U.S. Real Estate?

Explore 3 years (2023,2024,2025) of U.S. real estate in Chicago, Houston, Los Angeles , Miami , New York ,its challenges, and strategic future actions. This presentation highlights critical market insights paired with a sleek gold and black theme for a premium feel.

Agenda

1 **Introduction**

Project overview and objectives.

2 **Technical Steps**

How we built the solution (Azure Database to Dashboard).

3 **Insights Gained**

Key findings from the data.

4 **Recommendations**

Actions based on the insights.

5 **Conclusion**

Summary and next steps.

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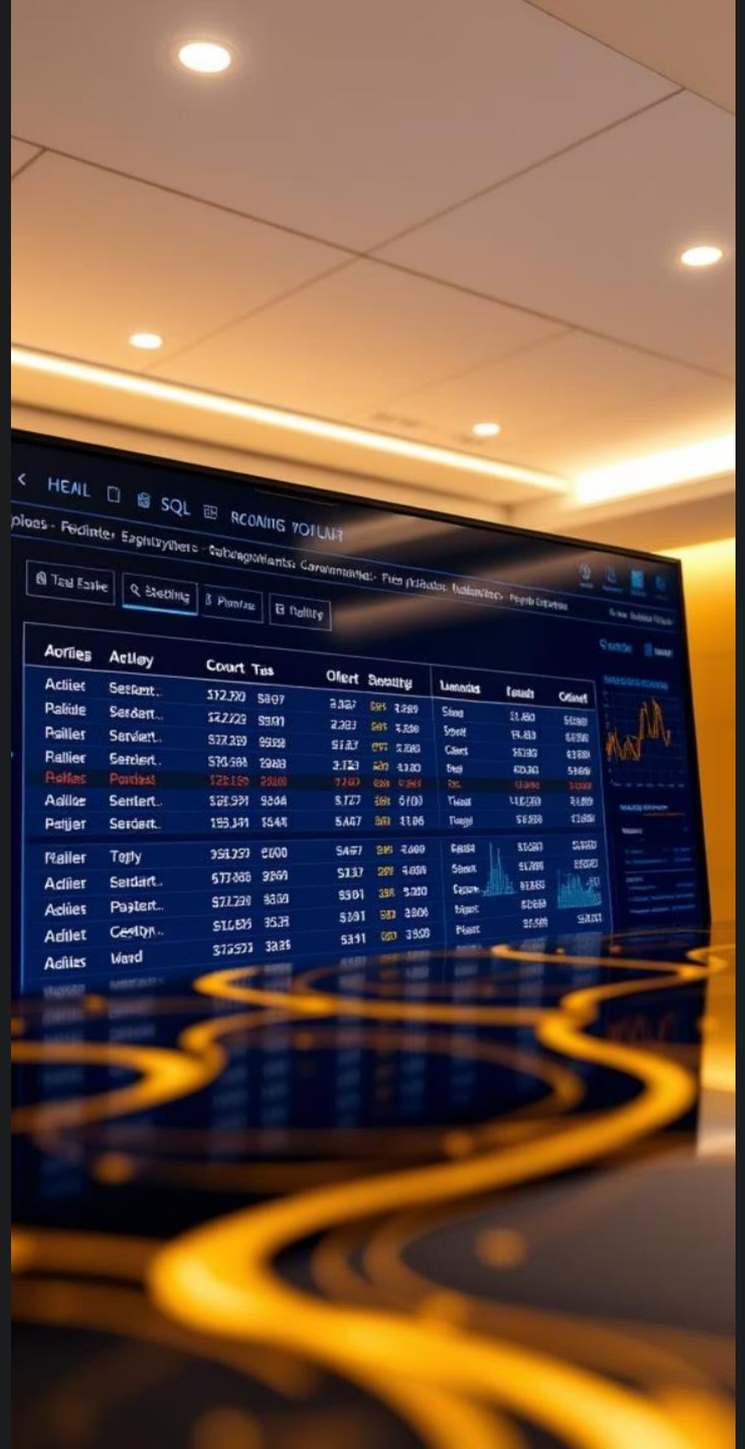

Technical Steps

Creating an Azure SQL Database

Action: Provisioned an Azure SQL Database to host real estate data.

Why Azure?: Scalability, security, and integration with Power BI.

Importing Data

Action: Imported datasets (properties, visits, sales, agents, etc.) into the SQL database.

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Introduction

Objective

Improve understanding of real estate performance.

Leverage data to support business decisions.

Scope

Track property sales, visits, and performance metrics.

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Tools We Use :

- Microsoft Azure ➔Secure cloud storage and scalable analytics.
- SQL ➔ SQL Server
- Python & Machine Learning ➔Pandas , Plotly , Seaborn ,Matplotlib , scikit learn
- Power BI ➔ Visualize insights for decision-making.

Key Metrics We Track:

🏠 Property Analytics: Market trends, pricing, and inventory.

📈 Sales Performance: Deals closed, revenue, and growth.

Agent & Client Engagement: Agent productivity and client interactions.

📍 Location-Based Insights: Neighborhood demand and investment hotspots.

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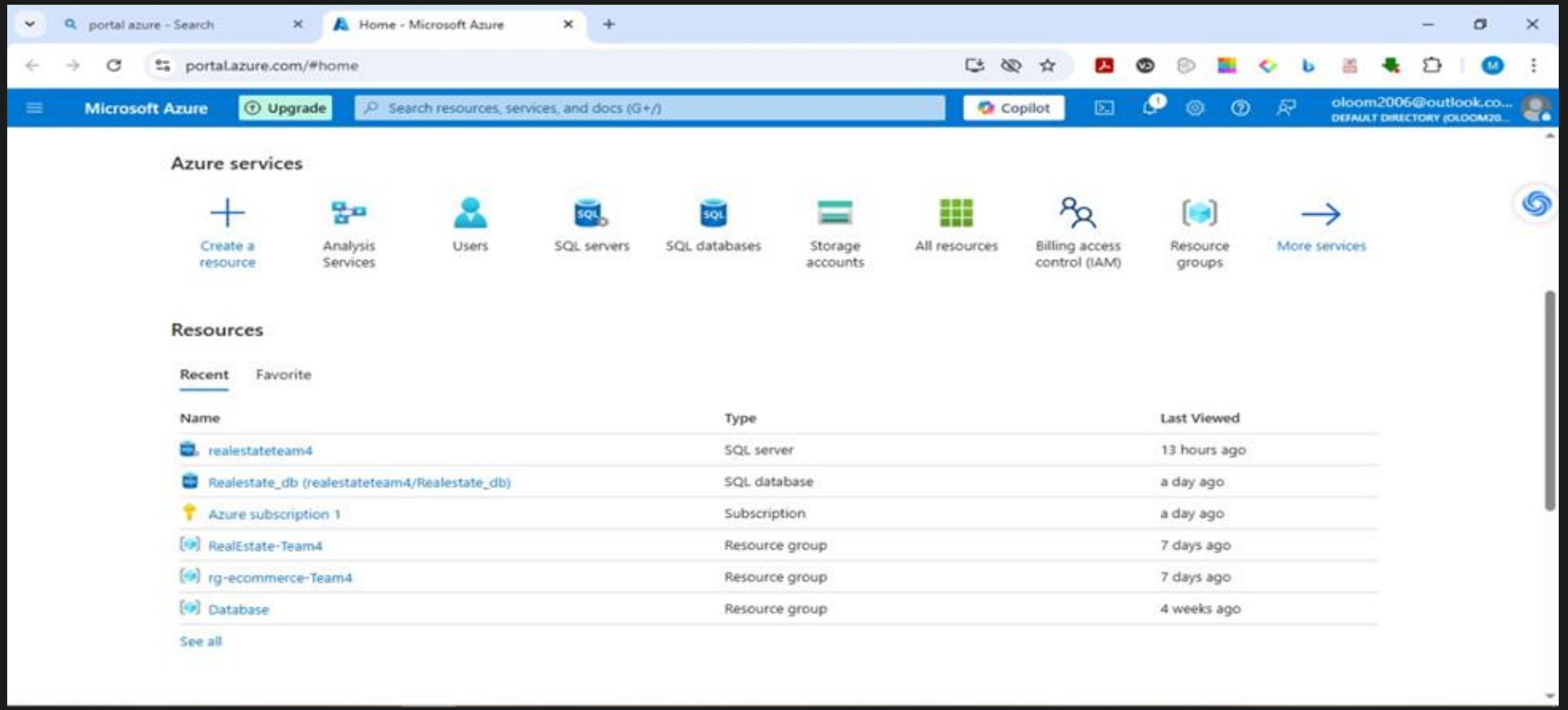

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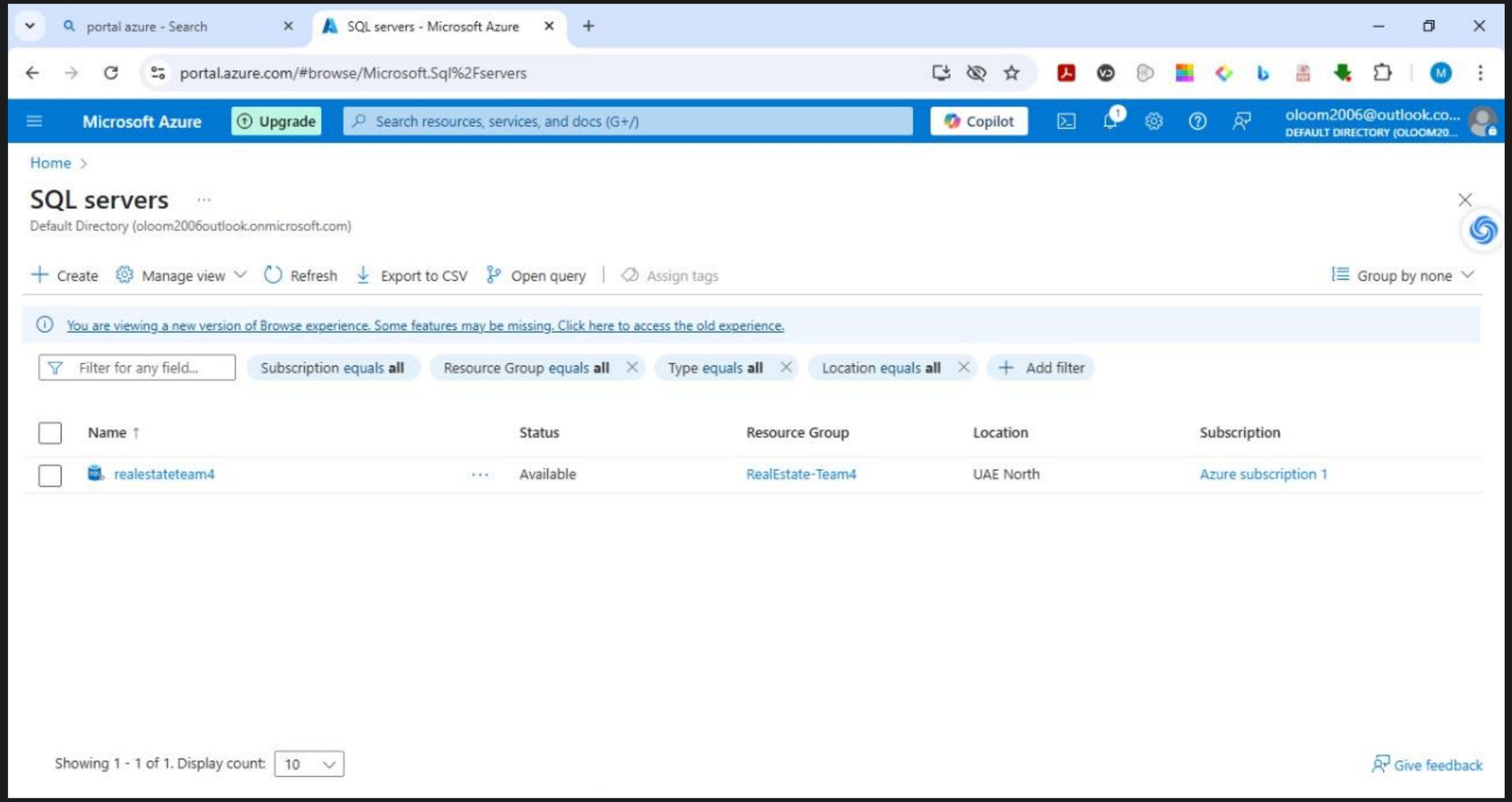

