

Memo

Washington State University

To: AdventureWorks company
From: Nam Jun Lee
Subject: TSQL #4
Date: April 7, 2023

Statement

Dataset: AdventureWorksDW2019

Problem 1:

1. Identify products sold on the web retail channel, but not yet sold on the physical stores in Germany.
2. Analyzing the data by city level, identify which products sold in Germany are sold on the internet but not in a physical store in that city.

Problem 2:

Produce a list of the TOP 10 products (that are currently not) sold in physical stores, but due to their popularity (high # of units sold in Germany) that should be sold in physical retail stores in Germany.

Problem 3:

Produces totals for bike sales by and then house addition subqueries to bring in data from the web channel and retail channel. Turn these results into a subquery adding a totals column for each row. And add more functionality such as formatting the data from units to percentages.

Problem 1

Products sold on the web retail channel, but not yet sold on the physical stores in Germany

	Product Key	Product Name	# Unit Sold																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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The above list shows products sold on web retail channels but not yet sold in physical stores in Germany. Through this list, a total of 73 products are not being sold in German physical stores. Looking at the first five rows of the list, it is judged that these five products are good to increase the number of foot track picks for physical stores, given that "Road Tire Tube," "Mountain Tire Tube," "Mountain Bottle Cage," "Touring Tire Cage," and "Road Bottle Cage" are sold 18005, 12220, 12155, 12025 and 11440 respectively.

Products sold in Germany are sold on the internet, but not in a physical store in that city

	City	Product Key	Product Name	Units Sold	Profit
1	Ascheim	228	Long-Sleeve Logo Jersey, S	40	460
2	Ascheim	310	Road-150 Red, 62	26	36,581
3	Ascheim	311	Road-150 Red, 44	28	39,395
4	Ascheim	312	Road-150 Red, 48	18	25,326
5	Ascheim	313	Road-150 Red, 52	14	19,698
6	Ascheim	314	Road-150 Red, 56	23	32,360
7	Ascheim	320	Road-650 Red, 58	2	572
8	Ascheim	321	Road-650 Red, 58	7	2,074
9	Ascheim	322	Road-650 Red, 60	2	572
10	Ascheim	323	Road-650 Red, 60	4	1,185
11	Ascheim	324	Road-650 Red, 62	2	572
12	Ascheim	325	Road-650 Red, 62	7	2,074
13	Ascheim	326	Road-650 Red, 44	5	1,430
14	Ascheim	327	Road-650 Red, 44	5	1,481
15	Ascheim	328	Road-650 Red, 48	2	572
16	Ascheim	329	Road-650 Red, 48	8	2,370
17	Ascheim	330	Road-650 Red, 52	2	572
18	Ascheim	331	Road-650 Red, 52	2	593
19	Ascheim	332	Road-650 Black, 58	3	858
20	Ascheim	333	Road-650 Black, 58	7	2,074
21	Ascheim	334	Road-650 Black, 60	2	572
22	Ascheim	335	Road-650 Black, 60	6	1,778
23	Ascheim	336	Road-650 Black, 62	2	572
24	Ascheim	337	Road-650 Black, 62	2	593
25	Ascheim	338	Road-650 Black, 44	3	858
26	Ascheim	339	Road-650 Black, 44	1	296

The above list shows only the first page of the results. The full list includes 2,774 products for each of Germany's 38 cities. So, summary of the list, it can see that "Long-Sleeve Logo Jersey, S", "Road-150 Red, 62", "Road-150 Red, 44", "Road-150 Red, 48", "Road-150 Red, 52" and "Road-150 Red, 56" are very popular products in the city of Ascheim. Also, check the profit, it can see that "Road-150 Red, 62", "Road-150 Red, 44", "Road-150 Red, 48", "Road-150 Red, 52", "Road-150 Red, 56" can profit a lot. Therefore, it is judged that selling the top 6 products on the list is good for management to increase foot traffic to physical stores in the city of Ascheim.

