True	True	2	Referal	Two Year
195	Stayed	Female	False	False	0	In Store	Two Year
306	Joined	Female	False	False	0	Marketing Campaigns	Month-to-Month
524	Stayed	Male	True	False	0	Referal	One Year
565	Stayed	Male	True	True	1	Referal	Two Year
962	Stayed	Female	True	False	0	Referal	Month-to-Month
982	Stayed	Male	False	False	0	Marketing Campaigns	Month-to-Month
1067	Stayed	Male	False	False	0	In Store	Month-to-Month
1313	Stayed	Female	False	True	3	In Store	Month-to-Month
1863	Stayed	Male	False	False	0	Social Media	One Year
1887	Joined	Male	False	False	0	In Store	Month-to-Month
1915	Stayed	Female	False	True	3	In Store	Two Year
1959	Churned	Male	True	False	0	Referal	Month-to-Month

Churned Customers by category

	CATEGORY NAME	CUSTOMER ID
⊞	Attitude	320
⊞	Competitor	606

Churn by Category

Churned Customers by category

	CATEGORY NAME	CUSTOMER ID
⊟	Attitude	320
⊟	Competitor	606
⊟	Dissatisfaction	454

customer_Details

City	Customer ID	Age	Married	Monthly GB	Churn Score
Sun City	79271	45	False	8	76
Sun City	682521	47	False	23	81
Sun City	839713	22	True	52	72

Churned by city

City	Customer Number
Los Alamitos	1
Grass Valley	1
Fontana	3
Garden Grove	4
Hermersville	1
Sun City	3
Selyor	1
Calexico	1

Churn & City linked report

Agent & Calls linked report

Handling Calls By Agent

NAME	Incoming Calls	Answered Calls
Dan	633	523
Joe	593	484
Jim	666	536
Becky	631	517
Greg	624	502
Stewart	582	477
Martha	638	514
Diane	633	501

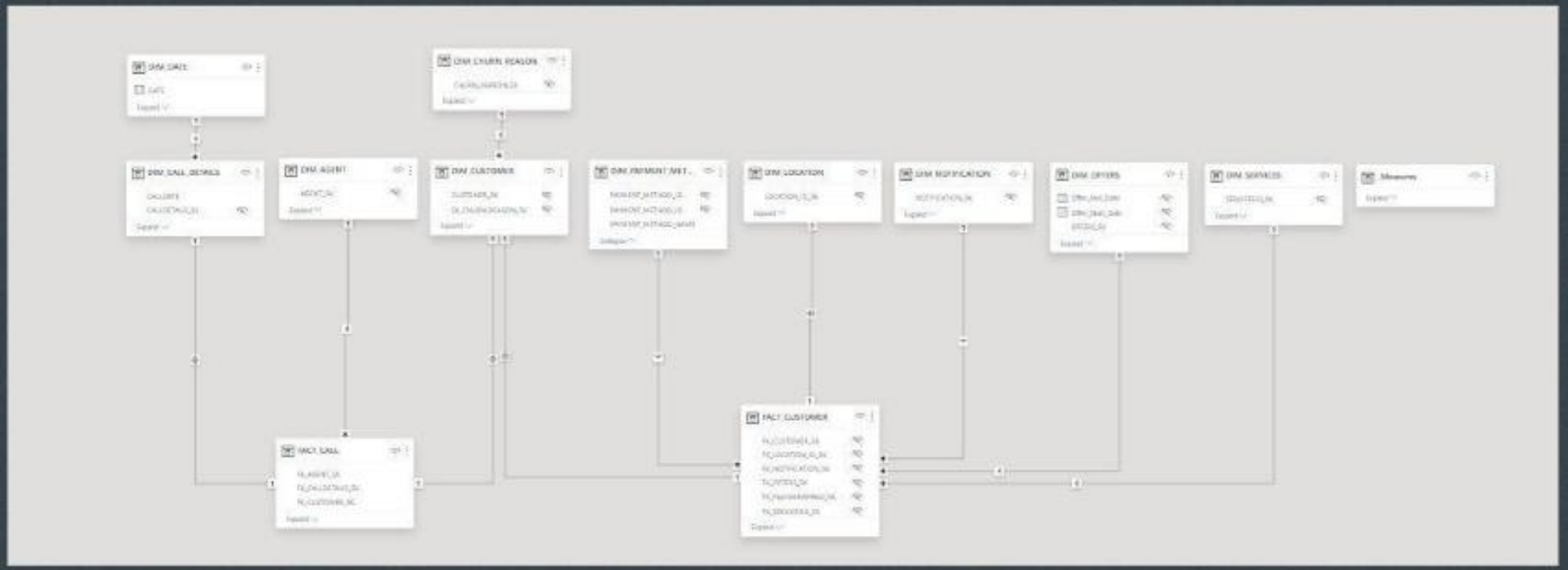
Call Details

Name	Customer ID	Satisfaction Rate	Handling Time	Spead Of Answer	Duration
Becky	4	3	57	70	5
Becky	7	3	62	66	1
Becky	17	4	62	48	4
Becky	18	2	57	60	6
Becky	20	0	57	0	0
Becky	37	5	62	119	1
Becky	48	5	57	90	3
Becky	57	3	57	35	1
Becky	76	1	62	122	5
Becky	81	3	57	50	3
Becky	87	5	62	100	5

