

# Workshop: BI Intro

- Introduction to BI tools
  - Microsoft PowerBI
  - Tableau
- Objectives:
  - Connect to data sources
  - BI data model
  - Create data visualizations (basic)
    - Filters
    - Hierarchy
    - Calculations
  - Create dashboards



# Our approach to assignments

- Install required software: DBMS
- Create & load data for databases
- Review data model (note: do not always get a data model)
- Answer business questions using SQL
  - You need to perform data profiling & understand data (get familiar with data)
  - You need to determine the answers for BI and/or data integration work to perform data validation
- Answer business questions using BI tool
  - Microsoft Power BI
  - Tableau

# Workshop: BI Intro

- Chinook Database
  - MySQL
  - PostgreSQL
  - Microsoft SQL Server
  - Azure SQL
  - Oracle 18c XE



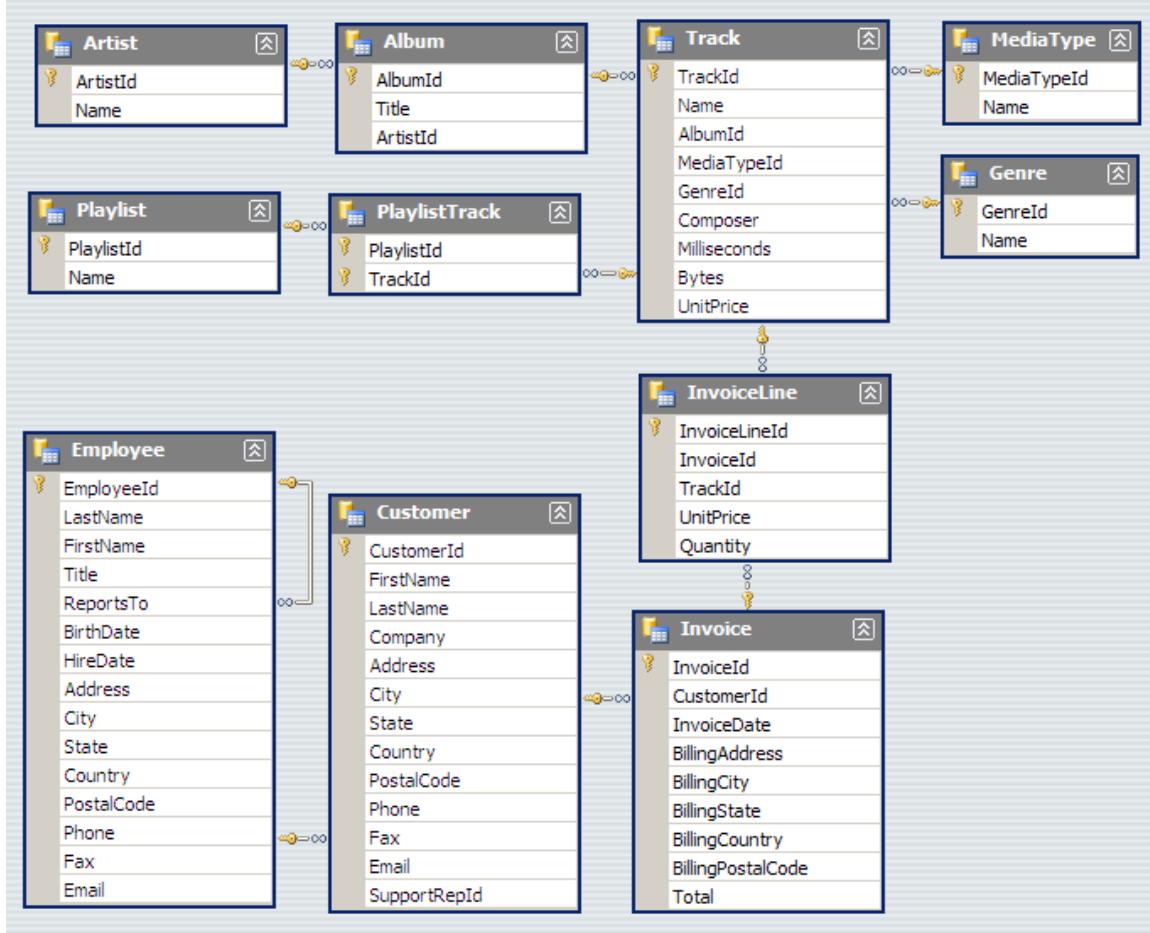
**18c ORACLE**  
Database



# Chinook

## Data Model

# Chinook Database



The Chinook data model represents a digital media store, including tables for artists, albums, media tracks, invoices and customers.

Chinook data model is an Entity Relationship (ER) Model.