Problem 2

TOP 10 products sold in physical stores in entire countries

	Product Key	Product Name	Status	# Units Sold
1	471	Classic Vest, S	Current	4079
2	491	Short-Sleeve Classic Jersey, XL	Current	3455
3	470	Full-Finger Gloves, L	X	3365
4	474	Women's Mountain Shorts, S	Current	2992
5	476	Women's Mountain Shorts, L	Current	2881
6	483	Hitch Rack - 4-Bike	Current	2838
7	225	AWC Logo Cap	Current	2832
8	234	Long-Sleeve Logo Jersey, L	Current	2803
9	477	Water Bottle - 30 oz.	Current	2571
10	490	Short-Sleeve Classic Jersey, L	Current	2474

The list on the left shows the top 10 products sold the most in physical stores in all countries. Except for one product (Full-Finger Gloves, L), sales are currently in progress at the store.

TOP 10 products sold in physical retail stores in Germany

	Product Key	Product Name	Status	# Units Sold
1	471	Classic Vest, S	Current	390
2	491	Short-Sleeve Classic Jersey, XL	Current	328
3	234	Long-Sleeve Logo Jersey, L	Current	286
4	477	Water Bottle - 30 oz.	Current	283
5	225	AWC Logo Cap	Current	278
6	483	Hitch Rack - 4-Bike	Current	222
7	487	Hydration Pack - 70 oz.	Current	221
8	222	Sport-100 Helmet, Blue	Current	201
9	217	Sport-100 Helmet, Black	Current	196
10	490	Short-Sleeve Classic Jersey, L	Current	187

The list on the left shows the top 10 products sold the most in physical stores in Germany. All products are currently on sale.

Among the products sold well in all countries, "Classic Vest, S", "Short-Sleeve Classic Jersey, XL", "Hitch Rack - 4-Bike", and "Short-Sleeve Classic Jersey, L" are also sold a lot in Germany.

Top 10 best-selling products in the entire country that are also selling in Germany

	Product Key	Product Name	Status	# Units Sold
1	471	Classic Vest, S	Current	390
2	491	Short-Sleeve Classic Jersey, XL	Current	328
3	234	Long-Sleeve Logo Jersey, L	Current	286
4	477	Water Bottle - 30 oz.	Current	283
5	225	AWC Logo Cap	Current	278
6	483	Hitch Rack - 4-Bike	Current	222
7	490	Short-Sleeve Classic Jersey, L	Current	187
8	476	Women's Mountain Shorts, L	Current	89
9	474	Women's Mountain Shorts, S	Current	62
10	470	Full-Finger Gloves, L	X	0

The list on the left shows whether the top 10 best-selling products in all countries are being sold in real stores in Germany. This shows that nine of the top 10 best-selling products in all countries are currently sold in physical stores in Germany, and that "Full-Finger gloves, L" products are still not sold in Germany. As a result, it is believed that selling "Full-Finger Gloves, L" products to real German stores will bring more profits to store management.

Problem 3

To solve this problem, a total of four subqueries were used, and each subquery will be described.

Level 1 Subquery

	Color	EnglishProductName	Reseller Sales	Internet Sales	Reseller Units Sold	Internet Units Sold
1	Red	Road-650 Red, 60	295056.0598	11884.6694	704	17
2	Red	Road-650 Red, 60	675199.3686	28187.64	1464	36
3	Red	Road-650 Red, 62	241188.8675	11185.5712	575	16
4	Red	Road-650 Red, 62	575619.5616	46196.41	1236	59
5	Black	Road-650 Black, 44	329968.2722	32885.58	703	42
6	Black	Road-650 Black, 48	75502.602	11884.6694	180	17
7	Black	Road-650 Black, 48	189326.982	33668.57	403	43
8	Black	Road-650 Black, 52	293841.0305	23070.2406	704	33
9	Silver	Mountain-200 Silver, 46	1157224.2822	370784.1084	933	179
10	Silver	Mountain-200 Silver, 46	975932.5614	930315.99	703	401
11	Black	Mountain-200 Black, 38	1471078.7218	340150.3012	1198	166
12	Black	Mountain-200 Black, 38	1634647.9374	954715.84	1197	416
13	Red	Road-250 Red, 58	435404.97	327408.90	297	134
14	Black	Road-250 Black, 44	975155.8224	281421.5625	748	129
15	Black	Road-250 Black, 44	913324.23	346955.70	623	142
16	Black	Road-250 Black, 48	842197.4394	307600.3125	644	141
17	Black	Road-250 Black, 48	814252.2515	383605.95	556	157
18	Yellow	Road-550-W Yellow, 48	464562.3586	72031.50	778	72
19	Yellow	Road-550-W Yellow, 48	485572.4091	211772.61	724	189
20	Blue	Touring-1000 Blue, 46	1164973.1831	421980.39	825	177
21	Blue	Touring-1000 Blue, 50	713790.558	357610.50	499	150
22	Blue	Touring-1000 Blue, 54	361901.826	381451.20	253	160
23	Blue	Touring-1000 Blue, 60	1370784.2244	350458.29	973	147
24	Silver	Mountain-400-W Silve...	121158.0473	106189.62	263	138
25	Silver	Mountain-500 Silver, 40	119664.882	25424.55	405	45
26	Silver	Mountain-500 Silver, 42	115935.948	25424.55	410	45