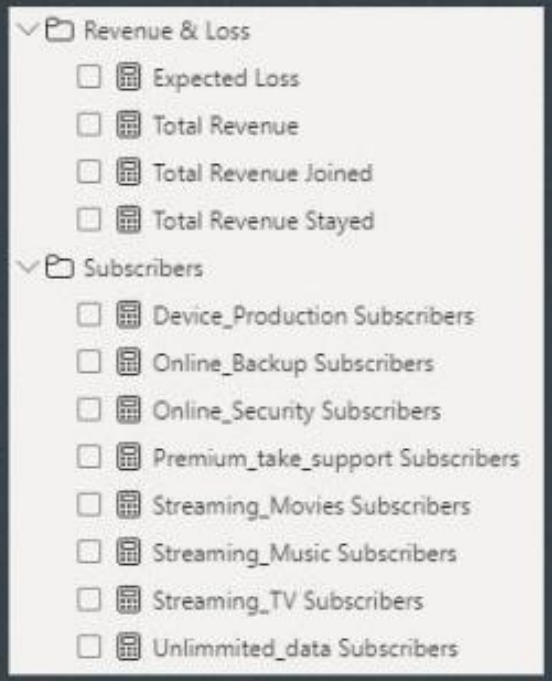
Advanced Analytics & Visualization

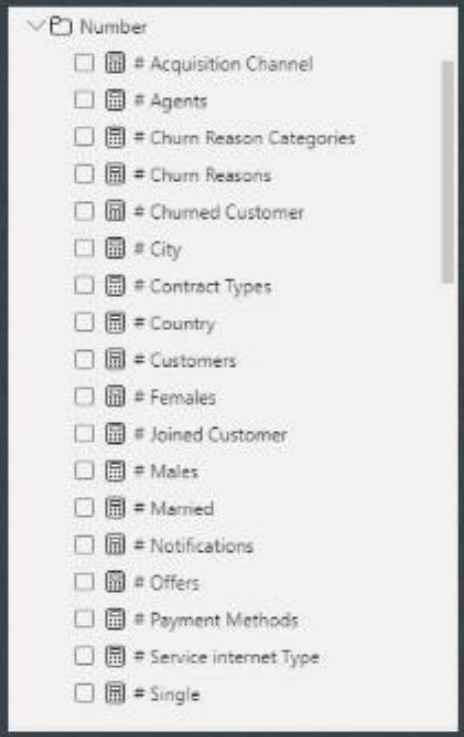
- create interactive dashboards for deeper data exploration.
- Enabled users discover hidden patterns.
- Provided a dynamic platform for monitoring customer churn and evaluating retention strategies.

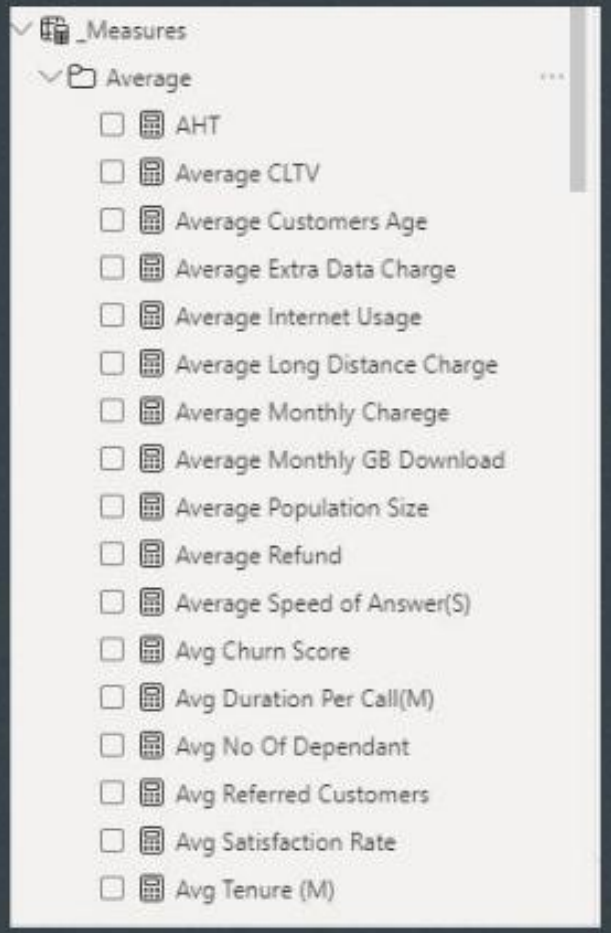
GALAXY DATA MODEL



Unveiling Churn Insights with DAX Measures







TELE TECH

- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
- Agent
- Company Revenue
- Company Loss
- Insights

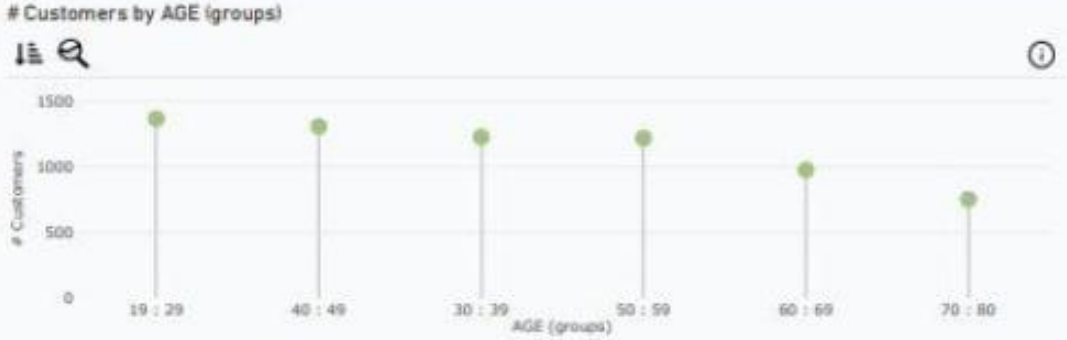
Hello!
Happy To See You Again.