# Chinook Database

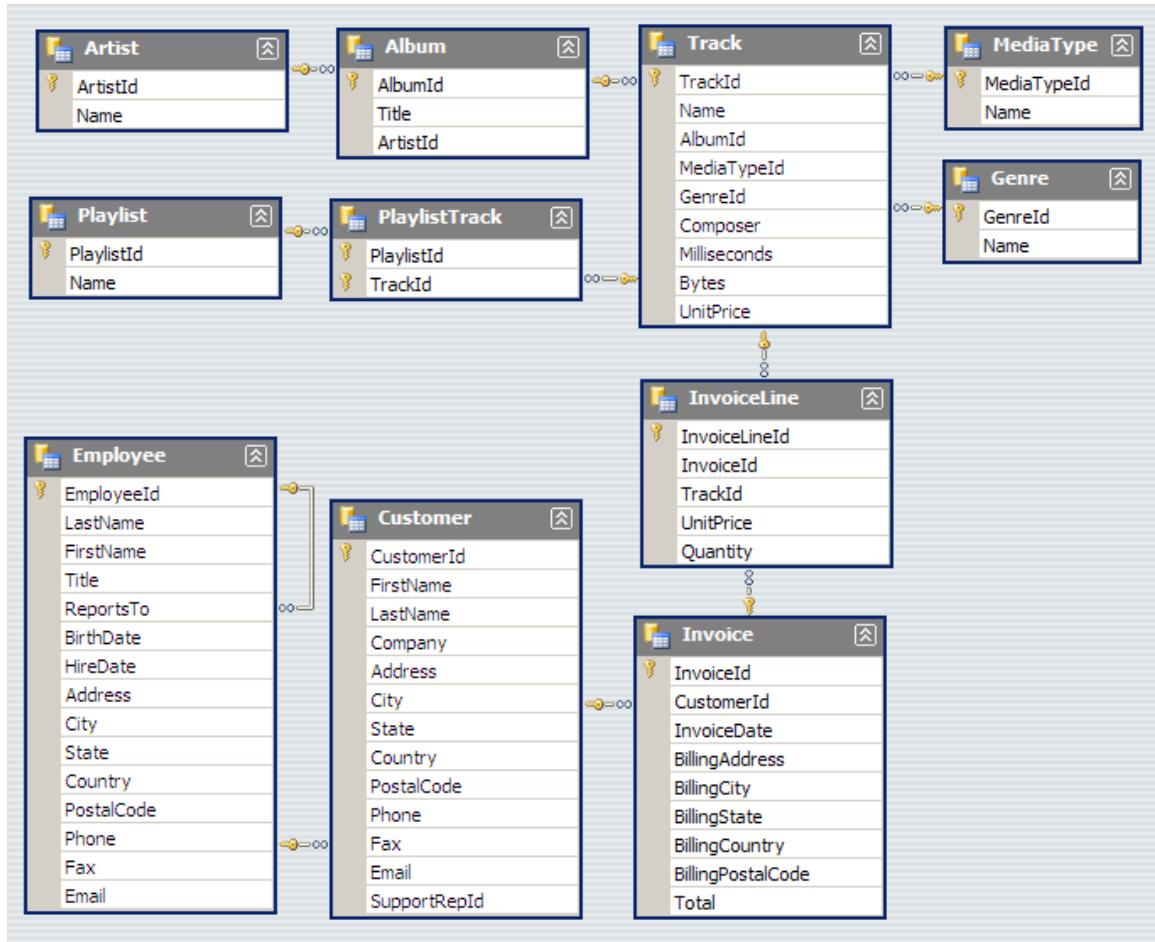
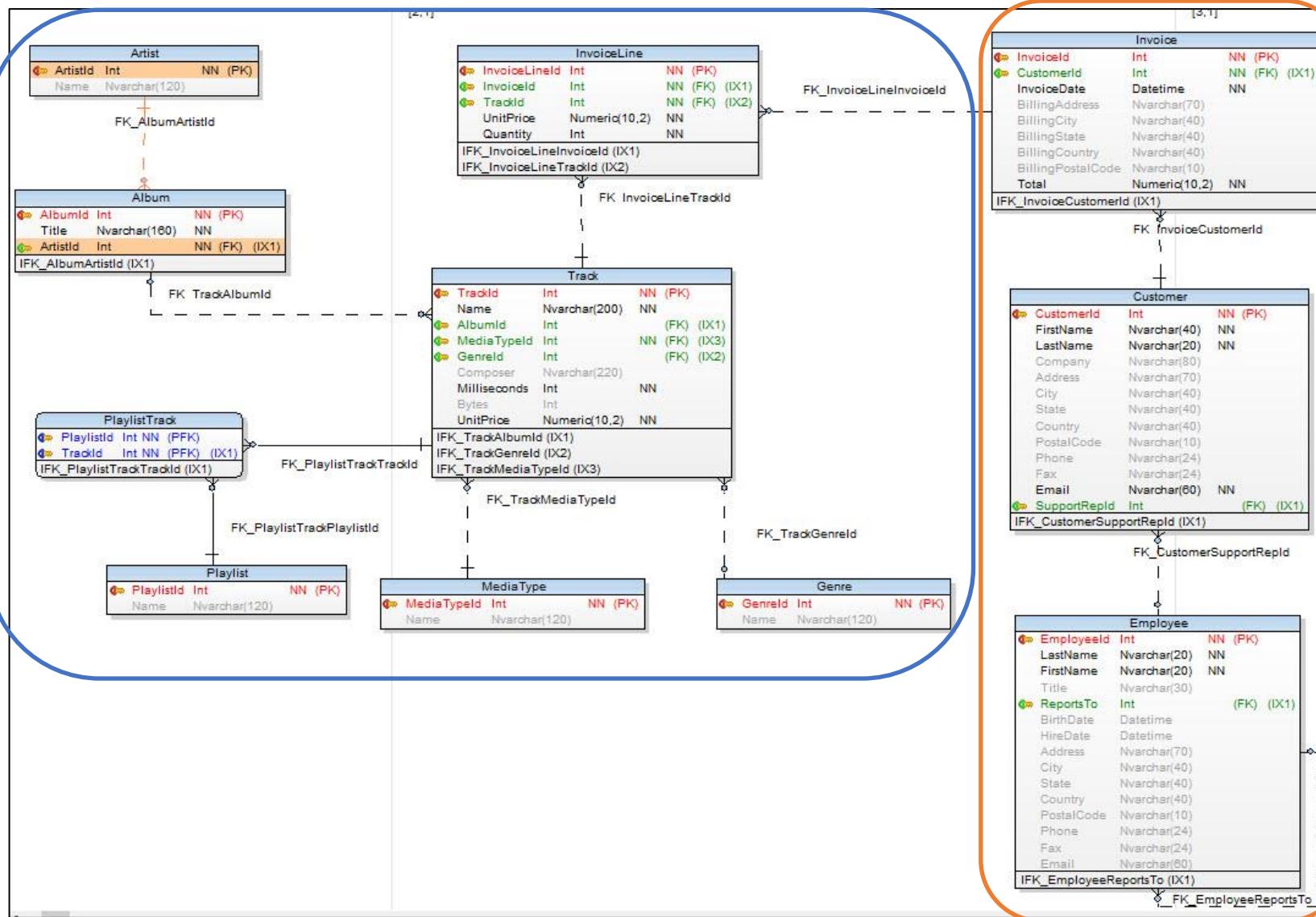