The first subquery above shows only the results of the first page of the list. The total list consists of 125 items of bike, which calculated the total retail channel sales, total web channel sales, total units sold in the retail channel, and total units sold in the web channel.

Level 2 Subquery

	Color	Reseller Total Sales	Internet Total Sales	Reseller Total Units Sold	Internet Total Units Sold
1	Black	24469987.8234	8659117.2976	27075	5309
2	Blue	6205258.3522	2169055.53	7173	1283
3	Red	12114587.8898	7646302.824	15333	2719
4	Silver	11931999.4272	5073081.4116	10580	2691
5	Yellow	11580548.0644	4770587.5875	14854	3203

The second subquery above calculates each total retail channel sales, total web channel sales, total retail channel units sold, and total web channel sales units sold by color from the first subquery.

Level 3 Subquery

	Color	Reseller Total Sales	Internet Total Sales	Reseller Total Units Sold	Internet Total Units Sold	Total Bike Sales	Total Bike Units Sold
1	Black	24469987.8234	8659117.2976	27075	5309	33129105.121	32384
2	Blue	6205258.3522	2169055.53	7173	1283	8374313.8822	8456
3	Red	12114587.8898	7646302.824	15333	2719	19760890.7138	18052
4	Silver	11931999.4272	5073081.4116	10580	2691	17005080.8388	13271
5	Yellow	11580548.0644	4770587.5875	14854	3203	16351135.6519	18057

The third subquery above calculates total bike sales by adding each total retail channel sales and total web channel sales and calculates total bike units sold by adding each total retail units sold and total web channel units from the second subquery.

Top Level Subquery

	Color	Reseller Total Sales	Internet Total Sales	Reseller Total Units Sold	Internet Total Units Sold	Total Bike Sales	Total Bike Units Sold	% Reseller Total Units Sold	% Internet Total Units Sold
1	Black	\$ 24,469,988	\$ 8,659,117	27075	5309	\$ 33,129,105	32384	83.61%	16.39%
2	Blue	\$ 6,205,258	\$ 2,169,056	7173	1283	\$ 8,374,314	8456	84.83%	15.17%
3	Red	\$ 12,114,588	\$ 7,646,303	15333	2719	\$ 19,760,891	18052	84.94%	15.06%
4	Silver	\$ 11,931,999	\$ 5,073,081	10580	2691	\$ 17,005,081	13271	79.72%	20.28%
5	Yellow	\$ 11,580,548	\$ 4,770,588	14854	3203	\$ 16,351,136	18057	82.26%	17.74%

The top-level subquery contains all the results obtained from the previous subquery. These results also included the proportion of retail channel and web channel by total bike units sold.

Therefore, the group with the black bike color has significantly higher sales at \$33,129,105 than the other four bike color groups. On the other hand, the group with a blue bike color has significantly lower sales at \$8,374,314, compared to the other four bike color groups.

Rank for total bike sales by color is

1. Black
2. Red
3. Silver
4. Yellow
5. Blue

In addition, the above results confirm that sales at the retail channel of all color-specific bike groups are relatively higher than that of the web channel. And the ratio of retail and web channels to total bike units sold shows that average units sold of all color-specific bike groups for a very large proportion of more than 80% in the retail channel and a very low proportion of less than 20% in the web channel.