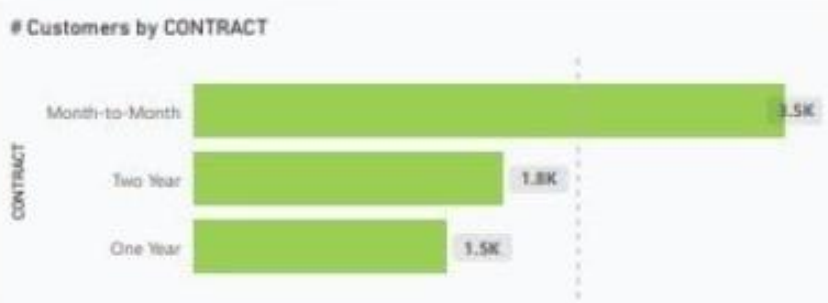
6861
Customers

4591
Stayed Customer

440
Joined Customer

1830
Churned Customer






TELE TECH
Customer Info
Customer Geo
Internet Services
Churned Customers
Correlations
Calls Summary
Agent
Company Revenue
Company Loss
Insights
6861
Customers
4
Acquisition Channel
4
Payment Methods
Customers by ACQ_CHANNEL_NAME
ACQ_CHANNEL_NAME
Referal
3138
Marketing Campaigns
1895
Social Media
941
In Store
887
Customers by PAYMENT_METHOD_NAME
3.5K
2.3K
0.9K
0.1K
Credit card (automatic)
Electronic check
Bank transfer (automatic)
Mailed Check
PAYMENT_METHOD_NAME
Customers by GENDER
Male
Female
3K (50%)
3K (50%)

TELE TECH

- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
- Agent
- Company Revenue
- Company Loss
- Insights

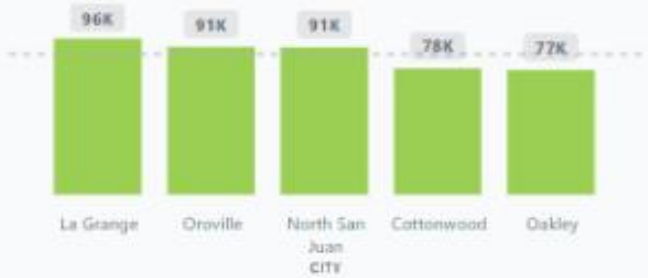
1
Country

1
State

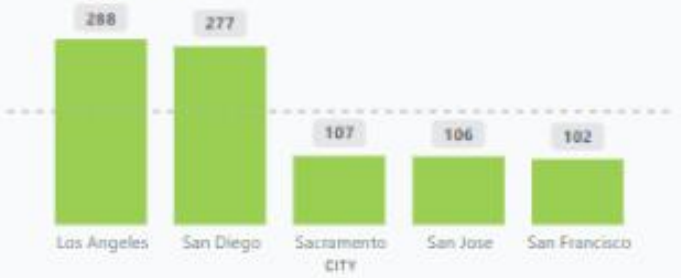
1106
City

Customers by CITY

Average Population Size by CITY



Customers by CITY




TELE TECH
Customer Info
Customer Geo
Internet Services
Churned Customers
Correlations
Calls Summary
Agent
Company Revenue
Company Loss
Insights
2363
Device_Production S...
2366
Online_Backup Subs...
2425
Streaming_Music Su...
1963
Online_Security Subs...
2667
Streaming_Movies S...
2639
Streaming_TV Subscr...
1987
Premium_take_supp...
4624
Unlimmited_data Su...
Customers by SERVICE_INTERNET_TYPE
2953
1611
813
Fiber Optic
DSL
Cable
SERVICE_INTERNET_TYPE
Stayed Customer, # Joined Customer and # Churned Customer by SERVICE_INTERNET_TYPE
Stayed Customer
Joined Customer
Churned Customer
1.7K
1.2K
0.5K
Fiber Optic
DSL
Cable
SERVICE_INTERNET_TYPE


TELE TECH
Customer Info
Customer Geo
Internet Services
Churned Customers
Correlations
Calls Summary
Agent
Company Revenue
Company Loss
Insights
1830
Churned Customer
5
Churn Reason Cate...
20
Churn Reasons
96
Max Churn Score
Churned Customer by AGE (groups)
317
312
303
302
300
296
70 : 80
40 : 49
30 : 39
60 : 69
50 : 59
19 : 29
AGE (groups)
Churned Customer by GENDER
Female
Male
907
(49.56%)
923
(50.44%)
Churned Customer by CATEGORY_NAME
CATEGORY_NAME
Competitor
606
Dissatisfaction
454
Attitude
320
Price
239
Other
211
Churned Customer by REASON_DESCRIPTION
REASON_DESCRIPTION
Competitor offered...
187
Attitude of support...
186
Competitor offered...
157
Don't know
152
Competitor made ...
139

TELE TECH

- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
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- Company Revenue
- Company Loss
- Insights