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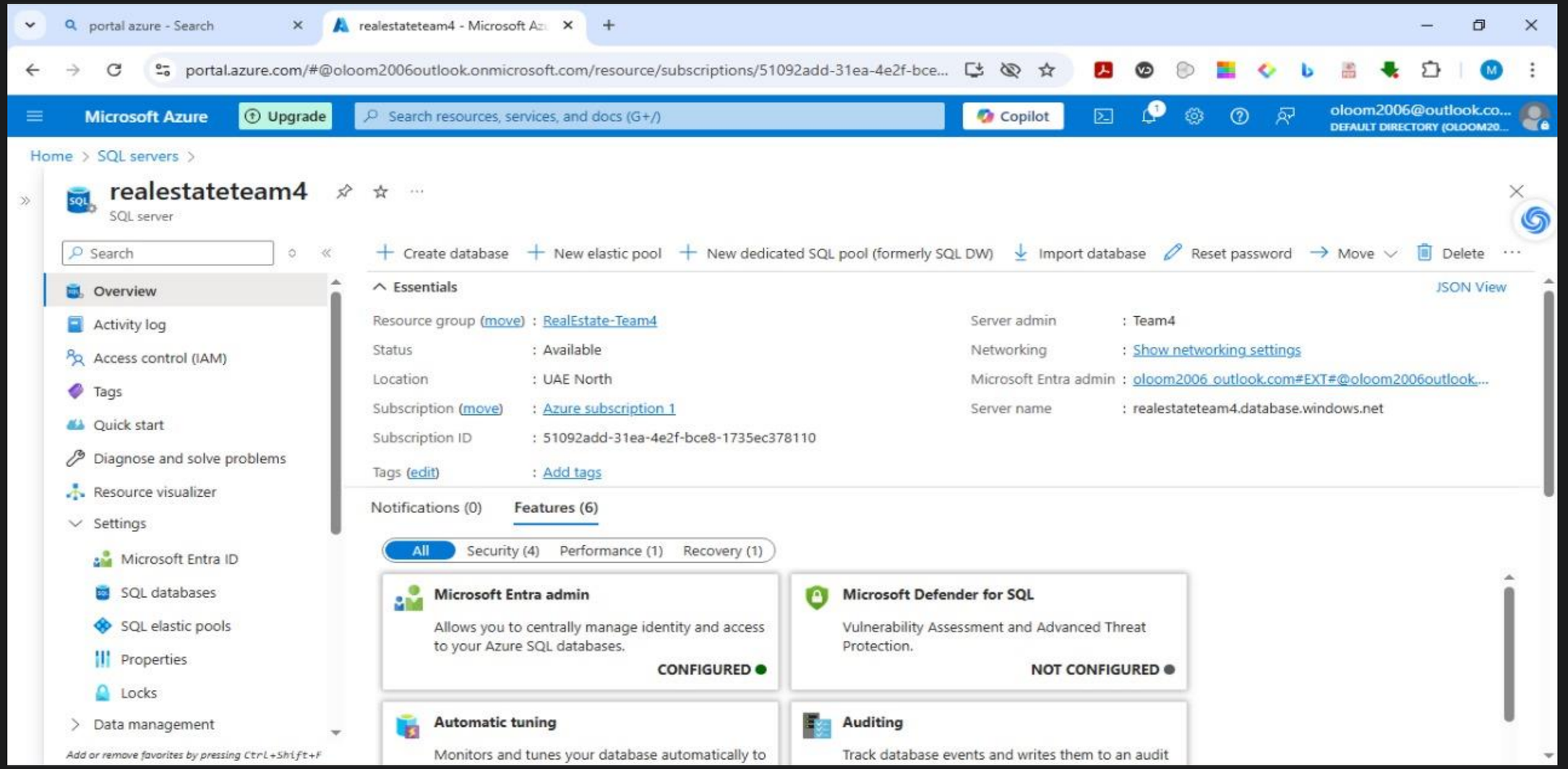

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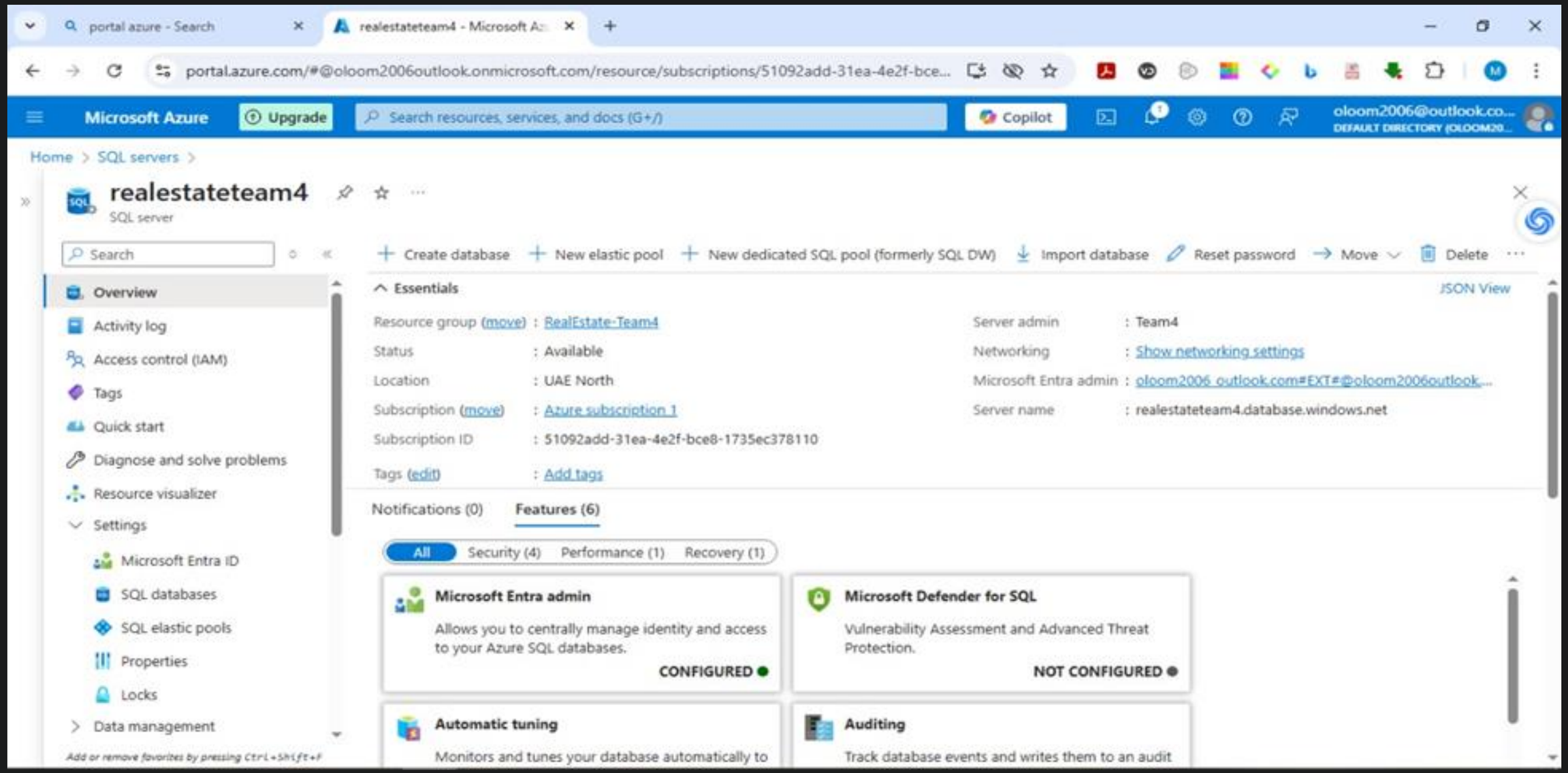

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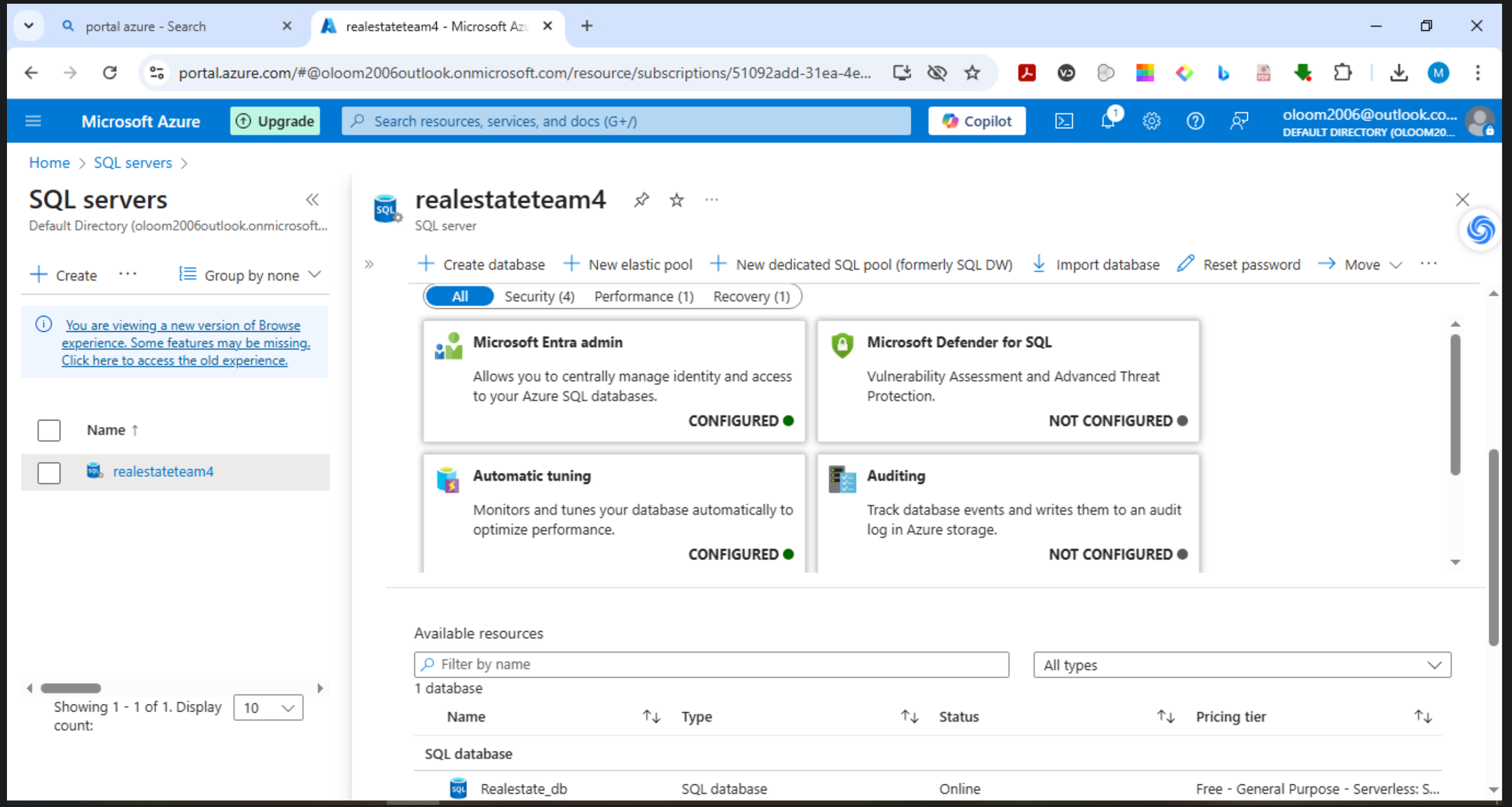
SQL Features:



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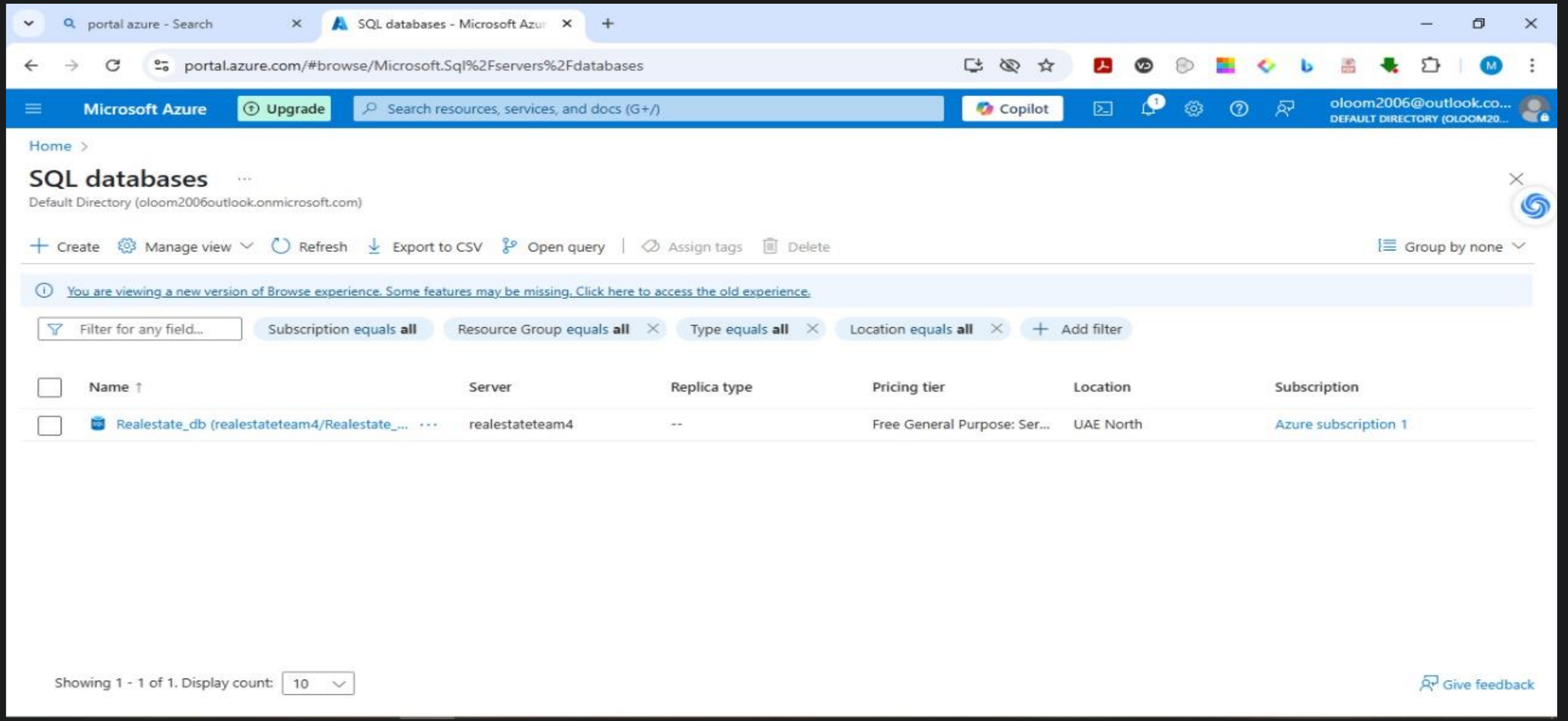

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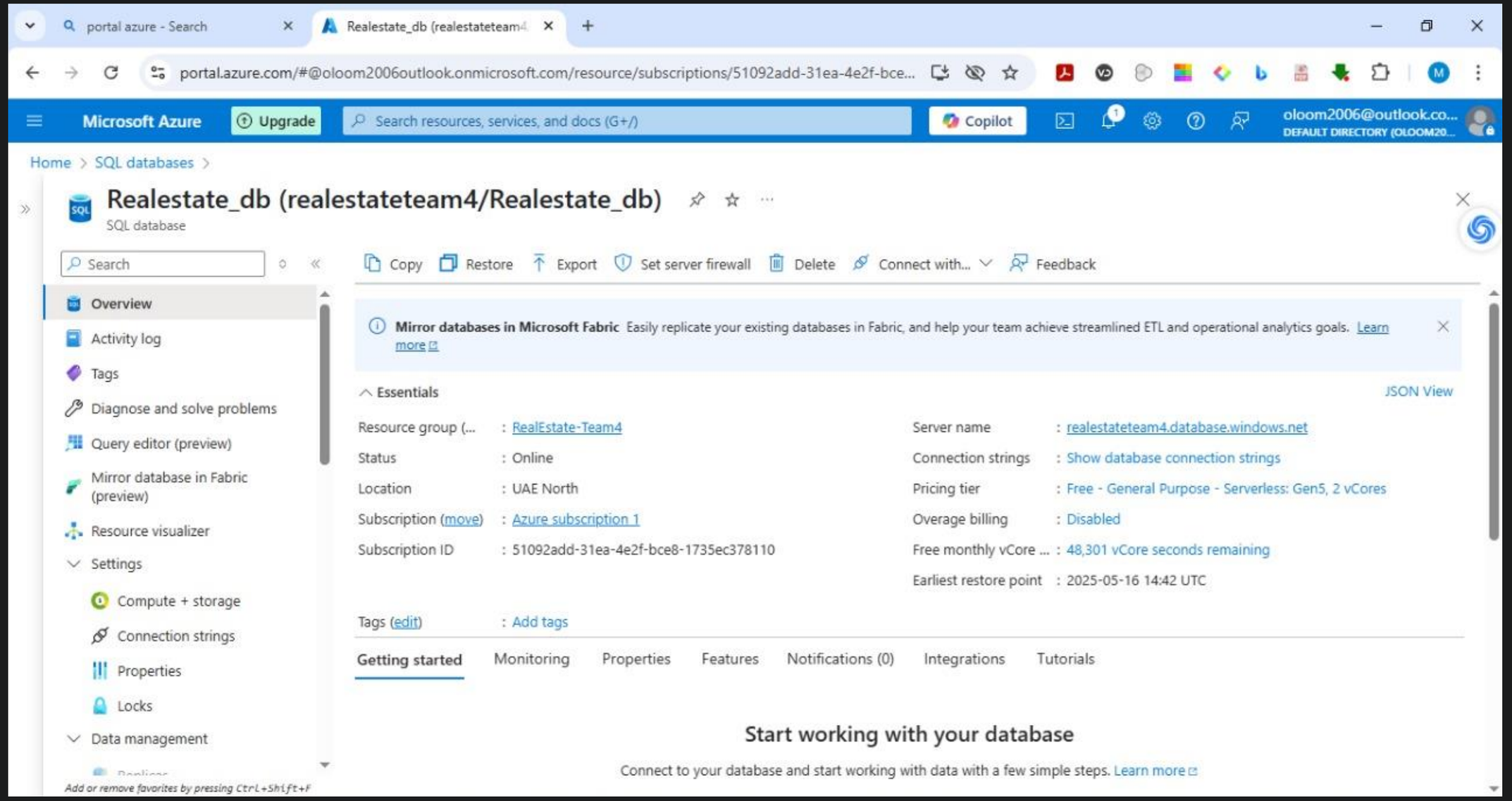
Realestate_db(realestateteam4):



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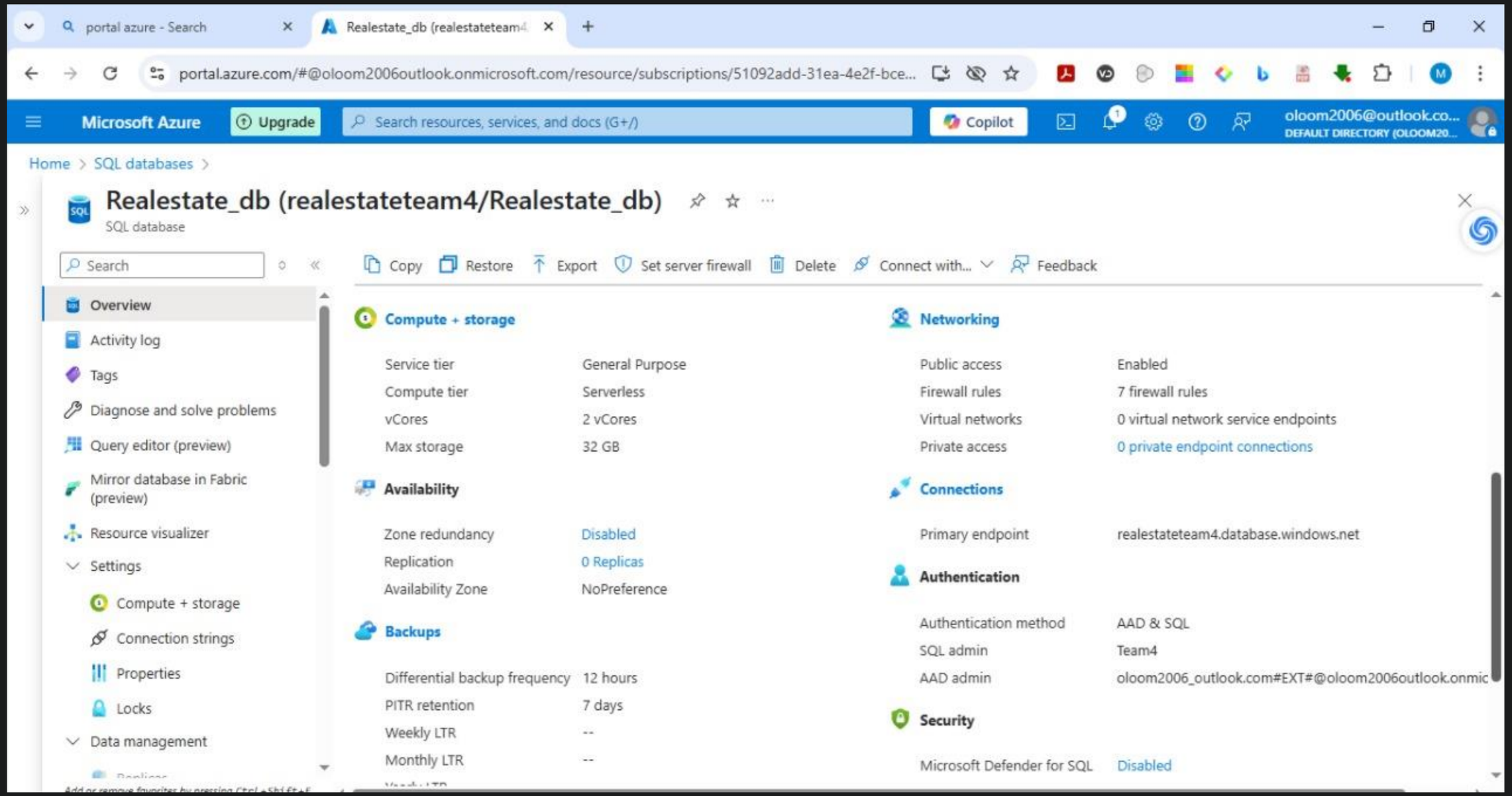
Database properties:



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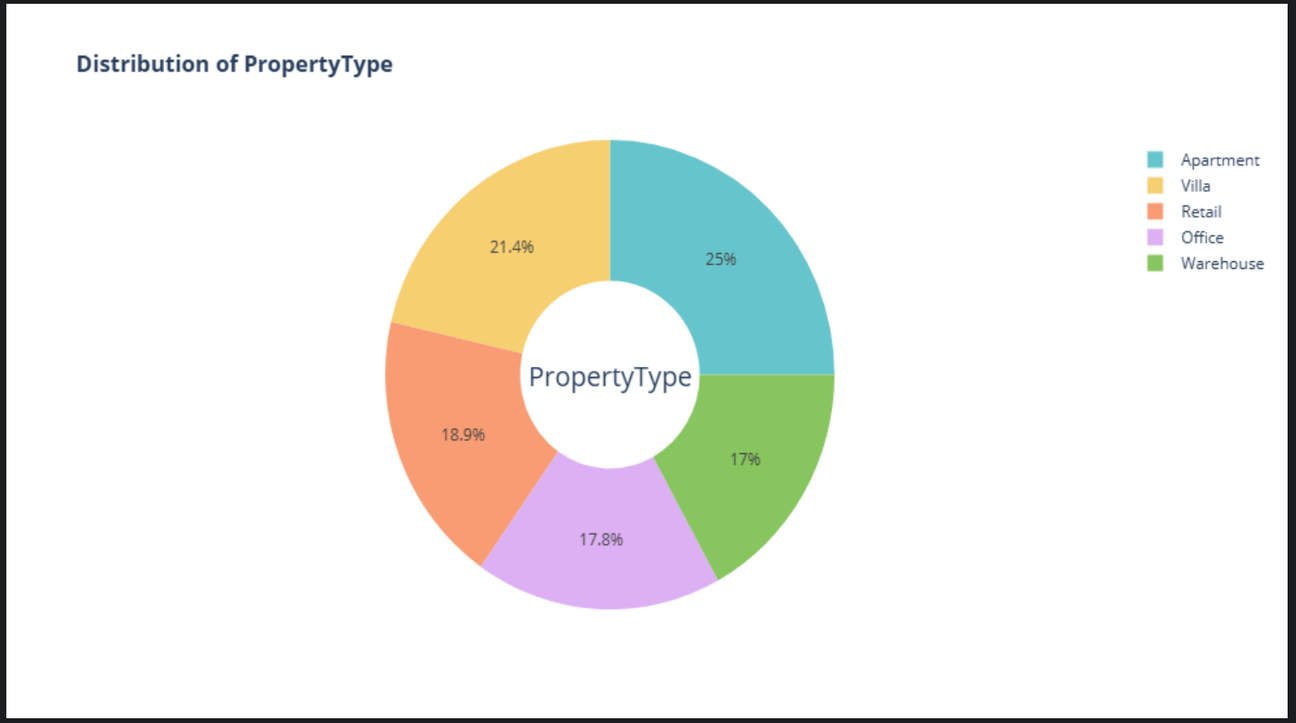
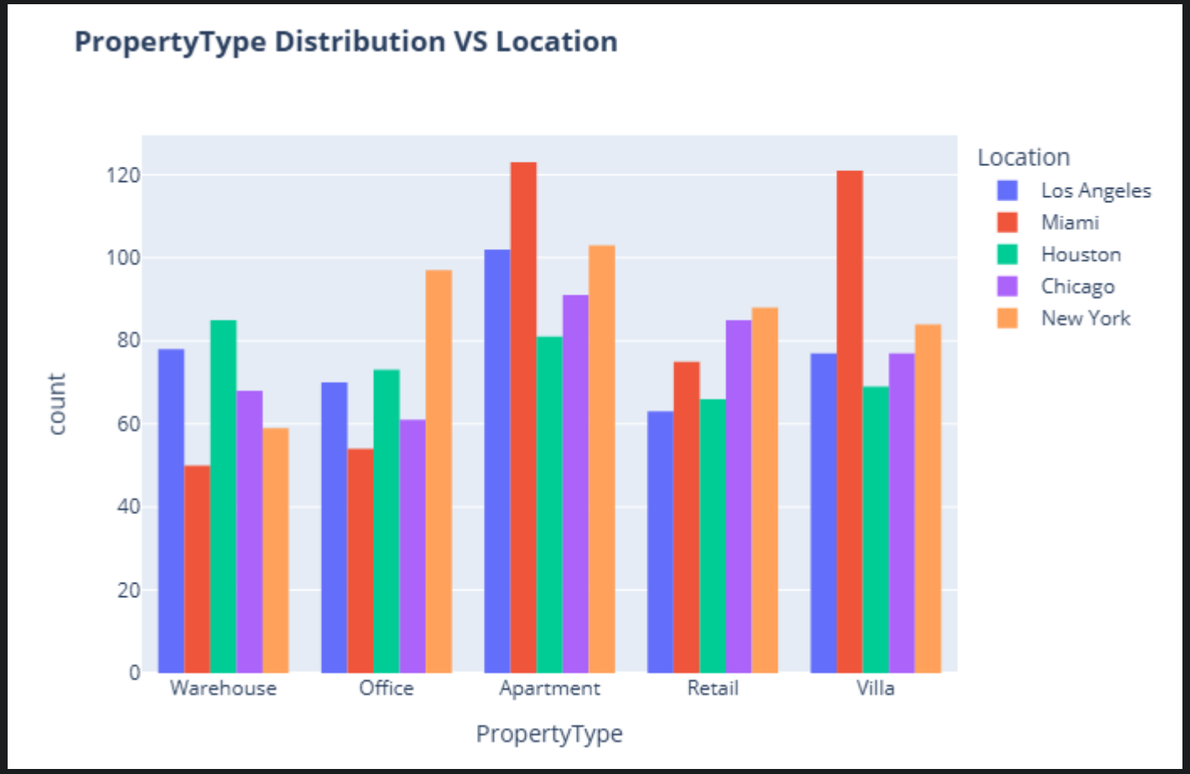
Property Analytics





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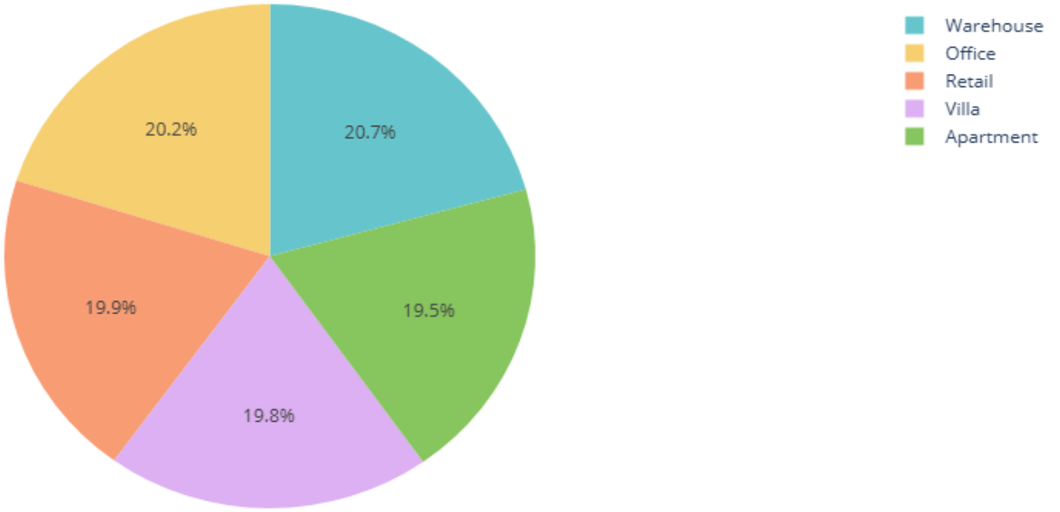
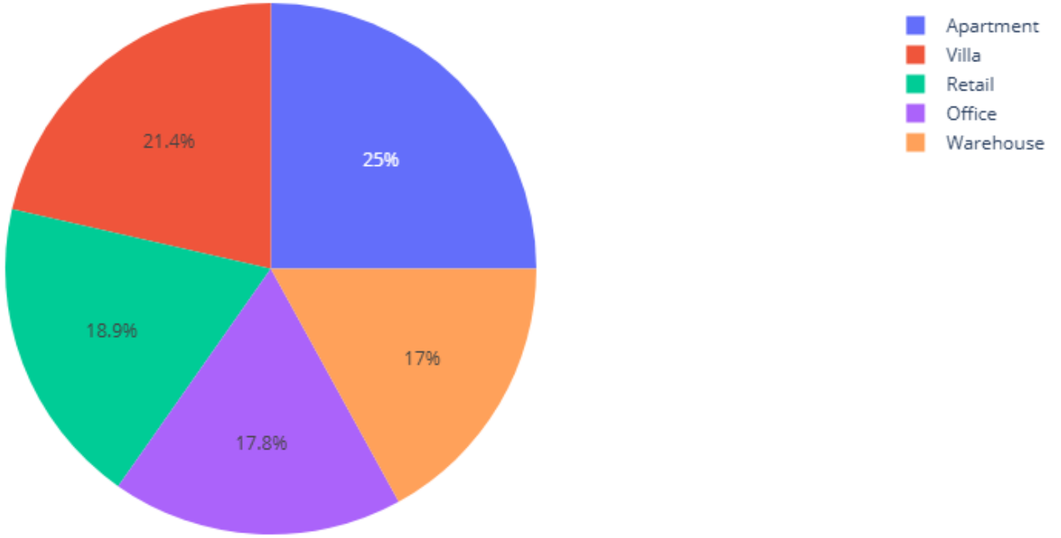
Average Sales Distribution by Property Type



Number of Properties Visited per Property Type



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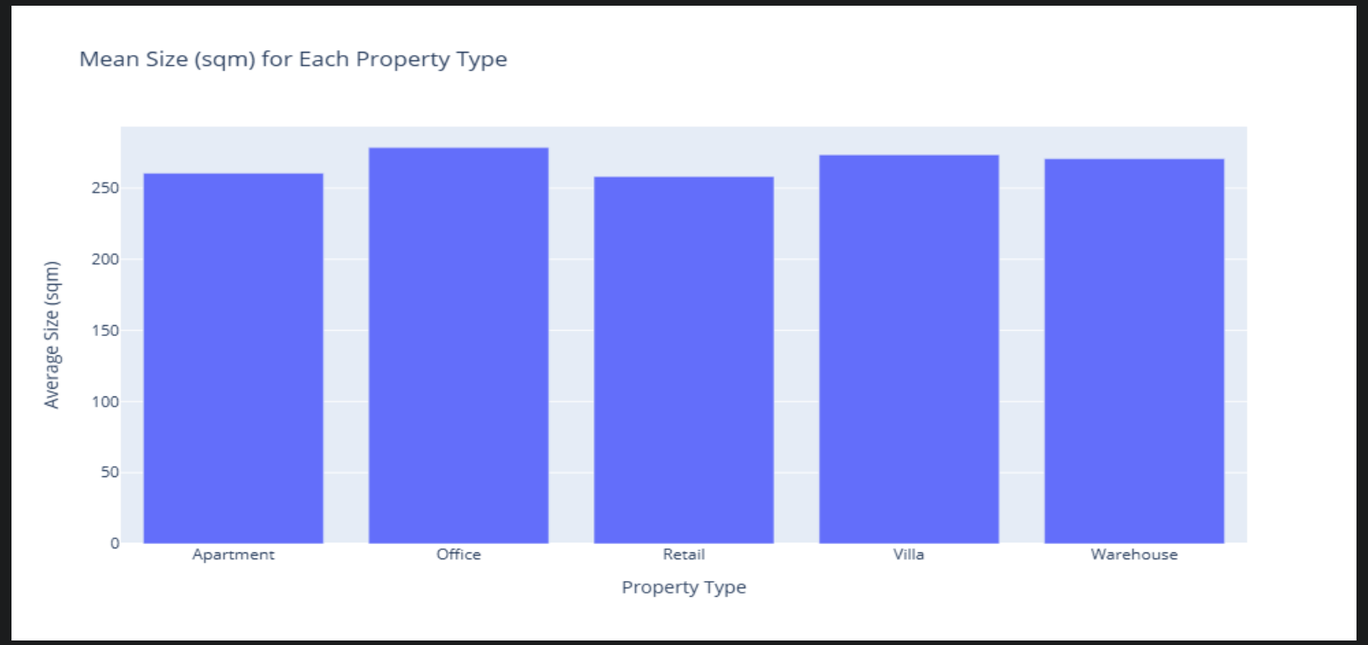

