

Workshop

- AdventureWorksDW DB
- SQL
- Tableau
- Microsoft Power BI
- Qlik Sense



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Sample Databases Provided by Microsoft

AdventureWorks201x & AdventureWorksDW201x

- AdventureWorks sells bikes & related products (parts & accessories) through two sales channels:
 - direct to customers via internet
 - indirectly through resellers (or stores)
- Business transactions tracked are: sales, purchases & inventory.
- These transactions may have some of the following dimensions:
 - Products sold or purchased - Product Hierarchy – Products, Product Subcategories & Product Categories
 - Address for customer, employees, stores & others - Geography Hierarchy – City, State, Country
 - Resellers (or Store)
 - Customers (Individuals buying over the internet)
 - Ship, Order, Due, Purchase & other Dates - Date Hierarchy - Year, Quarter, Month, Day
 - Employees – including sales people
 - Vendors – product and part suppliers
 - Sales promotions



Sample Databases Provided by Microsoft

AdventureWorks201x

- **System of record (SOR)** for AdventureWorks company
- OLTP (on-line transactional processing) database
- Normalized ER Model
- Three subject areas:
 - Sales
 - Inventory
 - Purchasing Sales

AdventureWorksDW201x

- **Data Warehouse (DW)** for AdventureWorks company
- Data source is AdventureWorks201x (sort of...)
- Dimensional data model (sort of, but does not follow best practices)
- Three subject areas:
 - Internet Sales
 - Reseller Sales
 - Inventory

Sample Databases Provided by Microsoft

AdventureWorks201x & AdventureWorksDW201x

- Microsoft's documentation has not been kept up-to-date (similar to most IT's BI & DW documentation BTW) but is useful when understanding the overall model and business rules:
 - [Schemas in AdventureWorks](#)
 - [AdventureWorks Data Dictionary](#)
 - [Adventure Works Cycles Business Scenarios](#)
- Additional documentation
 - [AdventureWorks – Data Dictionary](#) – by Datedo (sells data dictionary software & ERD)
 - [AdventureWorks \(printer friendly\).pdf](#) - pdf of above
- AdventureWorks Data Model (both old)
 - [AdventureWorks OLTP Database Diagram](#)
 - [AdventureWorks DW Schema](#)

AdventureWorksDW2017

Reseller Sales	Internet Sales	Table
x	x	DimCurrency
	x	DimCustomer
x	x	DimDate
x		DimEmployee
x	X	DimGeography
x	X	DimProduct
x	X	DimProductCategory
x	X	DimProductSubcategory
x	X	DimPromotion
x		DimReseller
x	X	DimSalesTerritory
	X	FactInternetSales
x		FactResellerSales

- Tables used by Internet and/or Reseller Sales

AdventureWorksDW2017

Views (Standard)

- vCurrency
- vSalesTerritory
- vEmployee
- vPromotion
- vGeography
- vReseller
- vCustomer
- vDate
- vInternetSales
- vResellerSales

Specialty Views

- Role-playing versions:
 - vShipDate
 - vOrderDate
 - vDueDate
- Eliminate snowflake versions
 - vProduct
- Union of internet & reseller sales
 - vTotalSales
- Union of Customers & Resellers
 - vSoldTo

AdventureWorksDW2017

Reseller	Internet	Total	Views	Comment
x	x	x	vCurrency	
	x	x	vCustomer	
			vDate	
x	x	x	vDueDate	Role playing version
x		x	vEmployee	
x	x	x	vGeography	
x	x	x	vOrderDate	Role playing version
x	x	x	vProduct	Star versus Snowflake version
x	x	x	vPromotion	
x		x	vReseller	
x	x	x	vSalesTerritory	
x	x	x	vShipDate	Role playing version
		x	vSoldTo	
	x		vInternetSales	
x			vResellerSales	
		x	vTotalSales	

- Views used by Internet and/or Reseller Sales

AdventureWorksDW2017

Hierarchies

Hierarchy	Members
Product	Product Category, Subcategory, (Model), Name
Promotion	Promotion Type, Promotion Name
Reseller	Business Type, Reseller Name
Geo	Country Region, State Province, City, Postal Code
Sales Territory	Sales Territory (ST) Group, ST Country, ST Region City, Postal Code
Order Date	Order_Year, Order_Qtr, Order_Month

AdventureWorksDW2017

Measures

- $\text{Gross Profit} = \text{Sales Amount} - \text{Total Product Cost}$
- $\text{Profit Margin \%} = (\text{Sales Amount} - \text{Total Product Cost}) / \text{Sales Amount}$

Microsoft PowerBI

Examples of data visualizations to answer questions

Assignments

Assignment 1:

- Load Internet Sales related views
- Create hierarchies & measures
- Create various visualizations

Assignment 2:

- Load Internet Sales related tables

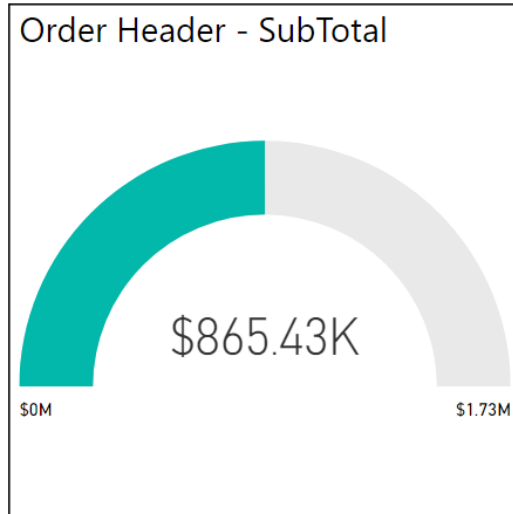
Inputs:

- Database: AdventureWorksDW2017
- Script: Create Views for BI

AdventureWorksLT - Questions

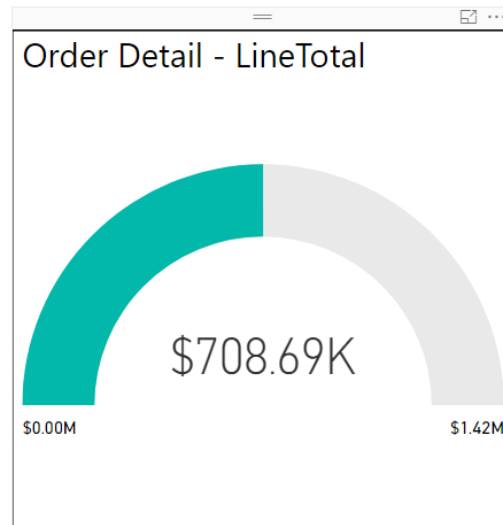
- a) Total sales
 - Using SalesOrderHeader
 - Using SalesOrderDetail
- b) Total sales by country – ranked/sorted (highest to lowest)
- c) Total sales by city & country – ranked/sorted (highest to lowest)
- d) Total sales by customer (person) – ranked/sorted (highest to lowest)
- e) Total sales by customer (company) – ranked/sorted (highest to lowest)
- f) Sales by product category – ranked/sorted (highest to lowest)
- g) Sales by product name – ranked/sorted (highest to lowest)

a) Total sales



```
SELECT  format(sum(SubTotal), 'c', 'en-US' ) as SubTotal
,format(sum(TaxAmt), 'c', 'en-US' ) as TaxAm
,format(sum(Freight), 'c', 'en-US' ) as Freight
,format(sum(TotalDue), 'c', 'en-US' ) as TotalDue FROM
SalesLT.SalesOrderHeader
```

SubTotal	TaxAmt	Freight	TotalDue
\$865,433.12	\$69,234.65	\$21,635.83	\$956,303.59



```
SELECT  format(sum(LineTotal), 'c', 'en-US' ) as LineTotal
FROM SalesLT.SalesOrderDetail
```

LineTotal
\$708,690.15

b) Total sales by country – ranked/sorted (highest to lowest)

Sales by Country

CountryRegion	TotalDue
United Kingdom	\$572,497
United States	\$383,807
Total	\$956,304

TotalDue by CountryRegion

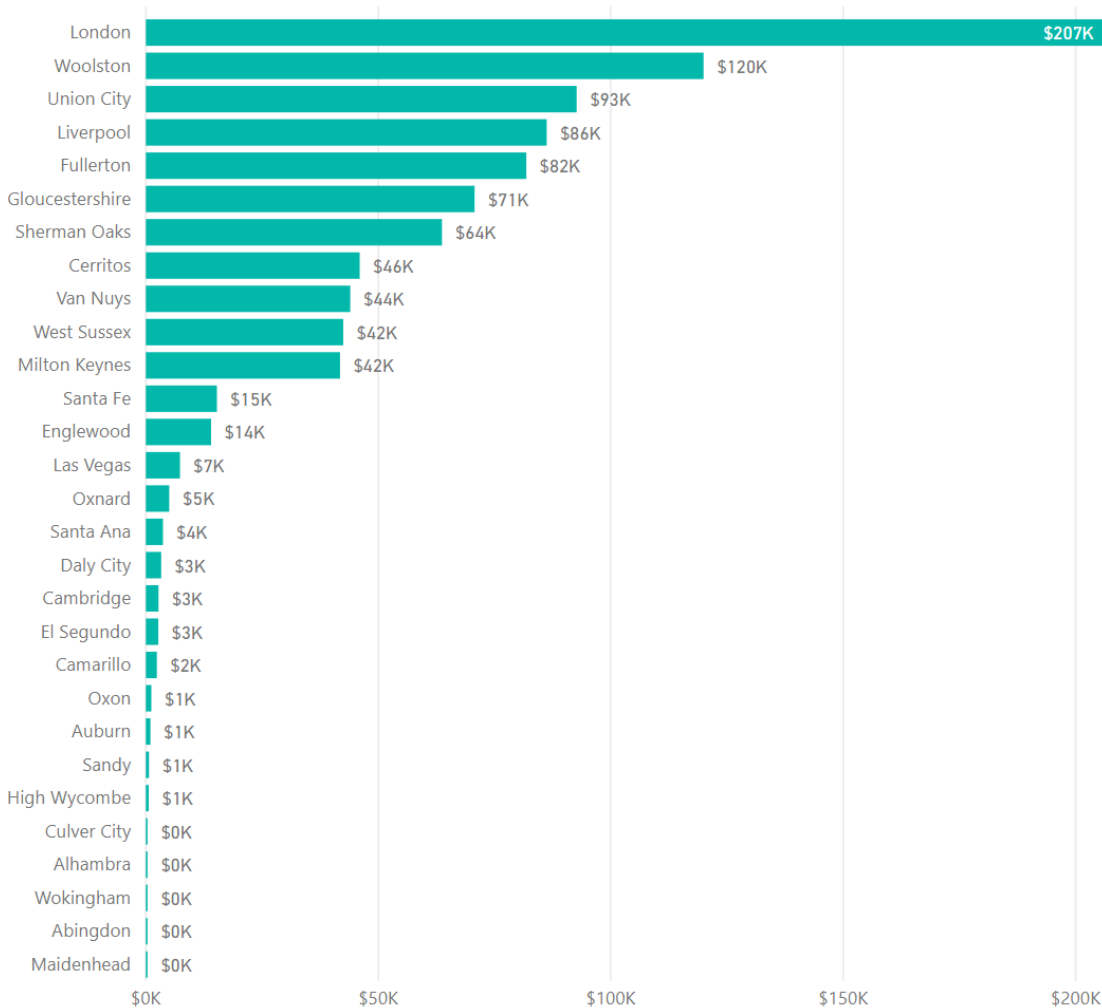


c) Total sales by city & country – ranked/sorted (highest to lowest)

Total Due by City

CountryRegion	City	TotalDue
United Kingdom	London	\$206,736
United Kingdom	Woolston	\$119,961
United States	Union City	\$92,664
United Kingdom	Liverpool	\$86,223
United States	Fullerton	\$81,835
United Kingdom	Gloucestershire	\$70,699
United States	Sherman Oaks	\$63,686
United States	Cerritos	\$45,992
United States	Van Nuys	\$43,963
United Kingdom	West Sussex	\$42,453
United Kingdom	Milton Keynes	\$41,760
United States	Santa Fe	\$15,275
United States	Englewood	\$14,018
United States	Las Vegas	\$7,331
United States	Oxnard	\$5,016
United States	Santa Ana	\$3,673
United States	Daly City	\$3,294
United Kingdom	Cambridge	\$2,711
United States	El Segundo	\$2,669
United States	Camarillo	\$2,362
United Kingdom	Oxon	\$1,171
United States	Auburn	\$973
United States	Sandy	\$665
United Kingdom	High Wycombe	\$608
United States	Culver City	\$273
United States	Alhambra	\$118
United Kingdom	Wokingham	\$87
United Kingdom	Abingdon	\$45
United Kingdom	Maidenhead	\$43
Total		\$956,304