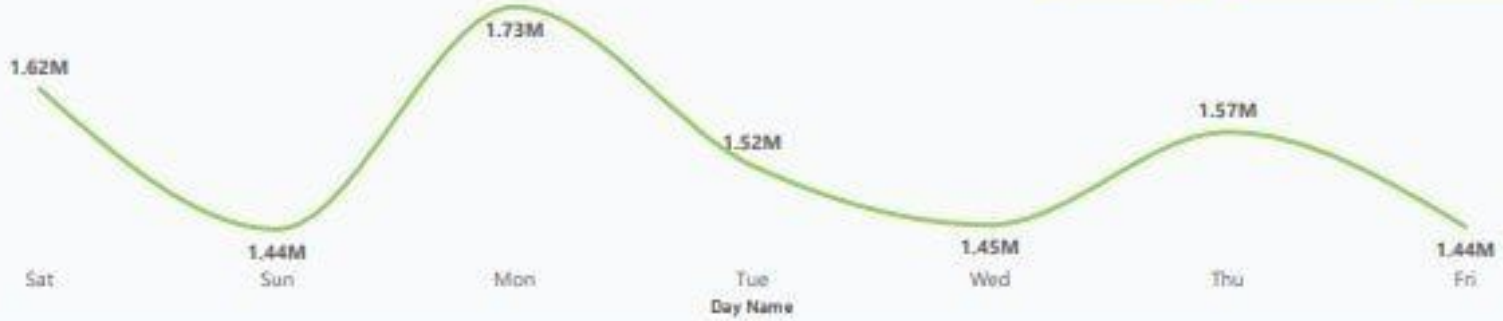
14,652,137.85
Total Revenue

11,846,052.06
Total Revenue Stayed

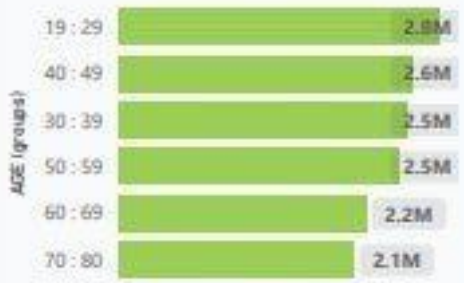
29,197.90
Total Revenue Joined

Total Revenue by Day Name

Month | Week | Day

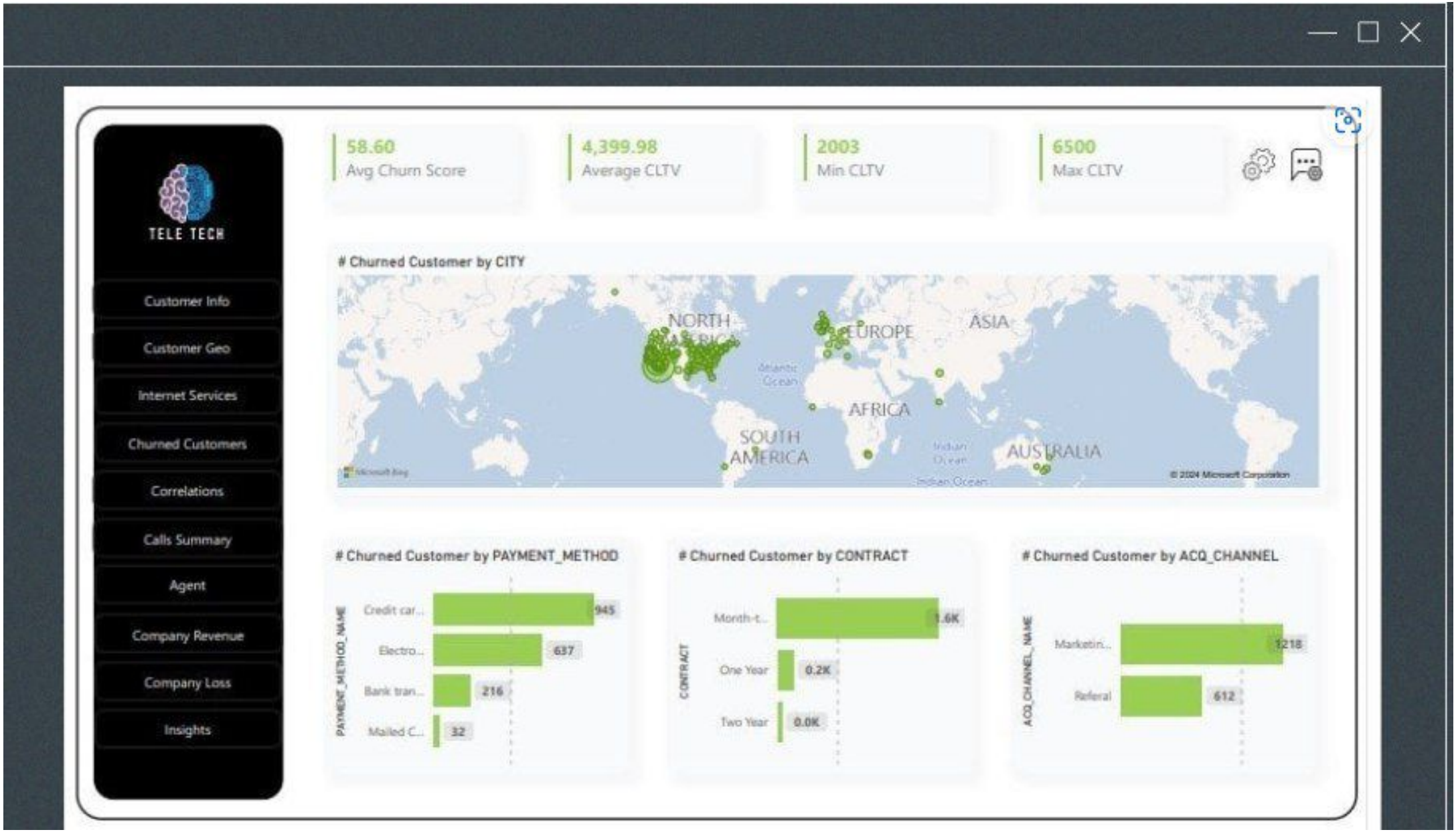


Total Revenue by AGE (groups)