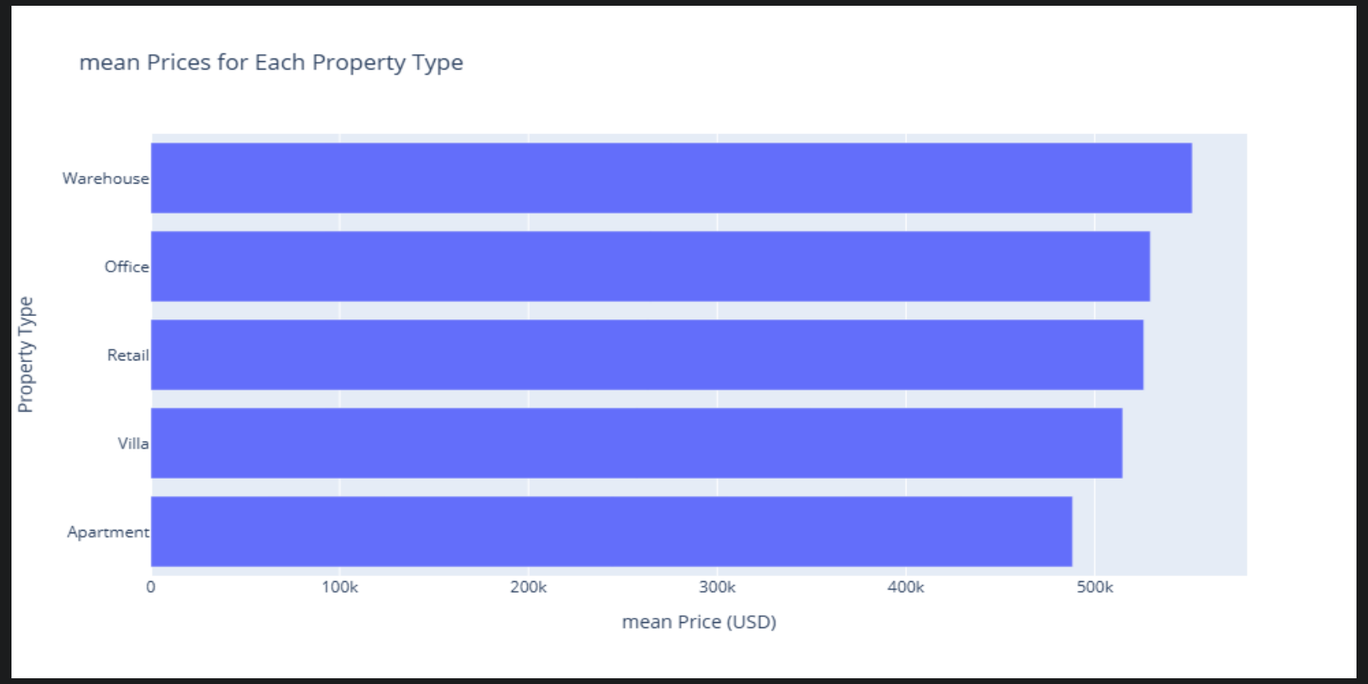

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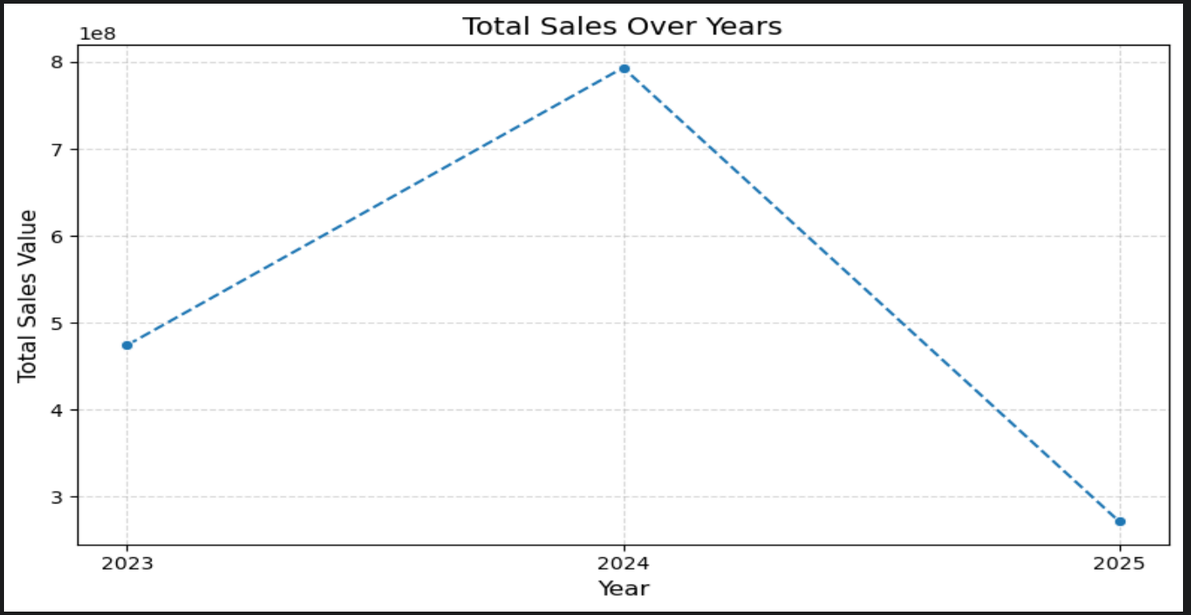
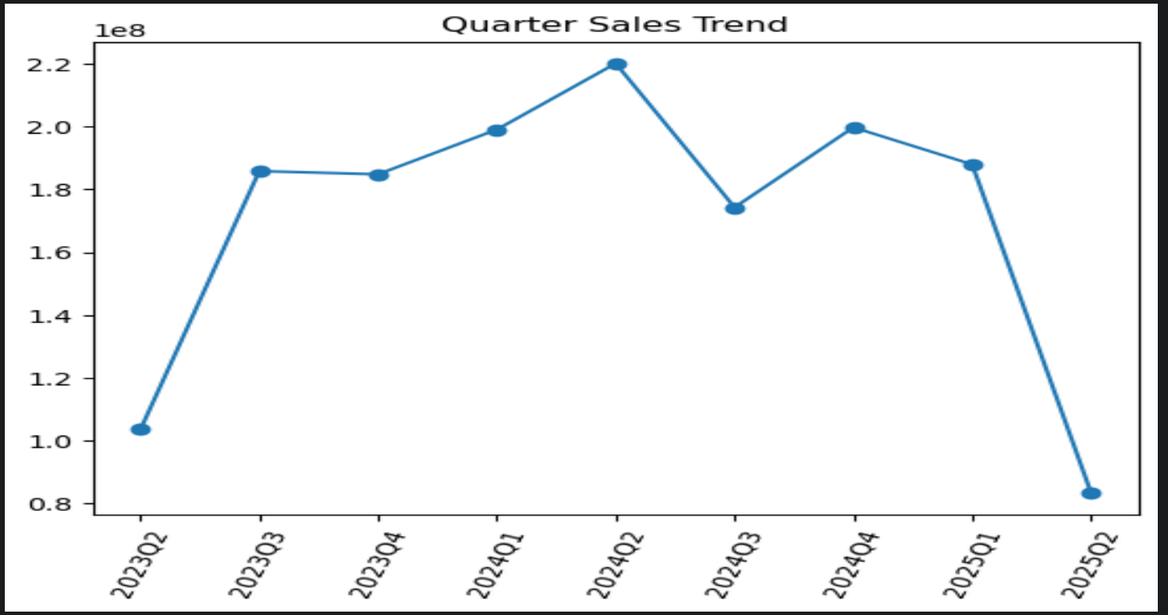
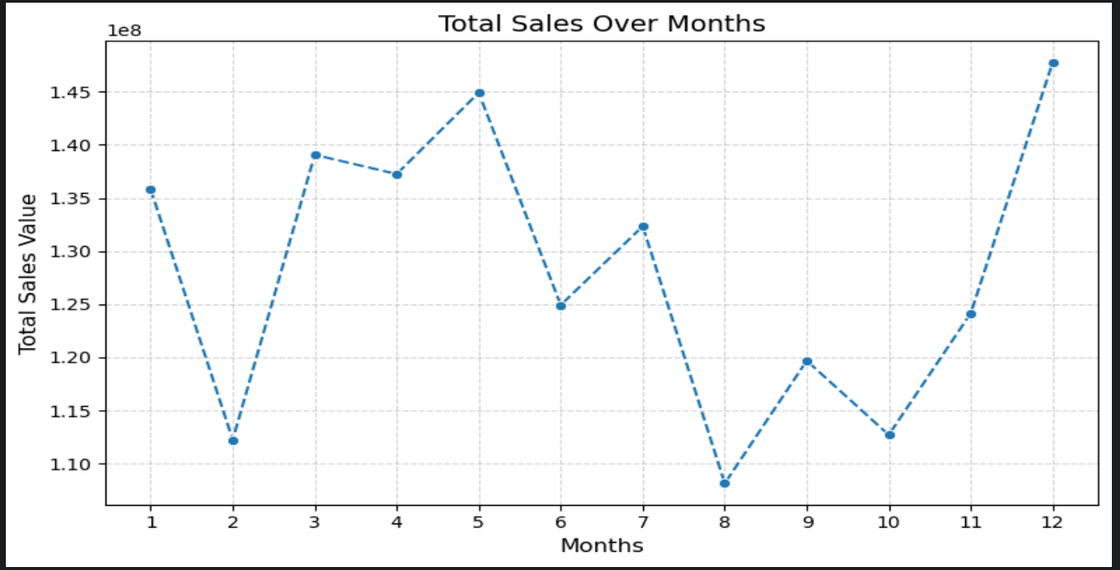
📈 Sales Performance







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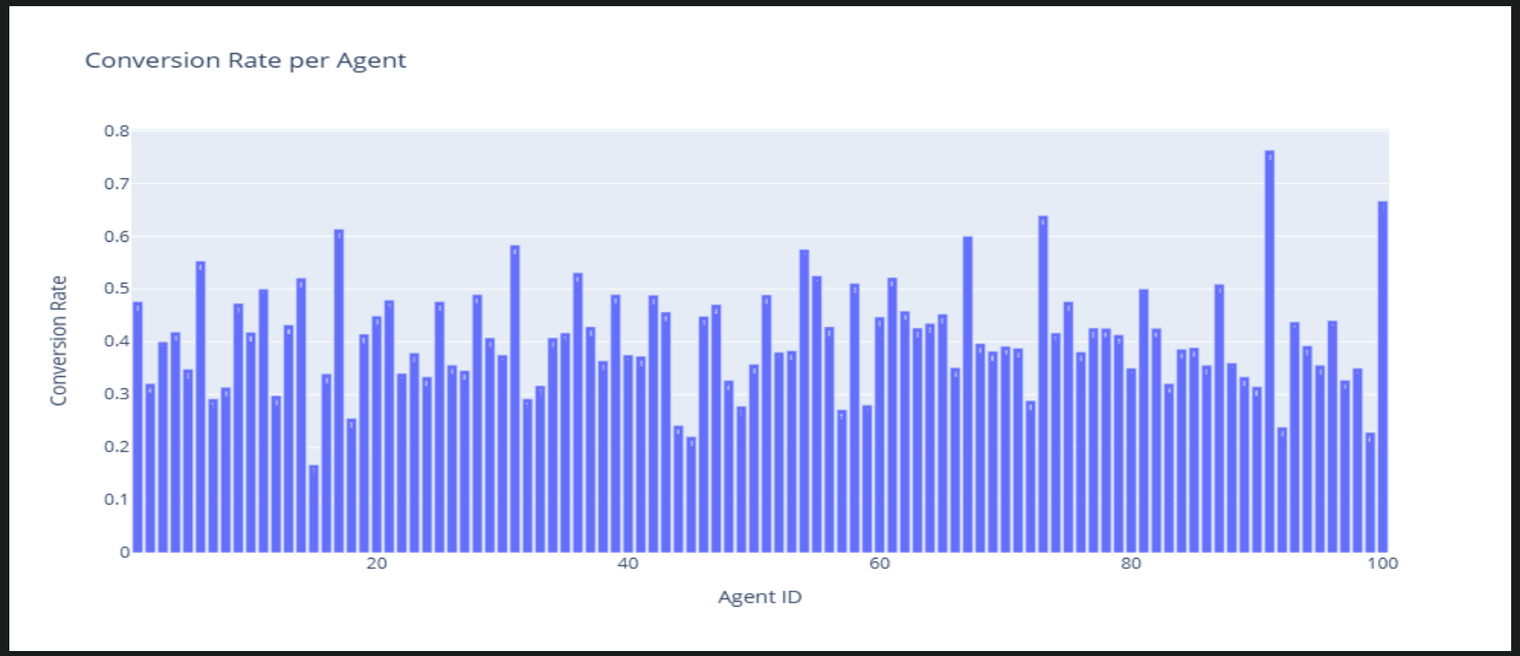
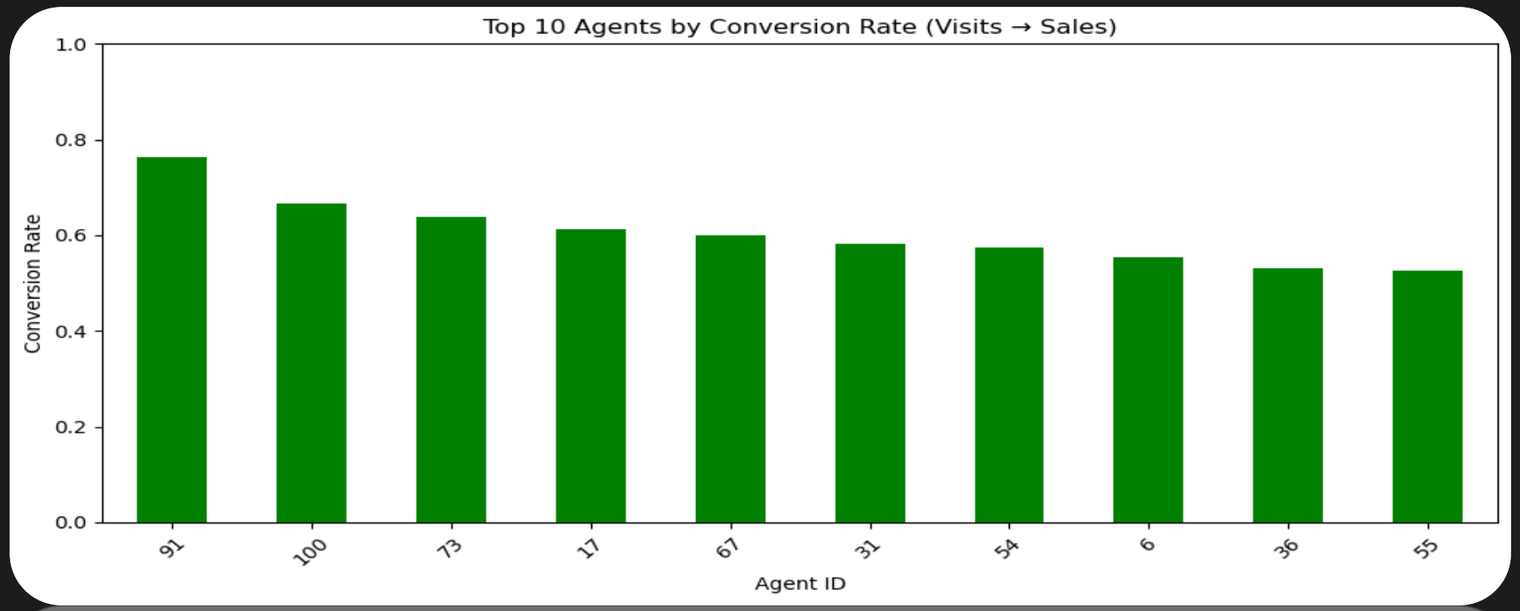
Top-Performing Agent