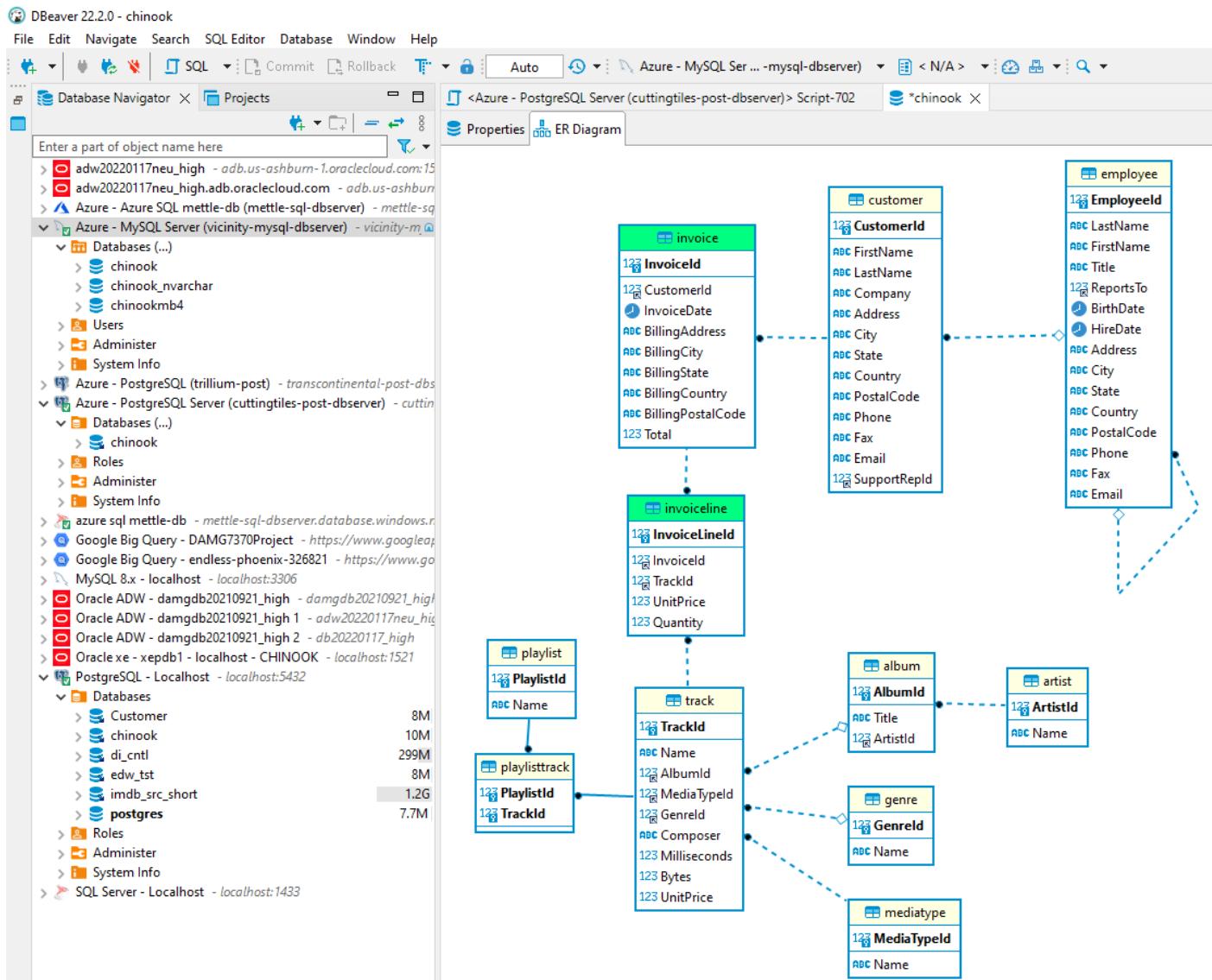
Table Name	Row
Album	347
Artist	275
Customer	59
Employee	8
Genre	25
Invoice	412
InvoiceLine	2,240
MediaType	5
Playlist	18
PlaylistTrack	8,715
Track	3,503