Total Revenue by ACQ_CHANNEL_NAME

Total Revenue by CONTRACT


TELE TECH
Customer Info
Customer Geo
Internet Services
Churned Customers
Correlations
Calls Summary
Agent
Company Revenue
Company Loss
Insights
58.60
Avg Churn Score
4,399.98
Average CLTV
2003
Min CLTV
6500
Max CLTV
Churned Customer by CITY
NORTH AMERICA
EUROPE
ASIA
AFRICA
SOUTH AMERICA
AUSTRALIA
Atlantic Ocean
Indian Ocean
© 2024 Microsoft Corporation
Churned Customer by PAYMENT_METHOD
PAYMENT_METHOD_NAME
Credit car...
945
Electro...
637
Bank tran...
216
Mailed C...
32
Churned Customer by CONTRACT
CONTRACT
Month-t...
1.6K
One Year
0.2K
Two Year
0.0K
Churned Customer by ACQ_CHANNEL
ACQ_CHANNEL_NAME
Marketin...
1218
Referal
612

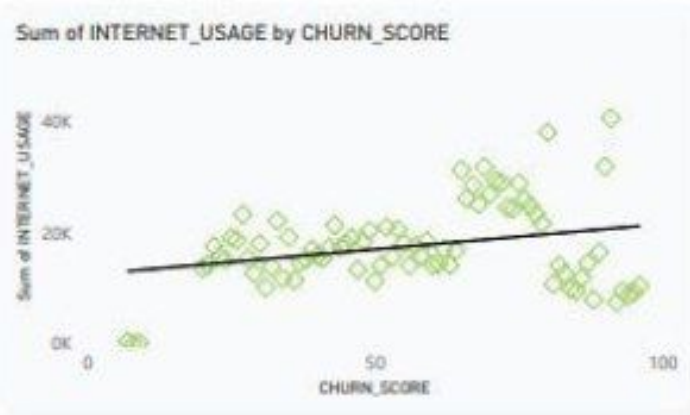
TELE TECH

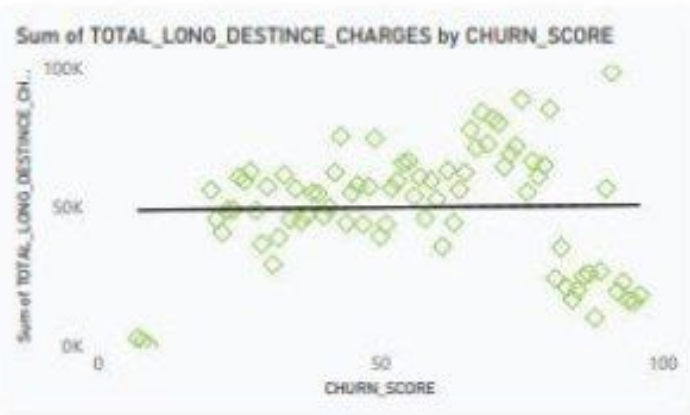
- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
- Agent
- Company Revenue
- Company Loss
- Insights

REASON_DESCRIPTION	# Churned Customer
Competitor offered higher download speeds	187
Attitude of support person	186
Competitor offered more data	157
Don't know	152
Competitor made better offer	139
Attitude of service provider	134
Competitor had better devices	123
Product dissatisfaction	102
Network reliability	101
Price too high	97
Lack of self-service on Website	87
Service dissatisfaction	86
Total	**1830**

TELE TECH

- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
- Agent
- Company Revenue
- Company Loss
- Insights



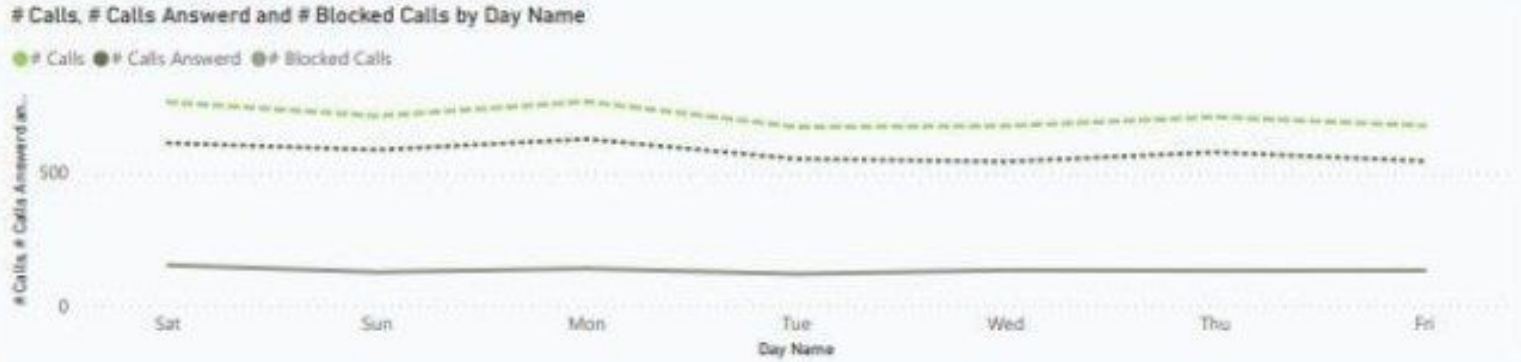



TELE TECH
Customer Info
Customer Geo
Internet Services
Churned Customers
Correlations
Calls Summary
Agent
Company Revenue
Company Loss
Insights
5000
Calls
4054
Calls Answerd
946
Blocked Calls
3646
Calls Resolved
0.73
Calls Success Rate
Calls by Day Name
Month
Week
Week
768
716
770
675
679
712
714
680
Sat
Sun
Mon
Tue
Wed
Thu
Fri
Calls by CATEGORY_NAME
CATEGORY_NAME
Competitor
Dissatisfaction
Attitude
Price
Other
446
330
253
170
163
Calls by WeekDay VS WeekEnd
WeekDay
WeekEnd
1K (28.96%)
4K (71.04%)