Agent ID : 91

Conversion rate : 76%



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most frequent client

```
# most_frequent client
df[df['ClientID'] == 1034][['ClientID','FirstName_x','LastName_x','PropertyType','Location']]
```

	ClientID	FirstName_x	LastName_x	PropertyType	Location
384	1034	Miranda	Gomez	Villa	Miami
1343	1034	Miranda	Gomez	Office	New York
1643	1034	Miranda	Gomez	Apartment	Chicago
1666	1034	Miranda	Gomez	Office	Chicago
1712	1034	Miranda	Gomez	Office	Miami
1713	1034	Miranda	Gomez	Retail	Miami
1909	1034	Miranda	Gomez	Apartment	New York

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Average visit-to-sale ratio per location

	Location	AvgVisitToSaleRatio
0	Chicago	2.628272
2	Los Angeles	2.528205
1	Houston	2.526738
3	Miami	2.486998
4	New York	2.350348

First-time vs repeat buyers

First-time

```
first_time_purchases
```

	ClientID	FirstName_x	LastName_x	Email_x	Phone_x	PropertyType	Location
0	291	John	Schroeder	elijahrichards@hotmail.com	(701)136-6900x97927	Warehouse	Los Angeles
5	437	Amy	Peterson	jennifer40@crawford.com	307-195-5748	Retail	Chicago
7	616	Rhonda	Banks	dsalinas@yahoo.com	5921562407	Warehouse	Miami
8	946	David	Wheeler	moorejeremy@hotmail.com	+1-102-891-2137x2171	Warehouse	Los Angeles
15	1333	Micheal	Bennett	qharper@marquez.com	(013)638-3210	Apartment	Houston
...	...	...	...	...	...	...	...
1974	317	Mark	Hall	willie89@gmail.com	705.381.0786x95520	Apartment	Houston
1990	383	Vincent	Russell	brownsuzanne@hotmail.com	083.152.0999x3238	Warehouse	Houston
1991	998	Jacob	Romero	jcobb@yahoo.com	3829863968	Retail	Chicago
1992	583	Joel	Dominguez	crawfordmichele@schwartz-diaz.com	(451)052-5898	Villa	Miami
1998	403	Christine	Miller	juarezmatthew@noble.com	(511)660-7946x6868	Office	New York

526 rows × 7 columns

repeat_buyers_purchases

```
repeat_buyers_purchases
```

	ClientID	FirstName_x	LastName_x	Email_x	Phone_x	PropertyType	Location
1	979	Keith	Valenzuela	awilson@gmail.com	001-860-877-0940	Retail	Miami
2	527	Charles	Miles	elizabethsanchez@yahoo.com	+1-406-225-7870x547	Retail	Houston
3	226	Sergio	Williams	hunterkeith@taylor.com	001-565-647-2177x498	Office	Los Angeles
4	498	Kelli	Woodard	jason06@hotmail.com	6519818654	Villa	Houston
6	339	Catherine	Rangel	kanejessica@berry-palmer.com	232.949.2466x256	Retail	New York
...	...	...	...	...	...	...	...
1994	655	Vanessa	Mcgee	thomas12@skinner-robinson.info	001-133-345-9565x52815	Villa	New York
1995	35	Daniel	Wilson	julia18@yahoo.com	540.181.0038x57035	Office	Chicago
1996	890	Alyssa	Rowe	xsmith@gmail.com	001-547-590-3064x272	Retail	New York
1997	1167	Todd	Whitehead	kathypatterson@west.com	465.187.1041x970	Villa	Miami
1999	849	David	Mccormick	charles05@gmail.com	375.799.0547x25418	Office	New York

1474 rows × 7 columns

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Customer Purchase Frequency Distribution

Frequency Purchase	Number of clients
1	526
2	333
3	165
4	51
5	18
6	2
7	1

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Top 10 spender clients

	ClientID	FirstName_x	LastName_x	SalePrice
748	1034	Miranda	Gomez	5309528
537	751	Deborah	Gibson	5059593
997	1378	Brenda	Cobb	4975928
215	315	William	Brown	4788386
705	973	James	Andrade	4726575
336	486	Michelle	Martin	4674197
325	466	Kimberly	Bowen	4501210
524	736	Joshua	Gray	4444278
1025	1416	Eric	Lambert	4319775
574	798	Jessica	Vasquez	4301397

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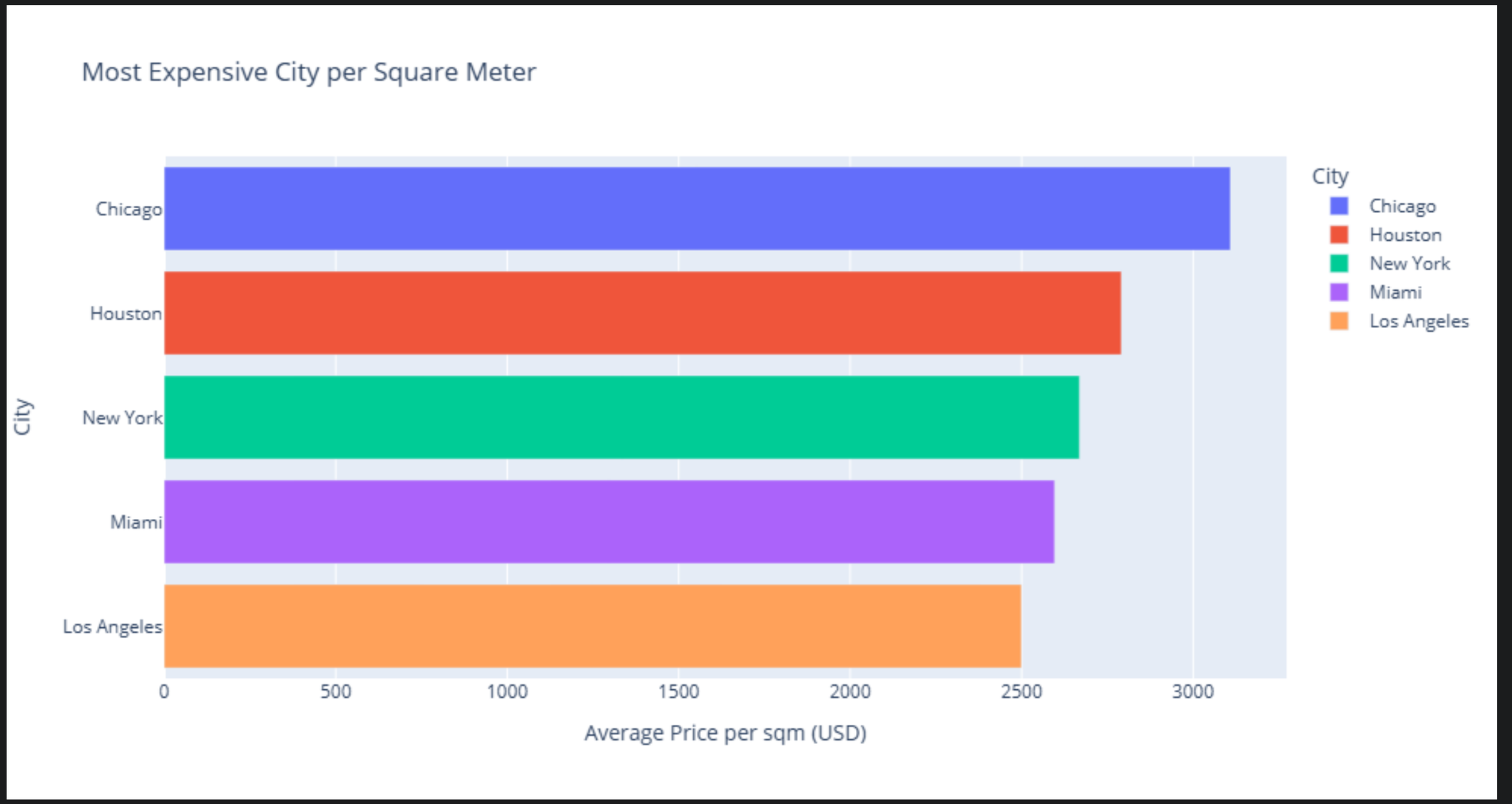

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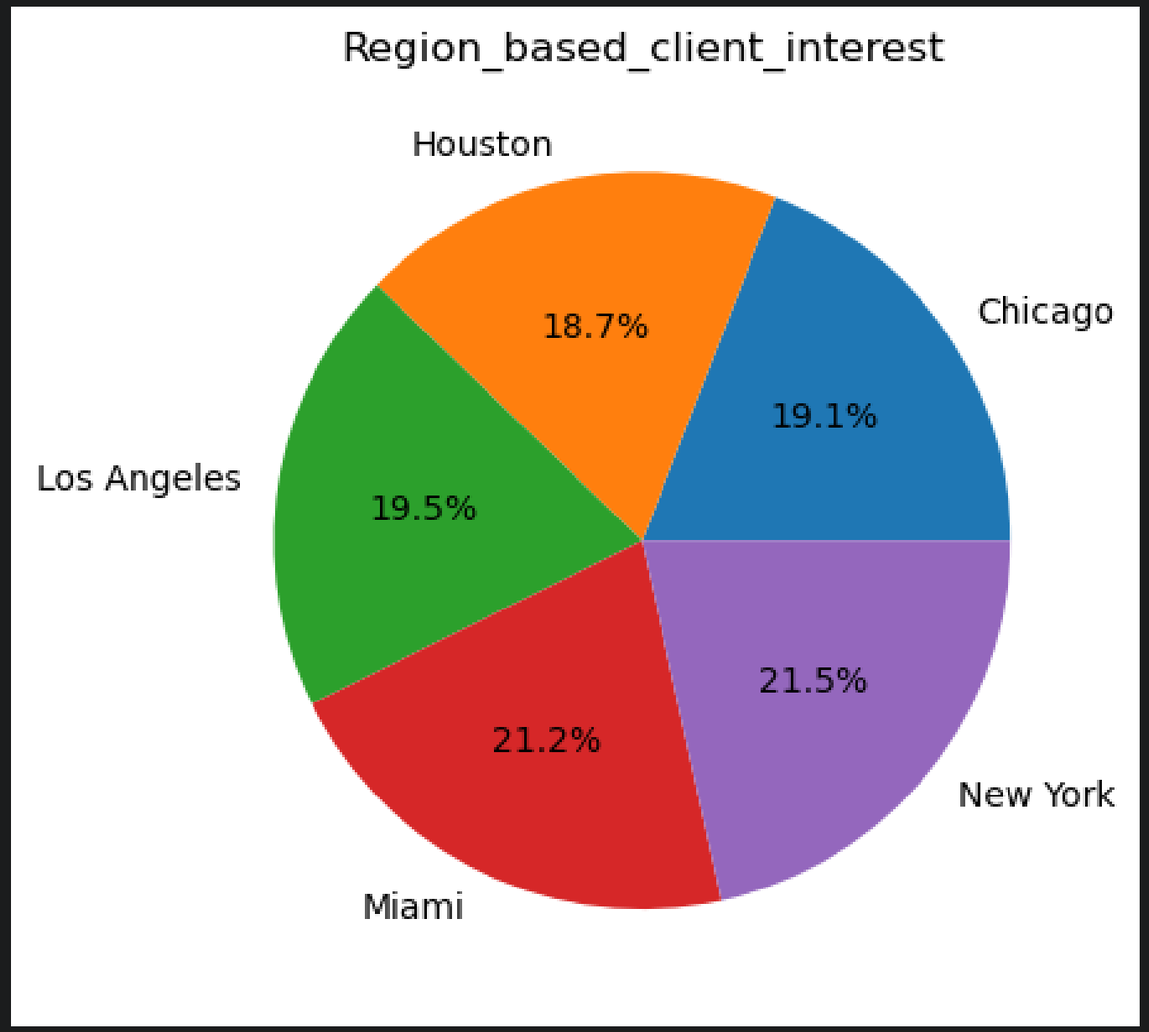
Region_based_client_interest