# Chinook Database: Data Model (ER/Studio)

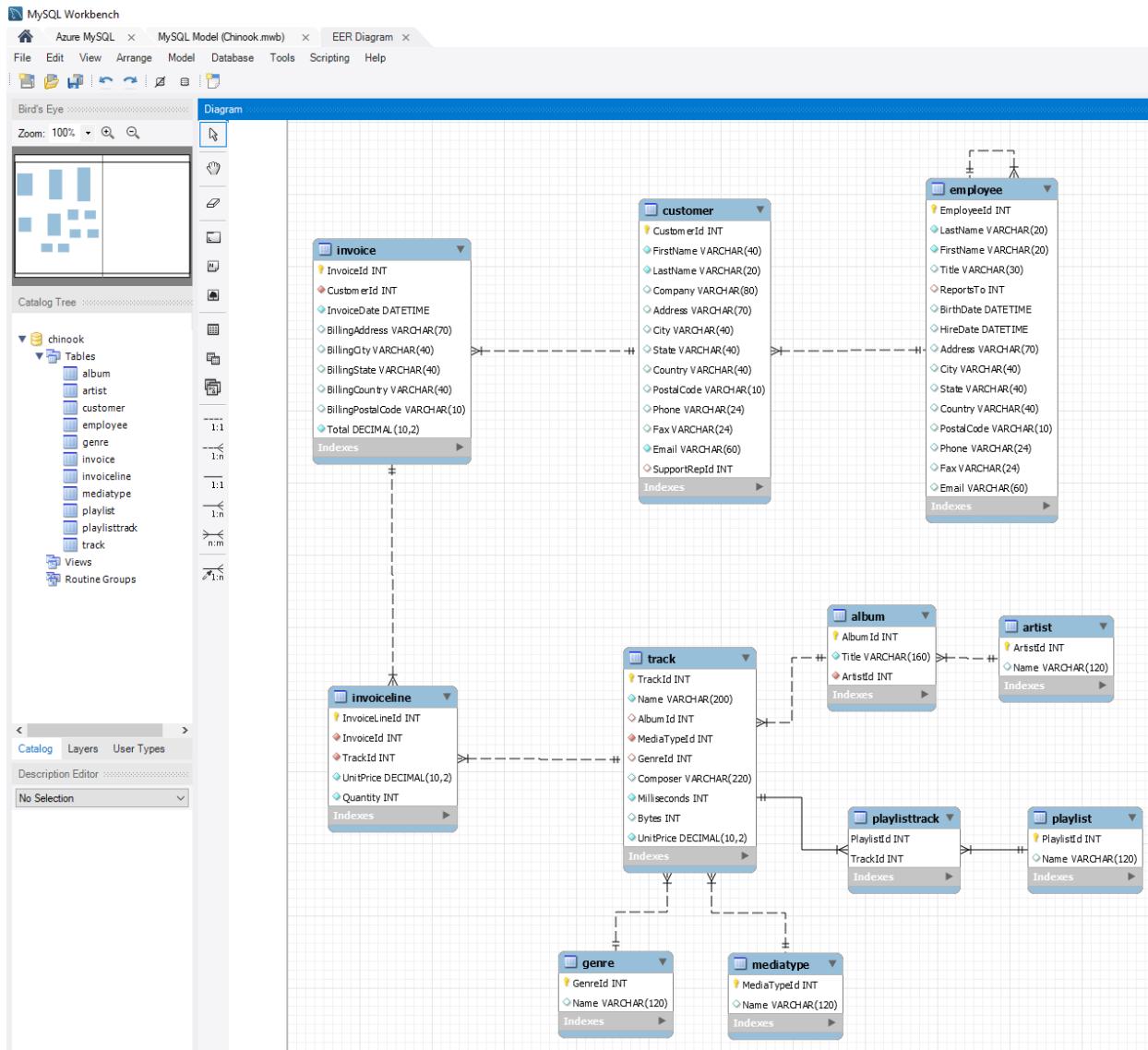


- Sale \$ in two entities
  - Invoice
  - Invoice Line Item
- Entities tied to Invoice
  - Customer
  - Employee
- Entities tied to Invoice Line
  - Track (Song)
  - Album
  - Artist
  - Genre
  - Media Type