TELE TECH

- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
- Agent
- Company Revenue
- Company Loss
- Insights

8	2.76	54.75	3.03
# Agents	Avg Satisfaction Rate	Average Speed of An...	AHT



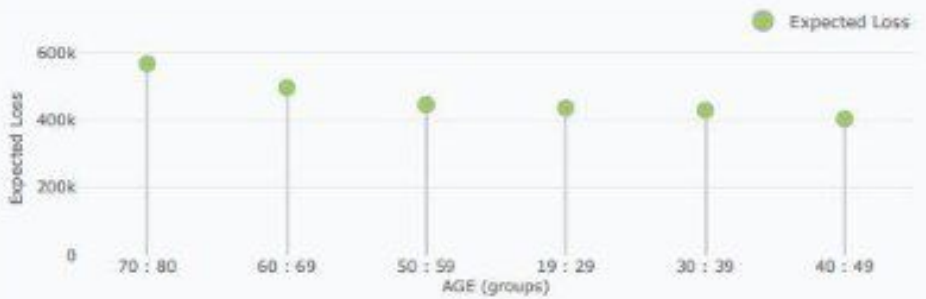
NAME	# Calls	# Calls Answerd	# Calls Resolved	# Calls Failed	AHT	Satisfaction Rate
Dan	633	523	471	162	3.19	2.85
Martha	638	514	461	177	3.01	2.80
Stewart	582	477	424	158	3.07	2.79
Becky	631	517	462	169	2.99	2.76
Greg	624	502	455	169	3.02	2.74
Jim	666	536	485	181	3.06	2.73
Joe	593	484	436	157	3.06	2.72
Total	**5000**	**4054**	**3646**	**1354**	**3.03**	**2.76**


TELE TECH
Customer Info
Customer Geo
Internet Services
Churned Customers
Correlations
Calls Summary
Agent
Company Revenue
Company Loss
Insights
14,652,137.85
Total Revenue
11,846,052.06
Total Revenue Stayed
29,197.90
Total Revenue Joined
Total Revenue by Day Name
Month
Week
Day
1.62M
1.44M
1.73M
1.52M
1.45M
1.57M
1.44M
Sat
Sun
Mon
Tue
Wed
Thu
Fri
Day Name
Total Revenue by AGE (groups)
AGE (groups)
19 : 29
40 : 49
30 : 39
50 : 59
60 : 69
70 : 80
2.8M
2.6M
2.5M
2.5M
2.2M
2.1M
Total Revenue by ACQ_CHANNEL_NAME
ACQ_CHANNEL_NAME
Referal
Marketin...
Social Me...
In Store
8.9M
2.8M
1.5M
1.4M
Total Revenue by CONTRACT
CONTRACT
Two Year
Month-to...
One Year
5.9M
4.5M
4.3M

TELE TECH

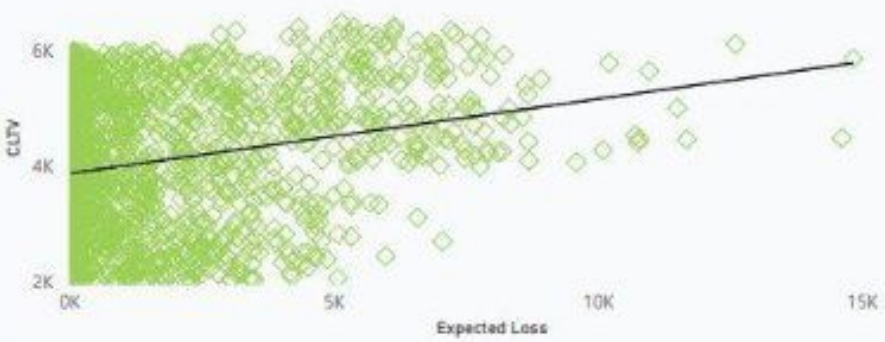
- Customer Info
- Customer Geo
- Internet Services
- Churned Customers
- Correlations
- Calls Summary
- Agent
- Company Revenue
- Company Loss
- Insights

Expected Loss by AGE (groups)