	Region	Frequency of clients
0	Chicago	382
1	Houston	374
2	Los Angeles	390
3	Miami	423
4	New York	431



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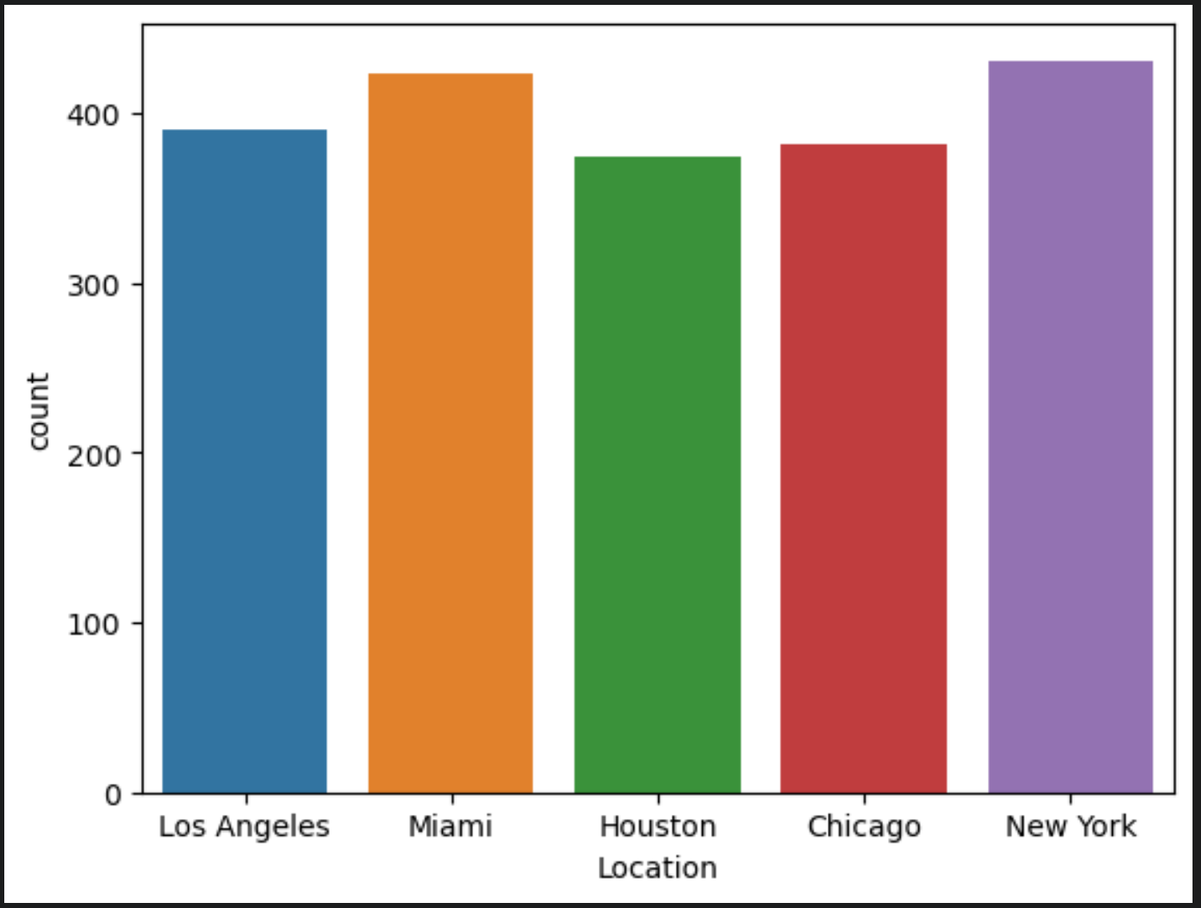

"The most sold property type in Miami is:"

```
miami_df = df[df['Location'] == 'Miami']
most_common_property = miami_df['PropertyType'].value_counts().idxmax()
print(most_common_property)
```

```
Apartment
```

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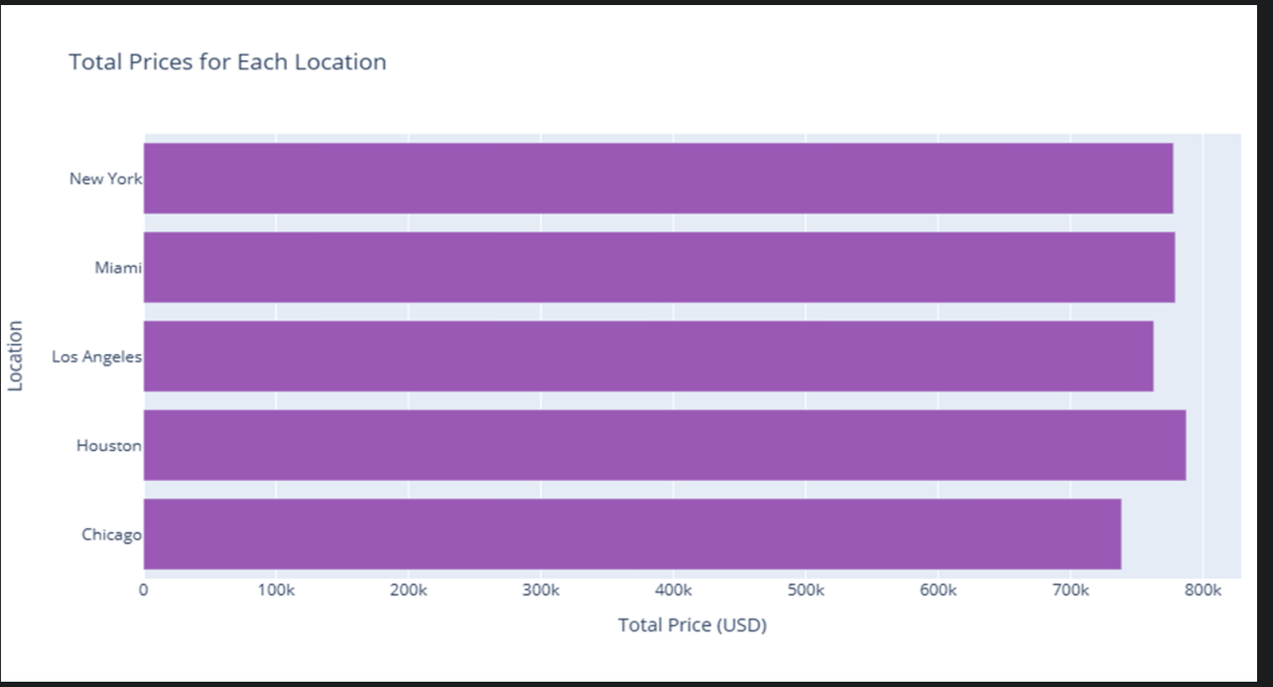
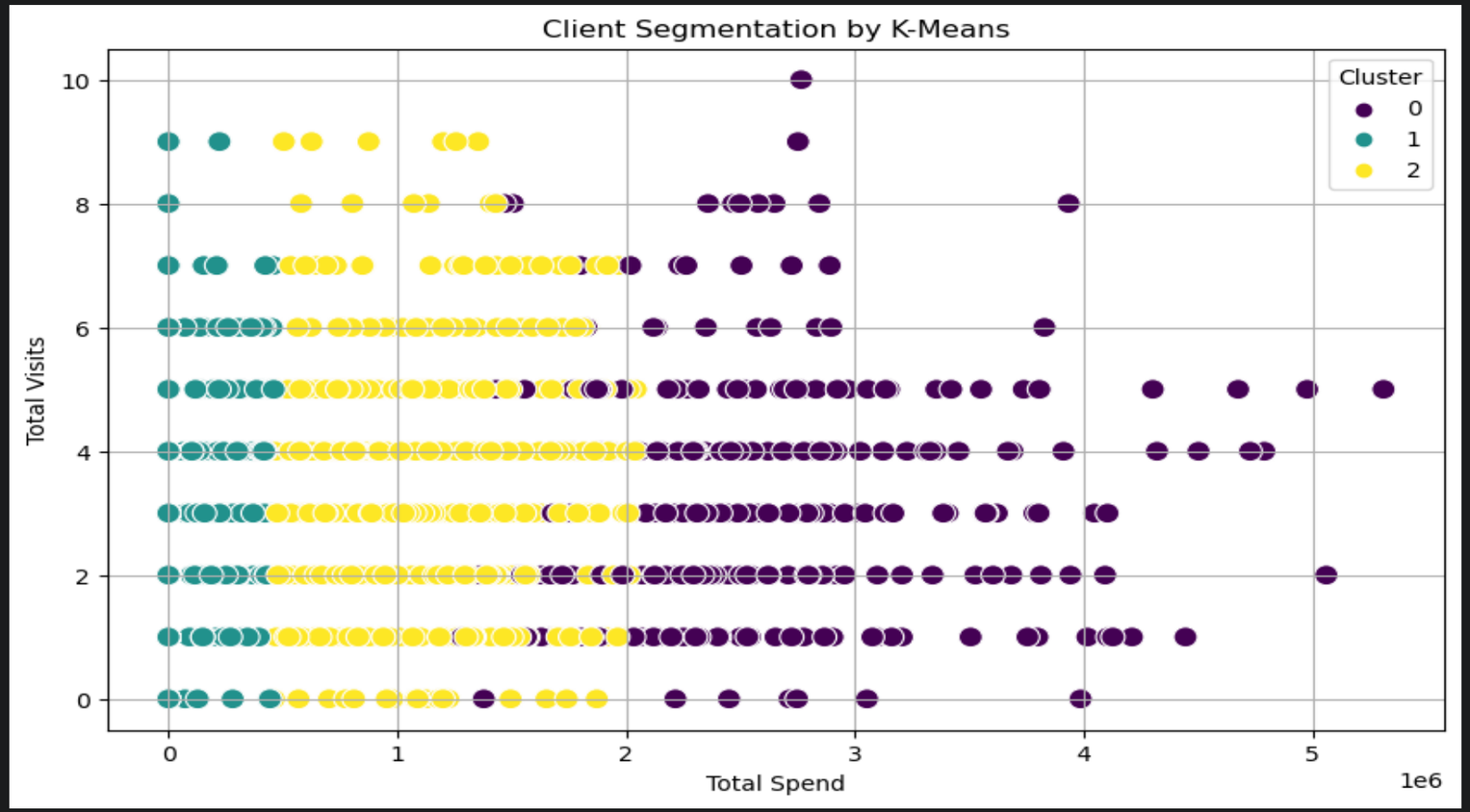
Distribution of PriceUSD
140
120
100
80
60
40
20
0
count
0.2M
0.4M
0.6M
0.8M
1M
PriceUSD


Total Prices for Each Location
New York
Miami
Los Angeles
Houston
Chicago
Location
0
100k
200k
300k
400k
500k
600k
700k
800k
Total Price (USD)

Customer Segmentation With Real Estate CRM

Using K-Means Cluster



	Cluster	TotalVisits	PurchaseFrequency	TotalSpend	AvgSpend
0	0	3.286667	3.073333	2.623646e+06	894425.244167
1	1	3.355752	0.299115	7.571453e+04	73123.053097
2	2	3.335433	1.431496	1.116656e+06	836169.334646