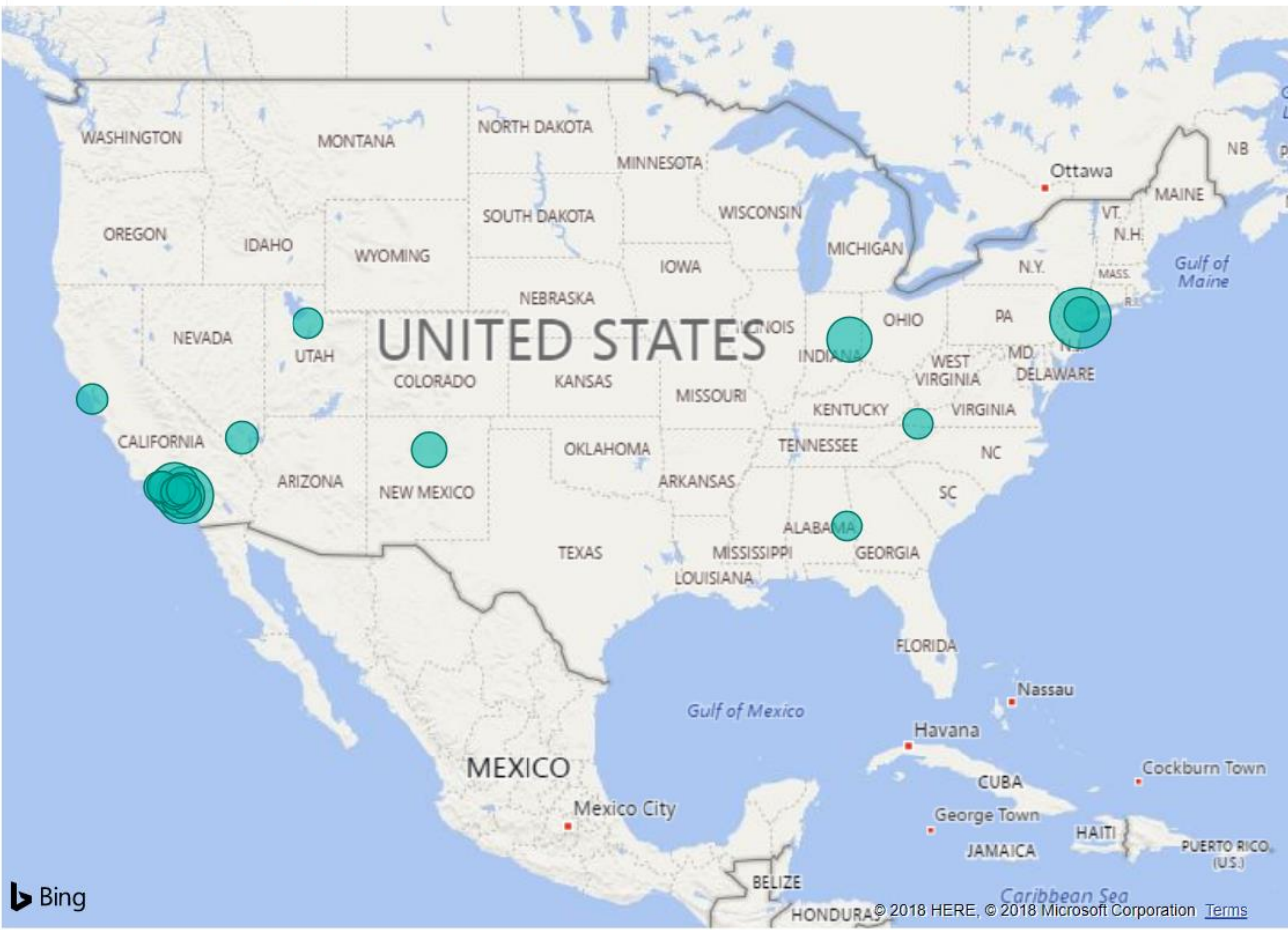
TotalDue by City



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United Kingdom	London	\$206,736
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Total		\$956,304