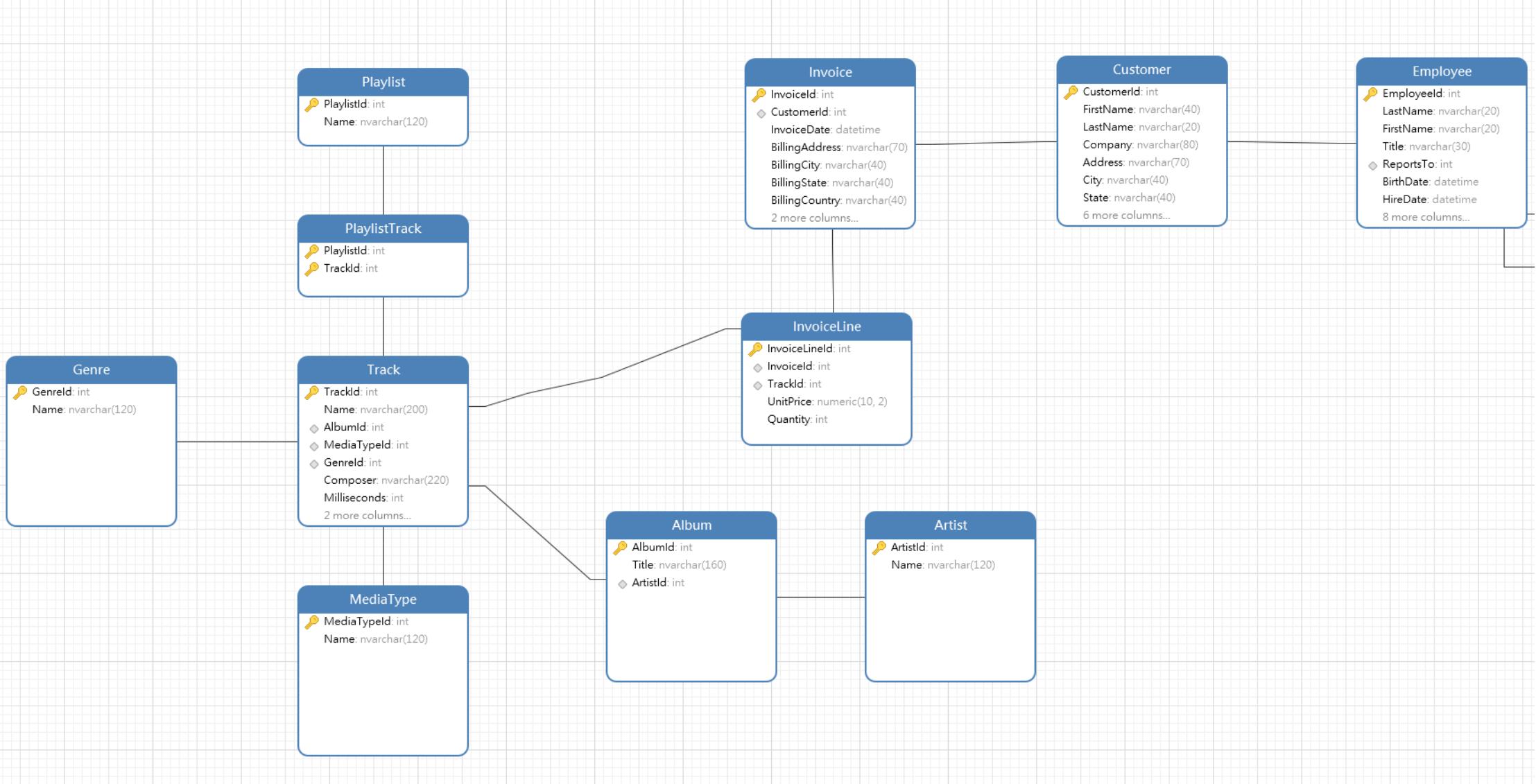
# Chinook Database: Data Model (BDeaver)



# Chinook Database: Data Model (MySQL Workbench)



# Chinook Database: Data Model (Navicat)



# Chinook

## Business Questions: SQL Queries & Data Visualizations

# Assignment

(a) Create & run query for each database (b) Create data visualizations

1. Total sales \$
2. Total sales \$ by country – ranked (or at least sorted largest to smallest)
3. Total sales \$ by country, state & city
4. Total sales \$ by customer (a person with last name & first name) – ranked (or at least sorted largest to smallest)
5. Total sales \$ by artist – ranked (or at least sorted largest to smallest)
6. Total sales \$ by albums
7. Total sales \$ by salesperson (employee)
8. Total tracks bought and total revenue \$ by media type
9. Total sales \$ by genre
10. Total sales \$ by company

# Deliverables

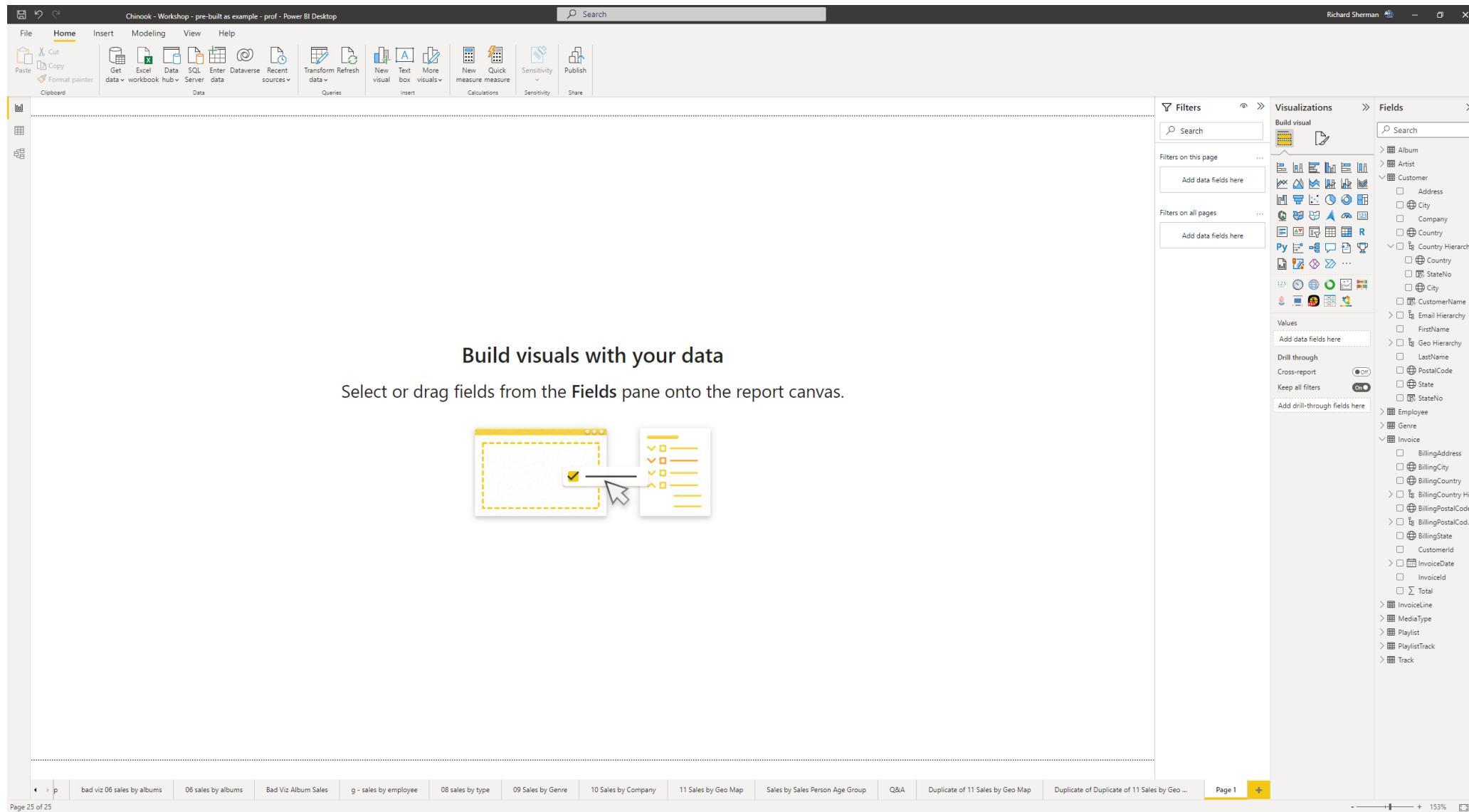
For each question (previous sheet):