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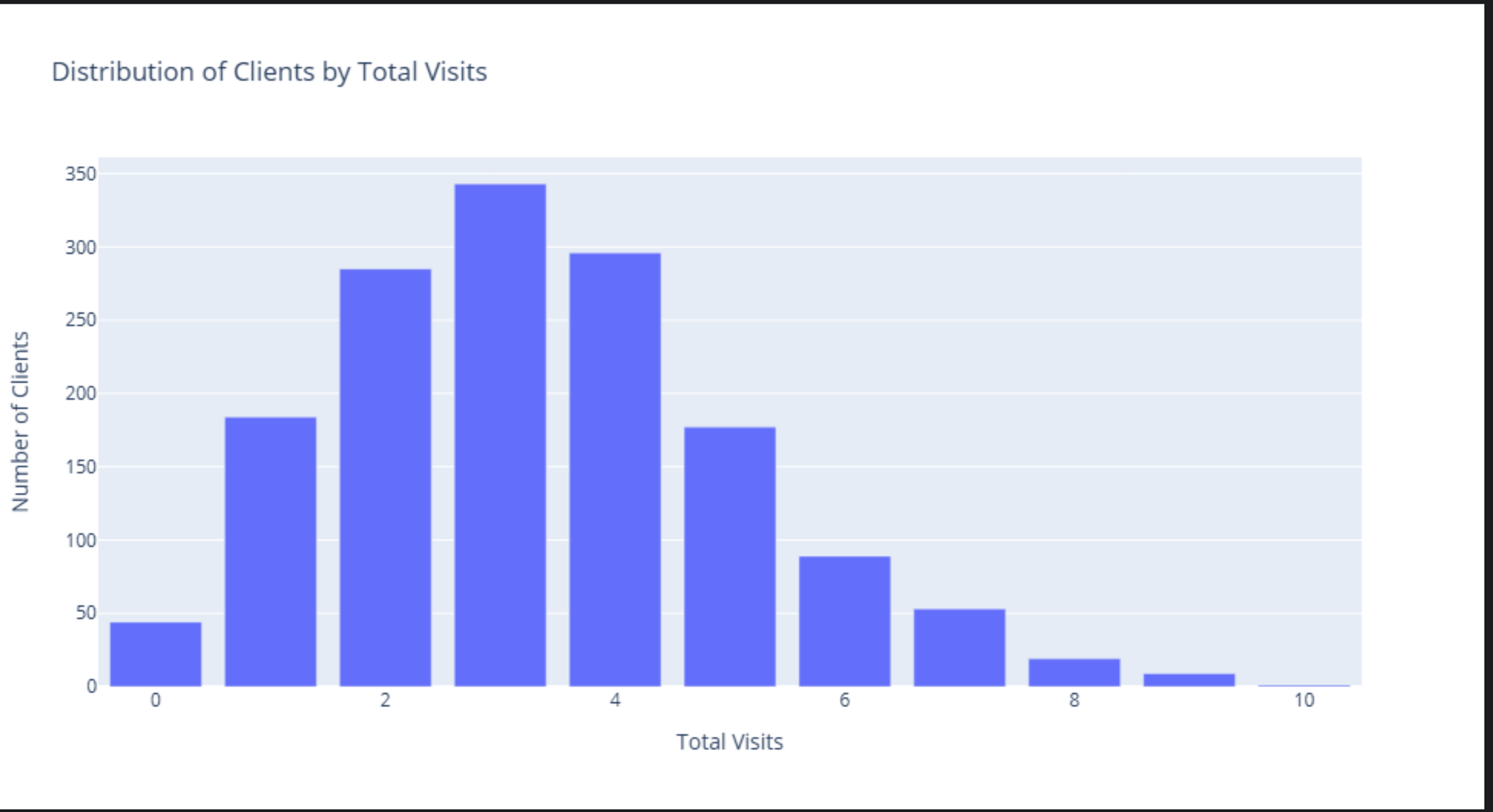

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```
cluster_0_clients = client_features[client_features['Cluster'] == 0]
cluster_0_clients
```

	ClientID	FirstName	LastName	Phone	Email	TotalVisits	PurchaseFrequency	TotalSpend	AvgSpend	Cluster
2	3	Shelia	Ryan	001-444-315-7702x8262	bradleybell@hotmail.com	5.0	3.0	2266640.0	7.555467e+05	0
7	8	Teresa	Smith	(573)794-8059x9130	randy50@yahoo.com	6.0	2.0	2631772.0	1.315886e+06	0
12	13	Debra	White	139-196-1817x120	kingrachel@gmail.com	5.0	3.0	2765309.0	9.217697e+05	0
14	15	Kimberly	Hill	111.374.8590	ileach@yahoo.com	0.0	4.0	3052637.0	7.631592e+05	0
22	23	Todd	Weaver	001-117-059-9016x52810	jortiz@hotmail.com	4.0	4.0	2133710.0	5.334275e+05	0
...	...	...	...	...	...	...	...	...	...	...
1464	1465	Latoya	Neal	+1-226-958-0522x69409	thomaslewis@ortiz.com	2.0	2.0	2125064.0	1.062532e+06	0
1470	1471	Patricia	Patel	7282605378	joseph71@rivera.com	2.0	4.0	2796593.0	6.991482e+05	0
1477	1478	Vincent	Martinez	599.920.7341	yrowe@ali.biz	5.0	2.0	2317288.0	1.158644e+06	0
1485	1486	Donald	Todd	(473)472-1800x8009	amandaclark@gmail.com	4.0	4.0	2850660.0	7.126650e+05	0
1486	1487	Deanna	Robinson	+1-350-955-9701x78430	nathaniel13@hotmail.com	2.0	4.0	2620723.0	6.551808e+05	0

300 rows × 10 columns

Made with GAMMA

```
cluster_1_clients = client_features[client_features['Cluster'] == 1]
cluster_1_clients
```

	ClientID	FirstName	LastName	Phone	Email	TotalVisits	PurchaseFrequency	TotalSpend	AvgSpend	Cluster
0	1	Daniel	Hoffman	5519656988	deborah83@hotmail.com	7.0	0.0	0.0	0.0	1
1	2	Heather	Good	+1-570-565-8487x89968	tamaraellis@dean.com	4.0	0.0	0.0	0.0	1
6	7	Vanessa	Hill	655-830-8435x43747	sarahheath@yahoo.com	4.0	1.0	162691.0	162691.0	1
9	10	Garrett	Owens	037.196.2178x793	royortega@hotmail.com	4.0	0.0	0.0	0.0	1
10	11	Tami	Watkins	201.090.1239x2453	mccoytony@smith.com	6.0	1.0	132709.0	132709.0	1
...	...	...	...	...	...	...	...	...	...	...
1484	1485	Karen	Stephenson	(143)015-3840x940	hunteramy@hotmail.com	1.0	0.0	0.0	0.0	1
1488	1489	Emily	Roberts	649.311.5230	kaitlinheath@simpson-oliver.com	5.0	1.0	221056.0	221056.0	1
1491	1492	Gregory	Peters	777.289.5014	tturner@gmail.com	1.0	1.0	150305.0	150305.0	1
1497	1498	Paul	Taylor	6930999306	alexandra71@yahoo.com	1.0	0.0	0.0	0.0	1
1498	1499	William	Watkins	001-091-126-8710x812	davidfriedman@hotmail.com	7.0	0.0	0.0	0.0	1

565 rows × 10 columns

Made with GAMMA

```
cluster_2_clients = client_features[client_features['Cluster'] == 2]
cluster_2_clients
```

	ClientID	FirstName	LastName	Phone	Email	TotalVisits	PurchaseFrequency	TotalSpend	AvgSpend	Cluster
3	4	Margaret	Knight	001-752-253-9221x228	mcmillanjulia@lindsey.com	5.0	2.0	1141581.0	570790.5	2
4	5	Jesus	Moore	633.478.9307x986	patelrebecca@day.com	3.0	1.0	1057874.0	1057874.0	2
5	6	Jose	Gibson	636-419-8972	brianguerra@hotmail.com	4.0	2.0	1364904.0	682452.0	2
8	9	Rachel	Odom	384.798.7184x33461	jade73@yahoo.com	2.0	1.0	1470352.0	1470352.0	2
15	16	Stephen	Jackson	803-950-5199x380	hancocknatalie@gmail.com	2.0	1.0	889976.0	889976.0	2
...	...	...	...	...	...	...	...	...	...	...
1493	1494	Carl	Hill	605.821.9900x455	daniellemcdonald@hotmail.com	5.0	1.0	739817.0	739817.0	2
1494	1495	Amy	Wise	905-603-5407x7060	jeffreybryant@yahoo.com	3.0	1.0	888063.0	888063.0	2
1495	1496	Victoria	Decker	+1-794-705-0520x43162	chaveztyler@gmail.com	1.0	2.0	1465643.0	732821.5	2
1496	1497	Richard	Benjamin	(898)658-0405x89259	harriseileen@yahoo.com	8.0	1.0	804149.0	804149.0	2
1499	1500	Miranda	Martinez	+1-206-460-6537x47745	johnsondevin@flores.com	2.0	2.0	1560225.0	780112.5	2

635 rows × 10 columns

Made with GAMMA

```
interested_no_purchase = client_features[
    (client_features['Cluster'] == 1) &
    (client_features['TotalSpend'] == 0) &
    (client_features['TotalVisits'] > 0)
]
```

```
interested_no_purchase
```

	ClientID	FirstName	LastName	Phone	Email	TotalVisits	PurchaseFrequency	TotalSpend	AvgSpend	Cluster
0	1	Daniel	Hoffman	5519656988	deborah83@hotmail.com	7.0	0.0	0.0	0.0	1
1	2	Heather	Good	+1-570-565-8487x89968	tamaraellis@dean.com	4.0	0.0	0.0	0.0	1
9	10	Garrett	Owens	037.196.2178x793	royortega@hotmail.com	4.0	0.0	0.0	0.0	1
11	12	Travis	Nelson	481.039.6516x236	rebecca52@proctor.com	1.0	0.0	0.0	0.0	1
13	14	James	Webster	(196)343-3877x50593	dianejohnson@yahoo.com	2.0	0.0	0.0	0.0	1
...	...	...	...	...	...	...	...	...	...	...
1474	1475	Christina	Cabrera	772-501-3528	ywhite@richard-jennings.net	4.0	0.0	0.0	0.0	1
1476	1477	Michael	Kline	+1-961-966-1935x13855	wstuart@cardenas-perez.com	1.0	0.0	0.0	0.0	1
1484	1485	Karen	Stephenson	(143)015-3840x940	hunteramy@hotmail.com	1.0	0.0	0.0	0.0	1
1497	1498	Paul	Taylor	6930999306	alexandra71@yahoo.com	1.0	0.0	0.0	0.0	1
1498	1499	William	Watkins	001-091-126-8710x812	davidfriedman@hotmail.com	7.0	0.0	0.0	0.0	1

392 rows × 10 columns

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```
unengaged_clients
```

	ClientID	FirstName	LastName	Phone	Email	TotalVisits	PurchaseFrequency	TotalSpend	AvgSpend	Cluster
162	163	Erica	Cruz	(464)591-0883	grantdenise@gmail.com	0.0	0.0	0.0	0.0	1
180	181	Brendan	Cole	+1-748-246-8366x9273	wkhan@gmail.com	0.0	0.0	0.0	0.0	1
239	240	Regina	Harris	492.793.2798	sparksmarc@yahoo.com	0.0	0.0	0.0	0.0	1
320	321	Crystal	Morales	2713369268	kevin17@hotmail.com	0.0	0.0	0.0	0.0	1
412	413	Lorraine	Bauer	+1-588-156-0228x989	joneszachary@gmail.com	0.0	0.0	0.0	0.0	1
480	481	Rachel	Stephenson	+1-519-092-5441x8441	trankent@stein.com	0.0	0.0	0.0	0.0	1
518	519	Jason	Reese	708-880-2320	uwright@long.biz	0.0	0.0	0.0	0.0	1
809	810	Travis	Richardson	(170)446-8434	barry92@hotmail.com	0.0	0.0	0.0	0.0	1
934	935	Amanda	Mcguire	001-951-226-0629	harristimothy@yang-humphrey.com	0.0	0.0	0.0	0.0	1
1110	1111	Omar	Wheeler	(846)259-5426	znguyen@yahoo.com	0.0	0.0	0.0	0.0	1
1203	1204	Jennifer	Ho	001-265-198-9492	thomasmoore@brooks-gray.com	0.0	0.0	0.0	0.0	1
1372	1373	Marie	Rose	001-889-969-8402x8147	brookecortez@brooks.com	0.0	0.0	0.0	0.0	1

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Power BI Dashboard

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Conclusion

Built Robust Data Solution

From Azure SQL to Power BI

Derived Actionable Insights

That can drive real estate growth

Expand Analysis

Include customer satisfaction and agent performance metrics

Continuously Refine

Dashboards and analysis

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Action Plan

1. Norhan Zaid
2. Safey El Deen Mohamed
3. Maged Fouad Mohamed
4. Ramy Elbouhy
5. Rawan Mohi
6. abdelghany ahmed

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Q&A

?

Questions

Invite questions from the audience

!

Feedback

Welcome feedback on the presentation

✓

Discussion

Open floor for further discussion

Invite questions and feedback from the audience.

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