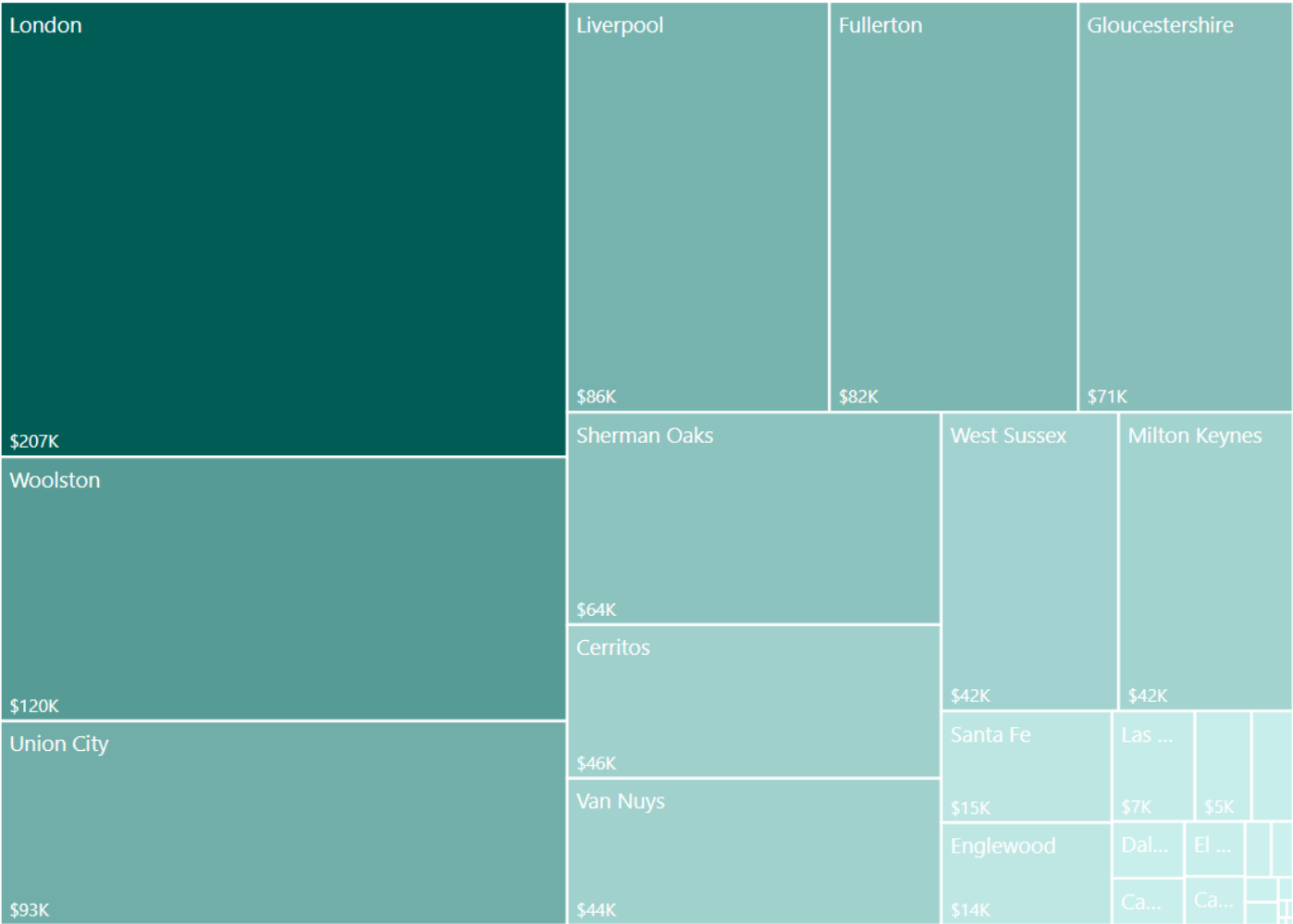
TotalDue by City



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CountryRegion	City	TotalDue
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United States	Van Nuys	\$43,963
United Kingdom	West Sussex	\$42,453
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United States	Santa Fe	\$15,275
United States	Englewood	\$14,018
United States	Las Vegas	\$7,331
United States	Oxnard	\$5,016
United States	Santa Ana	\$3,673
United States	Daly City	\$3,294
United Kingdom	Cambridge	\$2,711
United States	El Segundo	\$2,669
United States	Camarillo	\$2,362
United Kingdom	Oxon	\$1,171
United States	Auburn	\$973
United States	Sandy	\$665
United Kingdom	High Wycombe	\$608
United States	Culver City	\$273
United States	Alhambra	\$118
United Kingdom	Wokingham	\$87
United Kingdom	Abingdon	\$45
United Kingdom	Maidenhead	\$43
Total		\$956,304

TotalDue by City



d) Total sales by customer (person) – ranked/sorted (highest to lowest)

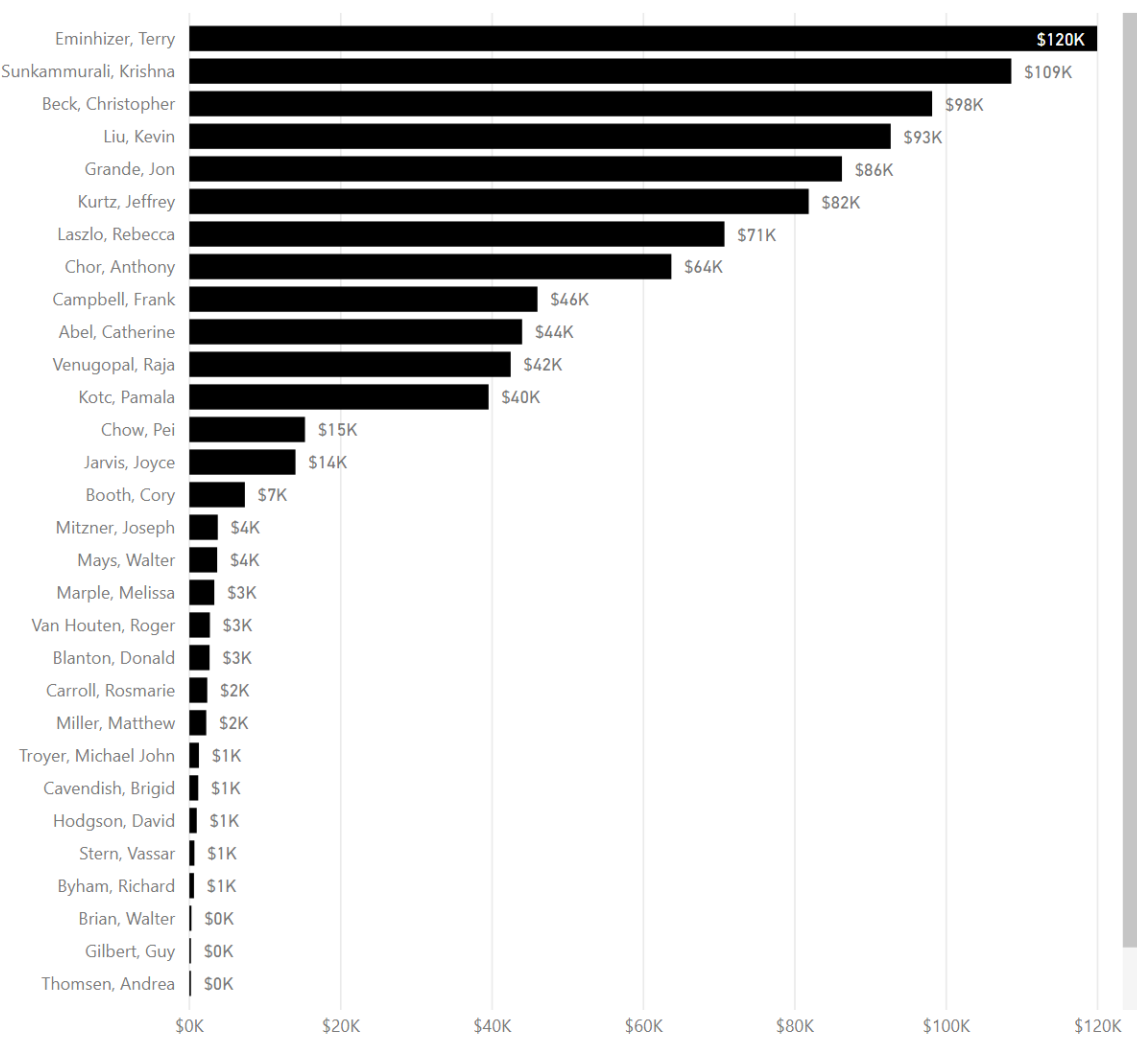
Sales by Customers

LastName	FirstName	TotalDue
Beck	Christopher	\$98,138
Liu	Kevin	\$92,664
Grande	Jon	\$86,223
Kurtz	Jeffrey	\$81,835
Laszlo	Rebecca	\$70,699
Chor	Anthony	\$63,686
Campbell	Frank	\$45,992
Abel	Catherine	\$43,963
Venugopal	Raja	\$42,453
Kotc	Pamala	\$39,532
Chow	Pei	\$15,275
Jarvis	Joyce	\$14,018
Booth	Cory	\$7,331
Mitzner	Joseph	\$3,755
Mays	Walter	\$3,673
Marple	Melissa	\$3,294
Van Houten	Roger	\$2,711
Blanton	Donald	\$2,669
Carroll	Rosmarie	\$2,362
Miller	Matthew	\$2,228
Troyer	Michael John	\$1,261
Cavendish	Brigid	\$1,171
Hodgson	David	\$973
Stern	Vassar	\$665
Byham	Richard	\$608
Brian	Walter	\$273
Gilbert	Guy	\$118
Thomsen	Andrea	\$87
Total		\$956,304