- Create & run query: place SQL queries in document & paste query results into an individual worksheet in an Excel spreadsheet
- Create appropriate data visualization & tabular report – upload screen shot of each and upload the BI file

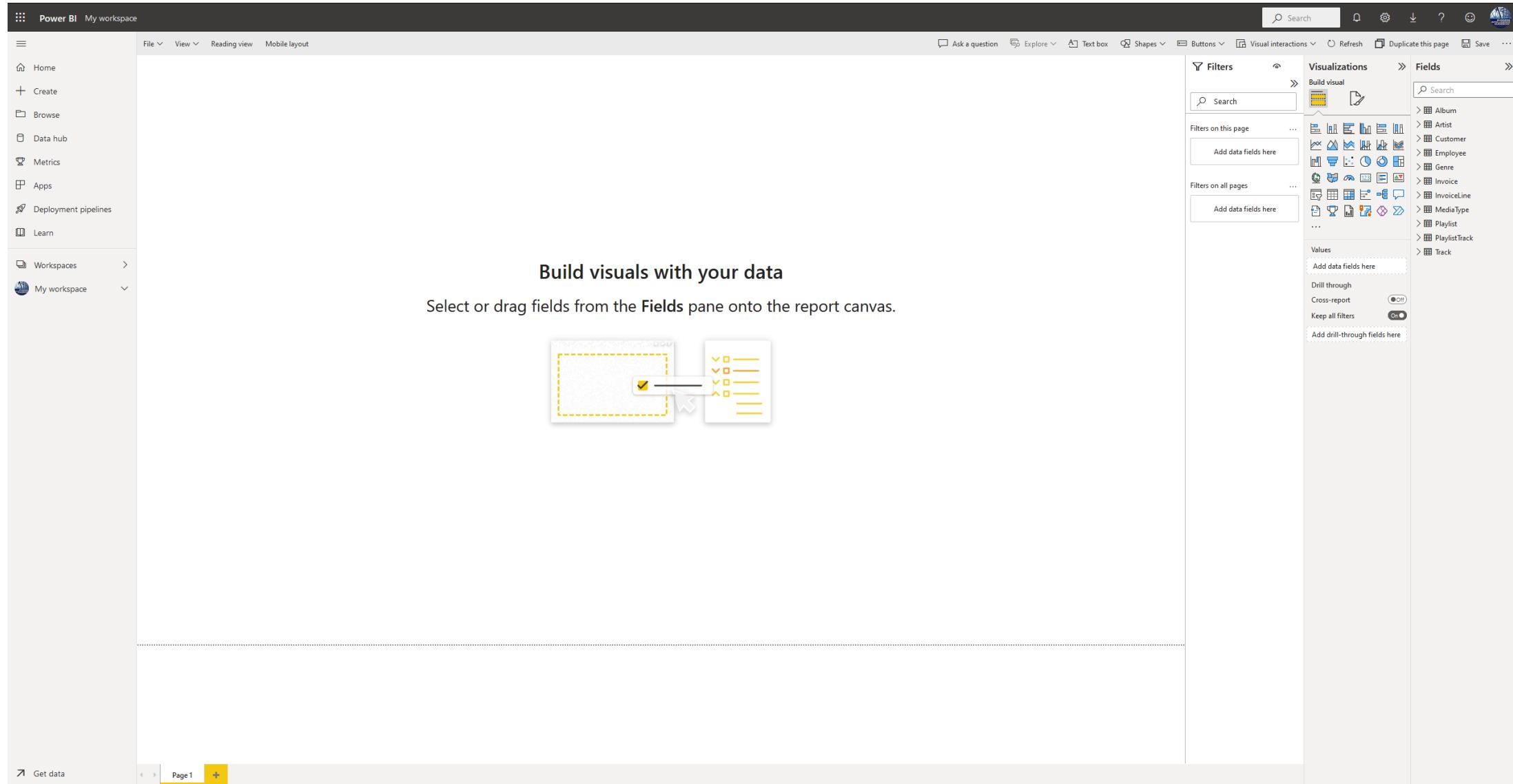
# Chinook

## Get Data & Modify Data Model

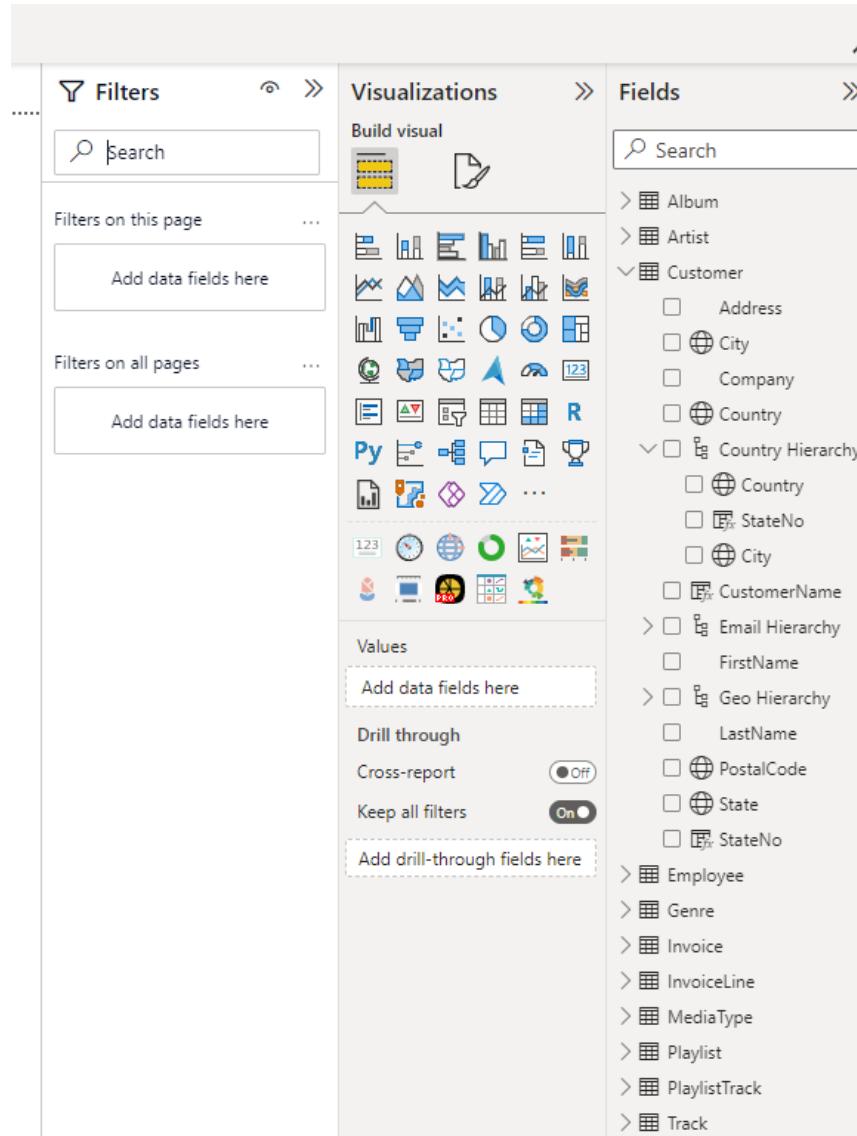
# Microsoft PowerBI



# Microsoft