Appendix

Problem1

USE [AdventureWorksDW2019];

-- Identify which products sold in Germany are sold on the internet but not in a physical store

```
SELECT DISTINCT(i.[ProductKey]) as [Product Key]
,[EnglishProductName] as [Product Name]
, SUM([OrderQuantity]) as [# Unit Sold]
FROM [dbo].[FactInternetSales] as i
INNER JOIN [dbo].[DimProduct] as p ON p.[ProductKey] = i.[ProductKey]
INNER JOIN [dbo].[DimGeography] as geo ON geo.[SalesTerritoryKey]= i.[SalesTerritoryKey]
WHERE [EnglishCountryRegionName] = 'Germany'
AND i.[ProductKey] NOT IN
(
SELECT DISTINCT(s.[ProductKey])
FROM [dbo].[FactResellerSales] as s
INNER JOIN [dbo].[DimReseller] as rs ON rs.ResellerKey = s.ResellerKey
INNER JOIN [dbo].[DimGeography] as g ON g.[GeographyKey] = rs.[GeographyKey]
WHERE g.[EnglishCountryRegionName] = geo.[EnglishCountryRegionName]
)
GROUP BY i.[ProductKey], [EnglishProductName]
ORDER BY SUM([OrderQuantity]) DESC
```

-- Analyzing the data by city level, identify which products sold in Germany are sold on the internet but not in a physical store in that city

```
SELECT [City],i.[ProductKey] as [Product Key]
,[EnglishProductName] as [Product Name]
, ISNULL(SUM([OrderQuantity]),0) as [Units Sold]
, FORMAT(SUM([UnitPrice] - [TotalProductCost]), 'N0') as [Profit]
FROM [dbo].[FactInternetSales] as i
INNER JOIN [dbo].[DimProduct] as p ON p.[ProductKey] = i.[ProductKey]
INNER JOIN [dbo].[DimGeography] as geo ON geo.[SalesTerritoryKey]= i.[SalesTerritoryKey]
WHERE [EnglishCountryRegionName] = 'Germany'
AND i.[ProductKey] NOT IN
(
SELECT DISTINCT(s.[ProductKey])
FROM [dbo].[FactResellerSales] as s
INNER JOIN [dbo].[DimReseller] as rs ON rs.ResellerKey = s.ResellerKey
INNER JOIN [dbo].[DimGeography] as g ON g.[GeographyKey] = rs.[GeographyKey]
WHERE g.[EnglishCountryRegionName] = geo.[EnglishCountryRegionName]
)
GROUP BY [City],i.[ProductKey],[EnglishProductName]
ORDER BY [City]
```

Problem2

USE [AdventureWorksDW2019];

-- List of the TOP 10 products (Current or Current not) sold in physical stores in all countries

```
SELECT Top(10) p.[ProductKey] as [Product Key]
,[EnglishProductName] as [Product Name]
```

```

, ISNULL([Status], 'X') as [Status]
, ISNULL((SELECT SUM([OrderQuantity]) FROM [dbo].[FactResellerSales] as rs
INNER JOIN [dbo].[DimReseller] as dr ON rs.[ResellerKey] = dr.[ResellerKey]
INNER JOIN [dbo].[DimGeography] as geo ON geo.[GeographyKey] = dr.[GeographyKey]
WHERE rs.ProductKey = p.ProductKey
AND [EnglishCountryRegionName]
IN ('Australia','Canada', 'France', 'Germany', 'United Kingdom',
'United States')), ") as [# Units Sold]
FROM [dbo].[DimProduct] as p
ORDER BY [# Units Sold] DESC

-- List of the TOP 10 products (Current or Current not) sold in physical retail stores in Germany
SELECT TOP(10) p.[ProductKey] as [Product Key]
,[EnglishProductName] as [Product Name]
, ISNULL([Status], 'X') as [Status]
, ISNULL((SELECT SUM([OrderQuantity])
FROM [dbo].[FactResellerSales] as rs
INNER JOIN [dbo].[DimReseller] as r
ON rs.[ResellerKey] = r.[ResellerKey]
INNER JOIN [dbo].[DimGeography] as g
ON g.[GeographyKey] = r.[GeographyKey]
WHERE rs.ProductKey = p.ProductKey
AND [EnglishCountryRegionName] = 'Germany'), ") as [# Units Sold]
FROM [dbo].[DimProduct] as p
ORDER BY [# Units Sold] DESC

-- Check the top 10 best-selling products in the entire country that are also selling in Germany
SELECT p.[ProductKey] as [Product Key]
,[EnglishProductName] as [Product Name]
, ISNULL([Status], 'X') as [Status]
, ISNULL((SELECT SUM([OrderQuantity])
FROM [dbo].[FactResellerSales] as rs
INNER JOIN [dbo].[DimReseller] as r
ON rs.[ResellerKey] = r.[ResellerKey]
INNER JOIN [dbo].[DimGeography] as g
ON g.[GeographyKey] = r.[GeographyKey]
WHERE rs.ProductKey = p.ProductKey
AND [EnglishCountryRegionName] = 'Germany'), ") as [# Units Sold]
FROM [dbo].[DimProduct] as p
WHERE p.[ProductKey] IN (471, 491, 470, 474, 476, 483, 225, 234, 477, 490)
ORDER BY [# Units Sold] DESC