Sales by Customers

CustomerName	TotalDue
Eminhizer, Terry	\$119,961
Sunkammurali, Krishna	\$108,598
Beck, Christopher	\$98,138
Liu, Kevin	\$92,664
Grande, Jon	\$86,223
Kurtz, Jeffrey	\$81,835
Laszlo, Rebecca	\$70,699
Chor, Anthony	\$63,686
Campbell, Frank	\$45,992
Abel, Catherine	\$43,963
Venugopal, Raja	\$42,453
Kotc, Pamala	\$39,532
Chow, Pei	\$15,275
Jarvis, Joyce	\$14,018
Booth, Cory	\$7,331
Mitzner, Joseph	\$3,755
Mays, Walter	\$3,673
Marple, Melissa	\$3,294
Van Houten, Roger	\$2,711
Blanton, Donald	\$2,669
Carroll, Rosmarie	\$2,362
Miller, Matthew	\$2,228
Troyer, Michael John	\$1,261
Cavendish, Brigid	\$1,171
Hodgson, David	\$973
Stern, Vassar	\$665
Byham, Richard	\$608
Brian, Walter	\$273
Gilbert, Guy	\$118
Thomsen, Andrea	\$87
Mitchell, Linda	\$45
Esteves, Janeth	\$43
Total	\$956,304

Sales by Customers

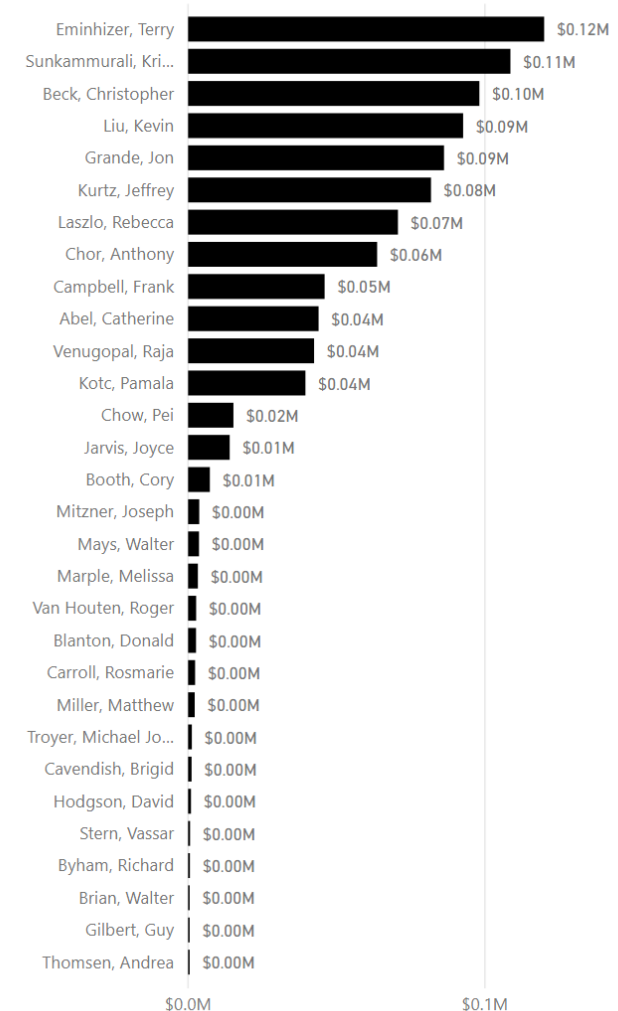


d) Total sales by customer (person) – ranked/sorted (highest to lowest)