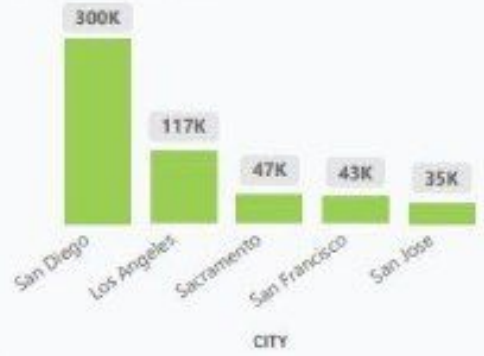


Expected Loss by CATEGORY_NAME

Expected Loss by CLTV



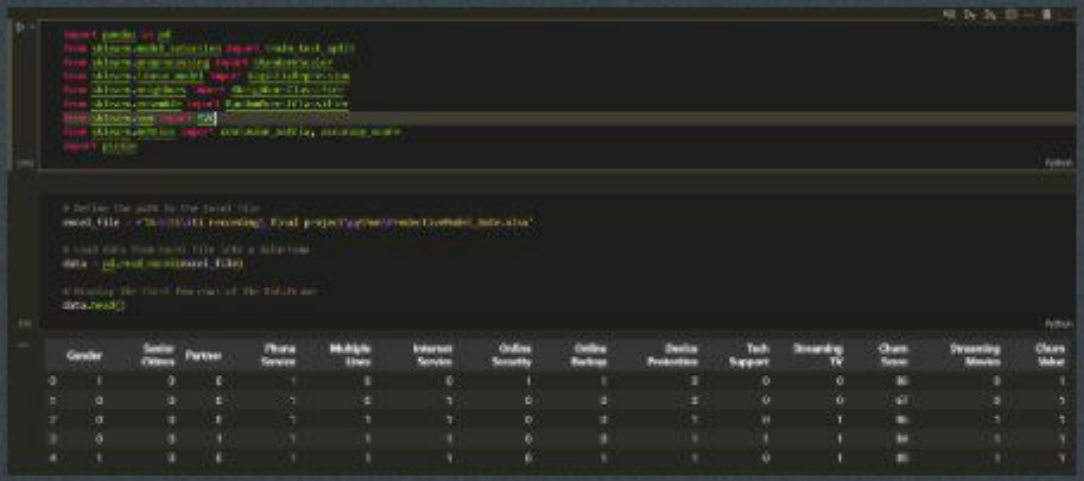
Expected Loss by CITY



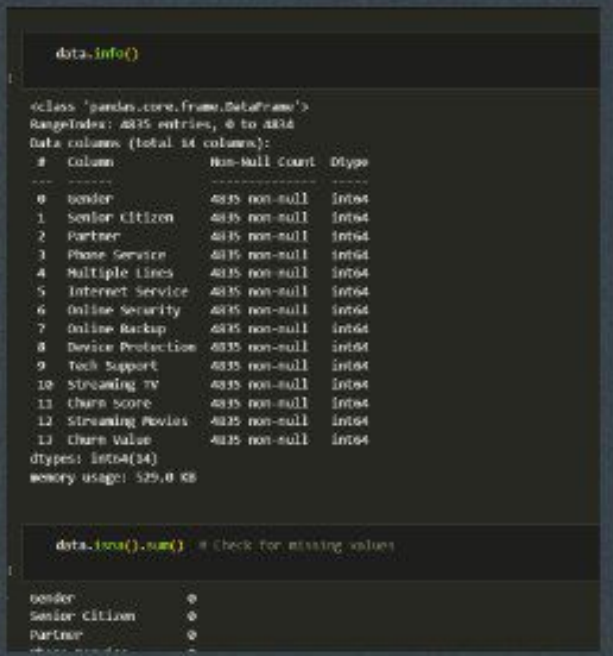
Building Our Churn Prediction model

- Data Exploration& Cleaning : Analyze customer data to identify churn patterns & relationships.
- Test-Train Split: Divide data into training (model learning) and testing (model evaluation) sets.
- Model Building & Training: Choose a model type (Logistic Regression) to analyze data and predict churn probability.
- Train the model on the training data to identify patterns associated with churn.
- Interactive Churn Prediction UI: using Flask to display predicted churn probabilities Users can input customer data and receive the model's prediction on their churn risk

Data Exploration & Cleaning

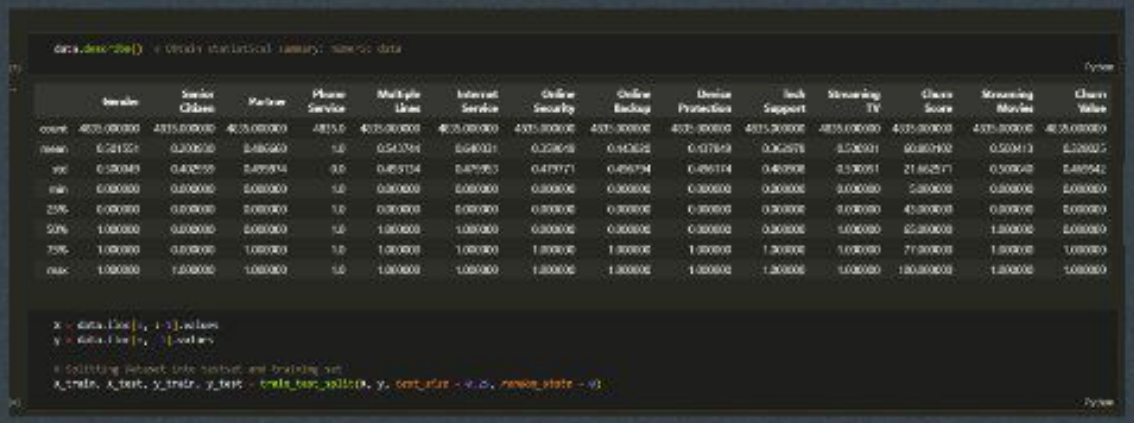


Gender	Senior Citizen	Partner	Phone Service	Multiple Lines	Internet Service	Online Security	Online Backup	Device Protection	Tech Support	Streaming TV	Churn Score	Streaming Movies	Churn Value
0	1	0	0	1	0	0	1	1	0	0	86	0	1
1	0	0	0	1	0	1	0	0	0	0	67	0	1
2	0	0	0	1	1	1	0	0	1	0	86	1	1
3	0	0	1	1	1	1	0	0	1	1	84	1	1
4	1	0	0	1	1	1	0	1	1	0	89	1	1



```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4835 entries, 0 to 4834
Data columns (total 14 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   Gender            4835 non-null   int64
 1   Senior Citizen    4835 non-null   int64
 2   Partner           4835 non-null   int64
 3   Phone Service     4835 non-null   int64
 4   Multiple Lines    4835 non-null   int64
 5   Internet Service  4835 non-null   int64
 6   Online Security   4835 non-null   int64
 7   Online Backup     4835 non-null   int64
 8   Device Protection 4835 non-null   int64
 9   Tech Support      4835 non-null   int64
 10  Streaming TV      4835 non-null   int64
 11  Churn Score       4835 non-null   int64
 12  Streaming Movies  4835 non-null   int64
 13  Churn Value       4835 non-null   int64
dtypes: int64(14)
memory usage: 529.0 KB
```

```
Gender              0
Senior Citizen      0
Partner             0
```