```

Problem 3

USE [AdventureWorksDW2019];

```

-- Top level Subquery
-- Change data for better viewing and add units to percentages (% of total)
SELECT Color, CONCAT('$ ',FORMAT([Reseller Total Sales],N0')) as [Reseller Total Sales]
, CONCAT('$ ',FORMAT([Internet Total Sales], 'N0')) as [Internet Total Sales]
, [Reseller Total Units Sold], [Internet Total Units Sold]
, CONCAT('$ ',FORMAT([Total Bike Sales], 'N0')) as [Total Bike Sales], [Total Bike Units Sold]
, FORMAT(CAST([Reseller Total Units Sold] as decimal)/CAST([Total Bike Units Sold] as decimal),'p2') as
[% Reseller Total Units Sold]
, FORMAT(CAST([Internet Total Units Sold] as decimal)/CAST([Total Bike Units Sold] as decimal),'p2') as

```



```

[% Internet Total Units Sold]
FROM
(
-- Level 3 Subquery
-- total bike sales and total units sold
SELECT *
, ([Reseller Total Sales] + [Internet Total Sales]) as [Total Bike Sales]
, ([Reseller Total Units Sold] + [Internet Total Units Sold]) as [Total Bike Units Sold]
FROM
(
-- Level 2 Subquery
-- bike sales and units sold by color
SELECT [Color]
,SUM([Reseller Sales]) as [Reseller Total Sales]
, SUM([Internet Sales]) as [Internet Total Sales]
, SUM([Reseller Units Sold]) as [Reseller Total Units Sold]
, SUM([Internet Units Sold]) as [Internet Total Units Sold]
FROM
(
-- Level 1 Subquery
-- all bike sales and units sold
SELECT d.[Color], d.[EnglishProductName]
, (SELECT ISNULL(SUM([SalesAmount]),0)
FROM [dbo].[FactResellerSales] as s
WHERE s.ProductKey = d.ProductKey
) as [Reseller Sales]
, (SELECT ISNULL(SUM([SalesAmount]),0)
FROM [dbo].[FactInternetSales] as i
WHERE i.ProductKey = d.ProductKey
) as [Internet Sales]
, (SELECT ISNULL(SUM([OrderQuantity]),0)
FROM [dbo].[FactResellerSales] as s
WHERE s.ProductKey = d.ProductKey
) as [Reseller Units Sold]
, (SELECT ISNULL(SUM([OrderQuantity]),0)
FROM [dbo].[FactInternetSales] as i
WHERE i.ProductKey = d.ProductKey
) as [Internet Units Sold]
FROM [dbo].[DimProduct] as d
INNER JOIN [dbo].[DimProductSubCategory] as ds ON ds.[ProductSubcategoryKey] = d.[ProductSubcategoryKey]
INNER JOIN [dbo].[DimProductCategory] as dc ON dc.ProductCategoryKey = ds.ProductCategoryKey
WHERE [Color] <> 'NA'
AND [EnglishProductCategoryName] = 'Bikes'
) sub1
GROUP BY Color
) sub2
) sub3

```