Sales by Customers

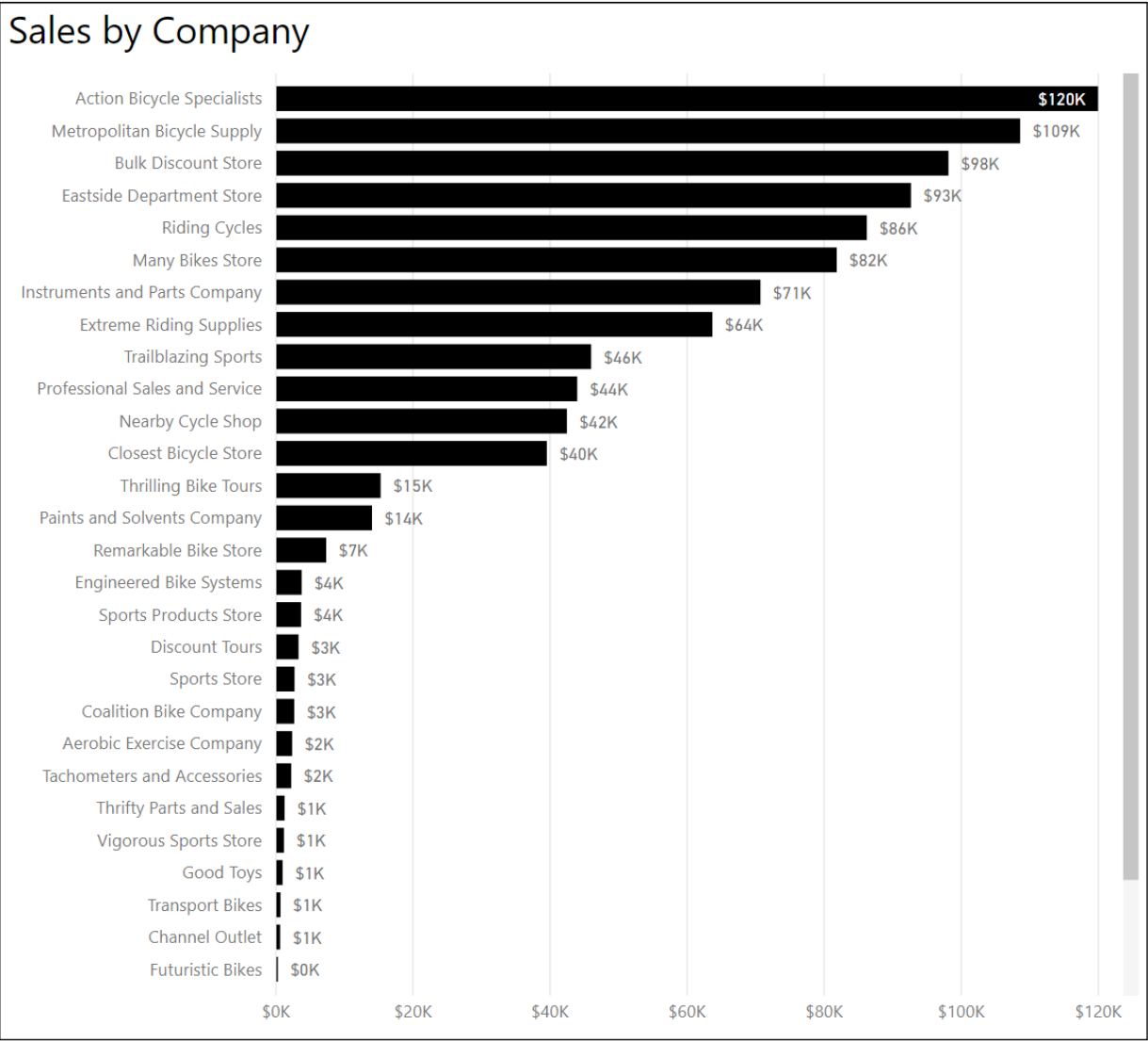
CustomerName	EmailAddress	AddressLine1	City	CountryRegion	PostalCode	TotalDue
Eminhizer, Terry	terry1@adventure-works.com	Warrington Ldc Unit 25/2	Woolston	United Kingdom	WA1 4SY	\$119,961
Sunkammurali, Krishna	krishna1@adventure-works.com	Paramount House	London	United Kingdom	W1N 9FA	\$108,598
Beck, Christopher	christopher1@adventure-works.com	93-2501, Blackfriars Road,	London	United Kingdom	SE1 8HL	\$98,138
Liu, Kevin	kevin5@adventure-works.com	9992 Whipple Rd	Union City	United States	94587	\$92,664
Grande, Jon	jon1@adventure-works.com	Galashiels	Liverpool	United Kingdom	L4 4HB	\$86,223
Kurtz, Jeffrey	jeffrey3@adventure-works.com	Receiving	Fullerton	United States	92831	\$81,835
Laszlo, Rebecca	rebecca2@adventure-works.com	Phoenix Way, Cirencester	Gloucestershire	United Kingdom	GL7 1RY	\$70,699
Chor, Anthony	anthony0@adventure-works.com	Riverside	Sherman Oaks	United States	91403	\$63,686
Campbell, Frank	frank4@adventure-works.com	251340 E. South St.	Cerritos	United States	90703	\$45,992
Abel, Catherine	catherine0@adventure-works.com	57251 Serene Blvd	Van Nuys	United States	91411	\$43,963
Venugopal, Raja	raja0@adventure-works.com	Burgess Hill	West Sussex	United Kingdom	RH15 9UD	\$42,453
Kotc, Pamala	pamala0@adventure-works.com	Garamonde Drive, Wymbush	Milton Keynes	United Kingdom	MK8 8ZD	\$39,532
Chow, Pei	pei0@adventure-works.com	4660 Rodeo Road	Santa Fe	United States	87501	\$15,275
Jarvis, Joyce	joyce0@adventure-works.com	955 E. County Line Rd.	Englewood	United States	80110	\$14,018
Booth, Cory	cory0@adventure-works.com	Eastern Beltway Center	Las Vegas	United States	89106	\$7,331
Mitzner, Joseph	joseph4@adventure-works.com	123 Camelia Avenue	Oxnard	United States	93030	\$3,755
Mays, Walter	walter1@adventure-works.com	Po Box 252525	Santa Ana	United States	92701	\$3,673
Marple, Melissa	melissa0@adventure-works.com	603 Gellert Blvd	Daly City	United States	94015	\$3,294
Van Houten, Roger	roger2@adventure-works.com	Internet House, 3399 Science Park	Cambridge	United Kingdom	CB4 4BZ	\$2,711
Blanton, Donald	donald0@adventure-works.com	Corporate Office	El Segundo	United States	90245	\$2,669
Carroll, Rosmarie	rosmarie0@adventure-works.com	39933 Mission Oaks Blvd	Camarillo	United States	93010	\$2,362
Miller, Matthew	matthew5@adventure-works.com	Wymbush	Milton Keynes	United Kingdom	MK8 8DF	\$2,228
Troyer, Michael John	michaeljohn0@adventure-works.com	Oxnard Outlet	Oxnard	United States	93030	\$1,261
Cavendish, Brigid	brigid0@adventure-works.com	Banbury	Oxon	United Kingdom	OX16 8RS	\$1,171
Hodgson, David	david16@adventure-works.com	99700 Bell Road	Auburn	United States	95603	\$973
Stern, Vassar	vassar0@adventure-works.com	25130 South State Street	Sandy	United States	84070	\$665
Byham, Richard	richard2@adventure-works.com	Knave's Beech Ind.	High Wycombe	United Kingdom	HP10 9QY	\$608
Brian, Walter	walter0@adventure-works.com	25136 Jefferson Blvd.	Culver City	United States	90232	\$273
Gilbert, Guy	guy0@adventure-works.com	Vista Marketplace	Alhambra	United States	91801	\$118
Thomsen, Andrea	andrea1@adventure-works.com	251 The Metro Center	Wokingham	United Kingdom	RG41 1QW	\$87
Mitchell, Linda	linda9@adventure-works.com	New Millhouse, 2583 Milton Park	Abingdon	United Kingdom	OX14 4SE	\$45
Esteves, Janeth	janeth1@adventure-works.com	6 The Farm, Liberty Road	Maidenhead	United Kingdom	SL67RJ	\$43
Total						\$956,304