Test-Train Split

```
# Feature Scaling
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)
```

[9] Python

```
LR_c = LogisticRegression()
RF_c = RandomForestClassifier(n_estimators = 10, criterion = 'entropy')
KNN_c = KNeighborsClassifier(n_neighbors = 5, metric = 'minkowski', p = 2)
SVM_c = SVC(kernel = 'rbf', random_state = 0)

classifier = [LR_c,RF_c,KNN_c,SVM_c]
for cl in classifier:
    cl.fit(X_train,y_train)
```

[11] Python

```
for cl in classifier:
    pred = cl.predict(X_test)
    print(cl," accuracy is : ",accuracy_score(y_test,pred))
    print(cl,"confusion matrix-")
    print(confusion_matrix(y_test,pred))
    print()
```

[12] Python

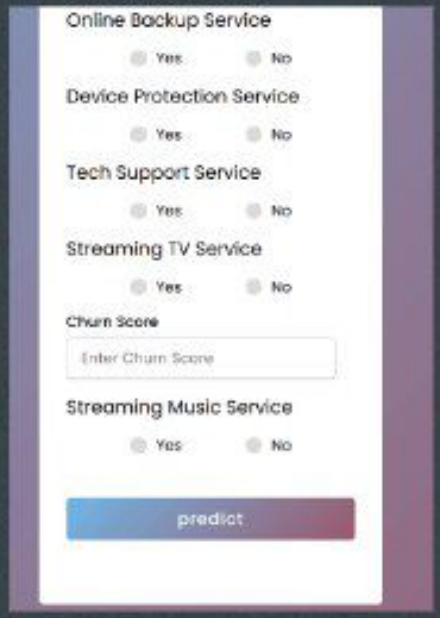
```
LogisticRegression()  accuracy is :  0.8751033912324235
LogisticRegression() confusion matrix-
[[720  84]
```

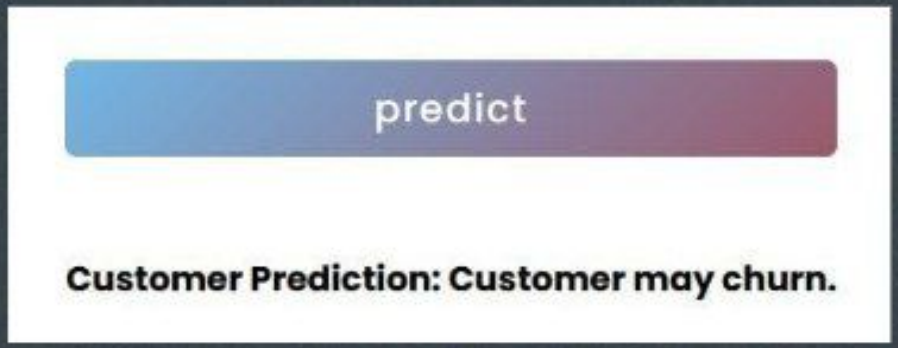
Model Building & Training: Achieving 87.5% Churn Prediction Accuracy

```
LogisticRegression()  accuracy is :  0.8751033912324235
LogisticRegression() confusion matrix-
[[720  84]
 [ 67 338]]

RandomForestClassifier(criterion='entropy', n_estimators=10)  accuracy is :  0.8610421836228288
RandomForestClassifier(criterion='entropy', n_estimators=10) confusion matrix-
[[726  78]
 [ 90 315]]

KNeighborsClassifier()  accuracy is :  0.815550041356493
KNeighborsClassifier() confusion matrix-
[[691 113]
 [110 295]]

SVC(random_state=0)  accuracy is :  0.8684863523573201
SVC(random_state=0) confusion matrix-
[[719  85]
 [ 74 331]]
```

UI for Prediction Results

```python
import numpy as np
from flask import Flask, request, jsonify, render_template
import pickle

app = Flask(__name__)
model = pickle.load(open('LR_C.pkl', 'rb'))# loads ML model

@app.route('/')
def home():
    return render_template('index.html')# renders index.html

@app.route('/predict',methods=['POST'])# gets the values that were sent in 'predict' by 'index.html'
def predict():
    int_features = [float(x) for x in request.form.values()]# defines the form values in an array
    final_features = [np.array(int_features)]# turns the form values into a Numpy array
    prediction = model.predict(final_features)# makes a prediction using the values in the created Numpy array

    output = prediction[0]# gets the prediction as a string
    if output == 1:
        output = "Customer may churn."
    else:
        output = "Customer may not churn"

    return render_template('index.html', prediction_text='Customer Prediction: {}'.format(output))# displays the prediction inside the '{{ prediction_text }}' that

if __name__ == "__main__":
    app.run(debug=True)# Runs the Web App
```





Tools Behind Project

Data Management & Modeling:
LucidChart,SQL Server , SSMS ,Excel,Power BI

Data Analysis & Machine Learning:
Python,Scikit-learn, Pickle, Flask

Data Visualization & SQL BI:
Power BI,SSAS,SSRS

Project Management & Collaboration:
Trello ,Github ,Teams


Thanks!
"The best way to predict the future is to create it."
- Peter Drucker