Sales by Customers

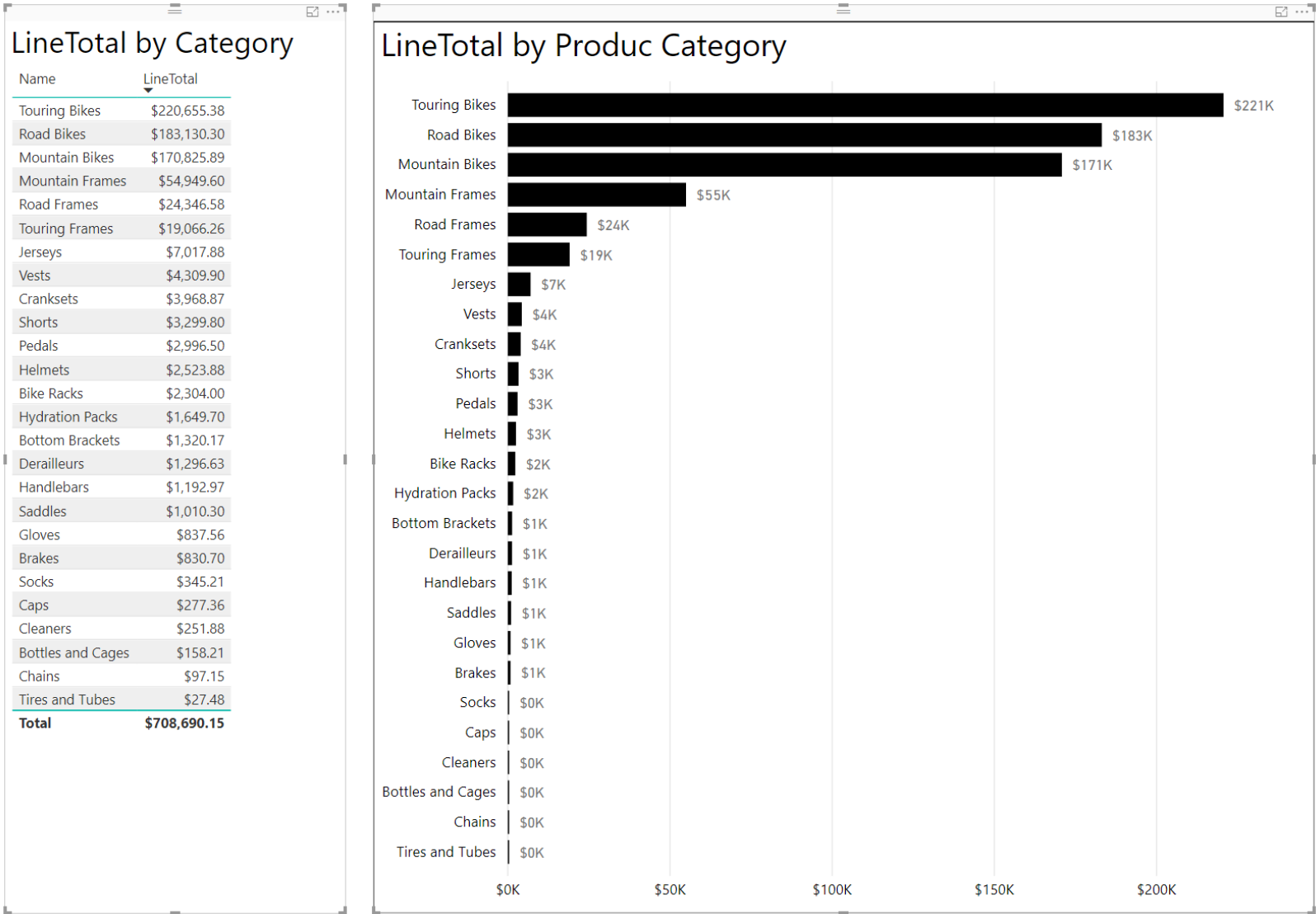


e) Total sales by customer (company) – ranked/sorted (highest to lowest)

Sales by Company	
CompanyName	TotalDue
West Side Mart	\$87
Vigorous Sports Store	\$1,171
Transport Bikes	\$665
Trailblazing Sports	\$45,992
Thrilling Bike Tours	\$15,275
Thrifty Parts and Sales	\$1,261
The Bicycle Accessories Company	\$118
Tachometers and Accessories	\$2,228
Sports Store	\$2,711
Sports Products Store	\$3,673
Riding Cycles	\$86,223
Remarkable Bike Store	\$7,331
Professional Sales and Service	\$43,963
Paints and Solvents Company	\$14,018
Nearby Cycle Shop	\$42,453
Metropolitan Bicycle Supply	\$108,598
Many Bikes Store	\$81,835
Instruments and Parts Company	\$70,699
Good Toys	\$973
Futuristic Bikes	\$273
Extreme Riding Supplies	\$63,686
Essential Bike Works	\$45
Engineered Bike Systems	\$3,755
Eastside Department Store	\$92,664
Discount Tours	\$3,294
Coalition Bike Company	\$2,669
Channel Outlet	\$1K
Futuristic Bikes	\$0K
Total	\$956,304



f - Sales by product category – ranked/sorted (highest to lowest)



f - Sales by product category – ranked/sorted (highest to lowest)

LineTotal by Category

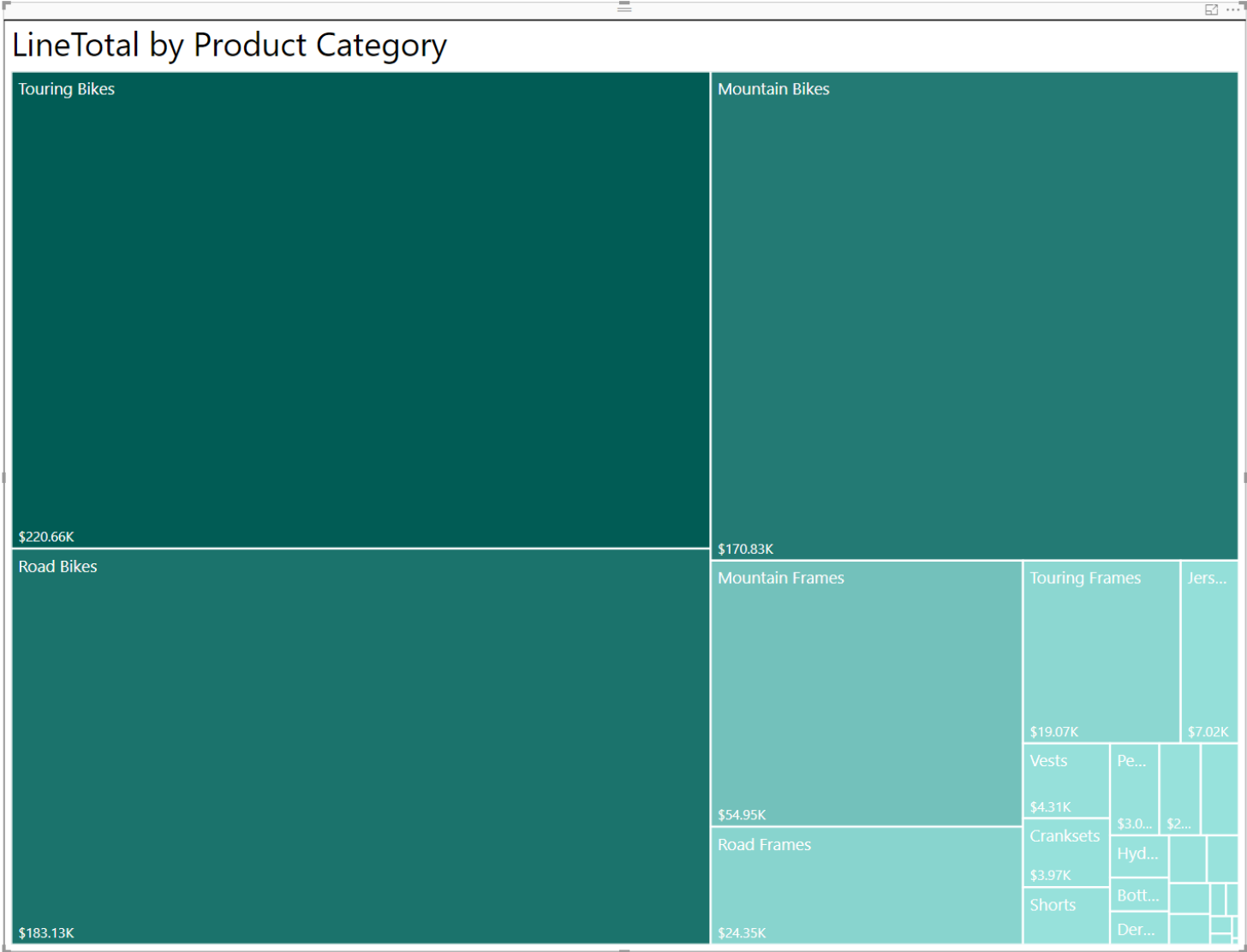
Name	LineTotal
Tires and Tubes	\$27.48
Chains	\$97.15
Bottles and Cages	\$158.21
Cleaners	\$251.88
Caps	\$277.36
Socks	\$345.21
Brakes	\$830.70
Gloves	\$837.56
Saddles	\$1,010.30
Handlebars	\$1,192.97
Derailleurs	\$1,296.63
Bottom Brackets	\$1,320.17
Hydration Packs	\$1,649.70
Bike Racks	\$2,304.00
Helmets	\$2,523.88
Pedals	\$2,996.50
Shorts	\$3,299.80
Cranksets	\$3,968.87
Vests	\$4,309.90
Jerseys	\$7,017.88
Touring Frames	\$19,066.26
Road Frames	\$24,346.58
Mountain Frames	\$54,949.60
Mountain Bikes	\$170,825.89
Road Bikes	\$183,130.30
Touring Bikes	\$220,655.38
Total	\$708,690.15

LineTotal by Product Category



f - Sales by product category – ranked/sorted (highest to lowest)

LineTotal by Category	
Name	LineTotal
Tires and Tubes	\$27.48
Chains	\$97.15
Bottles and Cages	\$158.21
Cleaners	\$251.88
Caps	\$277.36
Socks	\$345.21
Brakes	\$830.70
Gloves	\$837.56
Saddles	\$1,010.30
Handlebars	\$1,192.97
Derailluers	\$1,296.63
Bottom Brackets	\$1,320.17
Hydration Packs	\$1,649.70
Bike Racks	\$2,304.00
Helmets	\$2,523.88
Pedals	\$2,996.50
Shorts	\$3,299.80
Cranksets	\$3,968.87
Vests	\$4,309.90
Jerseys	\$7,017.88
Touring Frames	\$19,066.26
Road Frames	\$24,346.58
Mountain Frames	\$54,949.60
Mountain Bikes	\$170,825.89
Road Bikes	\$183,130.30
Touring Bikes	\$220,655.38
Total	\$708,690.15



f - Sales by product name – ranked/sorted (highest to lowest)

Category Name	Product Name	LineTotal	OrderQty
Touring Bikes	Touring-1000 Blue, 60	\$37,191.49	26
Mountain Bikes	Mountain-200 Black, 42	\$37,178.84	27
Road Bikes	Road-350-W Yellow, 48	\$36,486.24	42
Mountain Bikes	Mountain-200 Black, 38	\$35,801.84	26
Touring Bikes	Touring-1000 Yellow, 60	\$23,413.47	17
Touring Bikes	Touring-1000 Blue, 50	\$22,887.07	16
Mountain Bikes	Mountain-200 Silver, 42	\$20,879.91	15
Road Bikes	Road-350-W Yellow, 40	\$20,411.88	20
Mountain Bikes	Mountain-200 Black, 46	\$19,277.92	14
Road Bikes	Road-350-W Yellow, 42	\$18,692.52	19
Mountain Bikes	Mountain-200 Silver, 46	\$18,095.92	13
Road Bikes	Road-250 Black, 44	\$17,592.12	12
Road Bikes	Road-250 Black, 48	\$17,592.12	12
Touring Bikes	Touring-1000 Blue, 46	\$17,165.30	12
Touring Bikes	Touring-1000 Yellow, 46	\$17,165.30	12
Mountain Bikes	Mountain-200 Silver, 38	\$15,311.93	11
Touring Bikes	Touring-2000 Blue, 54	\$13,120.38	18
Mountain Frames	HL Mountain Frame - Silver, 38	\$13,099.20	16
Road Bikes	Road-550-W Yellow, 38	\$12,773.59	19
Road Bikes	Road-250 Black, 52	\$11,728.08	8
Touring Bikes	Touring-3000 Blue, 50	\$10,244.43	23
Mountain Frames	HL Mountain Frame - Black, 42	\$9,717.12	12
Touring Bikes	Touring-3000 Yellow, 62	\$8,650.16	20
Touring Bikes	Touring-1000 Blue, 54	\$8,582.65	6
Mountain Frames	HL Mountain Frame - Silver, 46	\$8,187.00	10
Touring Bikes	Touring-3000 Yellow, 44	\$8,017.38	18
Touring Bikes	Touring-2000 Blue, 60	\$7,289.10	10
Touring Frames	HL Touring Frame - Yellow, 60	\$7,228.15	12
Touring Bikes	Touring-1000 Yellow, 50	\$7,152.21	5
Road Bikes	Road-750 Black, 48	\$6,803.87	21
Touring Bikes	Touring-3000 Blue, 54	\$6,681.15	15
Touring Bikes	Touring-2000 Blue, 46	\$6,560.19	9
Touring Bikes	Touring-2000 Blue, 50	\$6,560.19	9
Total		\$708,690.15	2087