PowerBI Pro

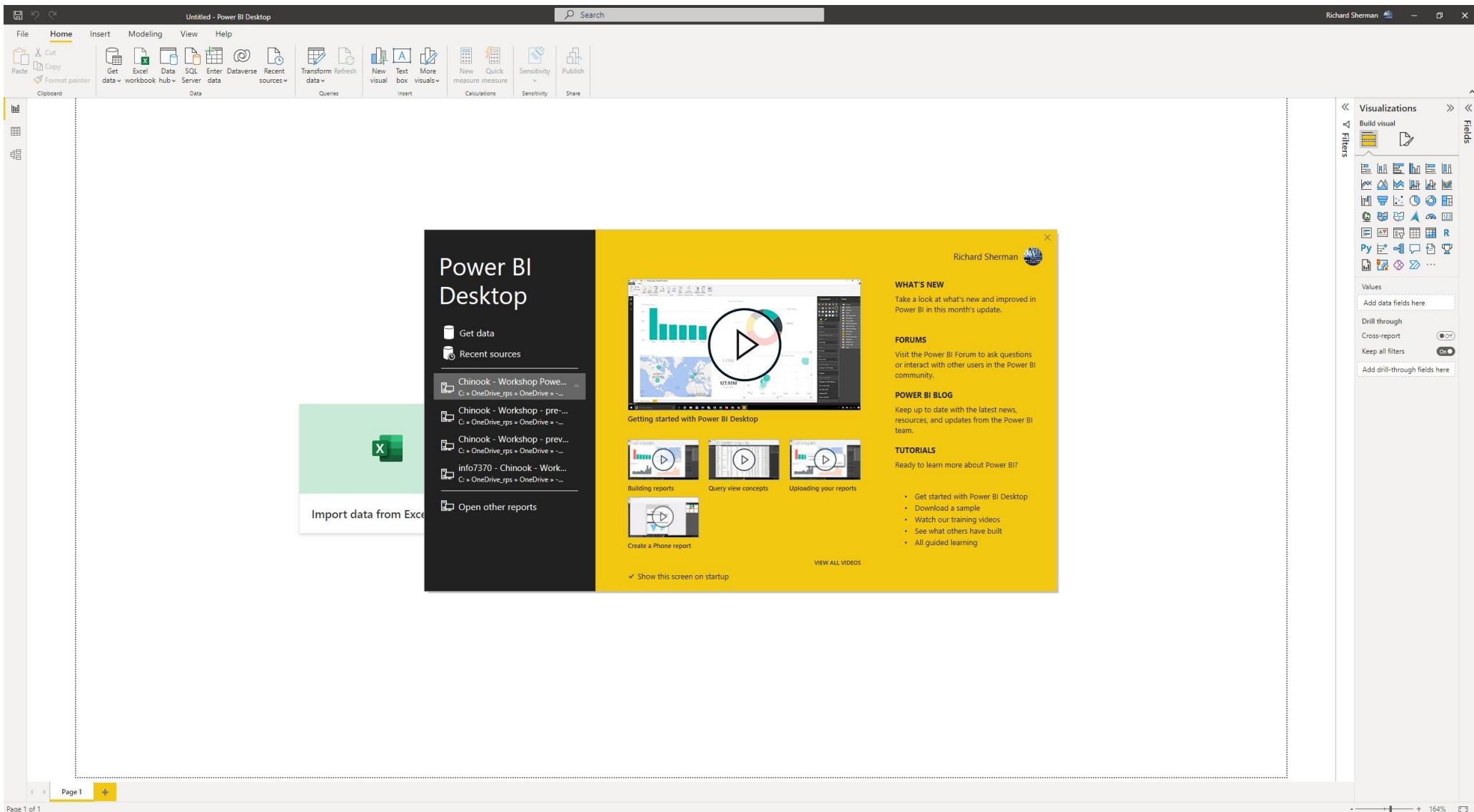


# Microsoft PowerBI

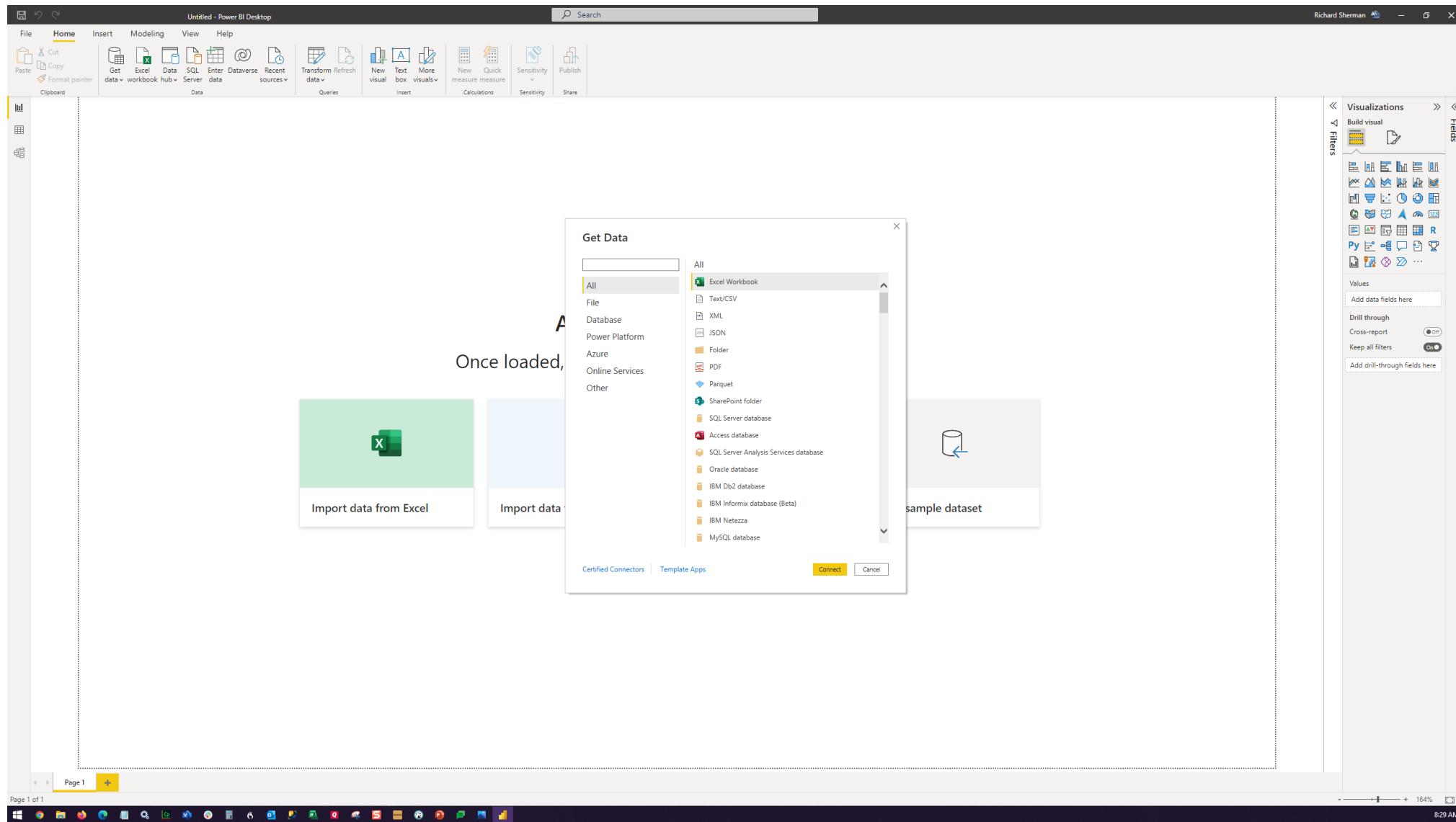


- Select visualization
- Define visualization
- Select fields
- Assign filters

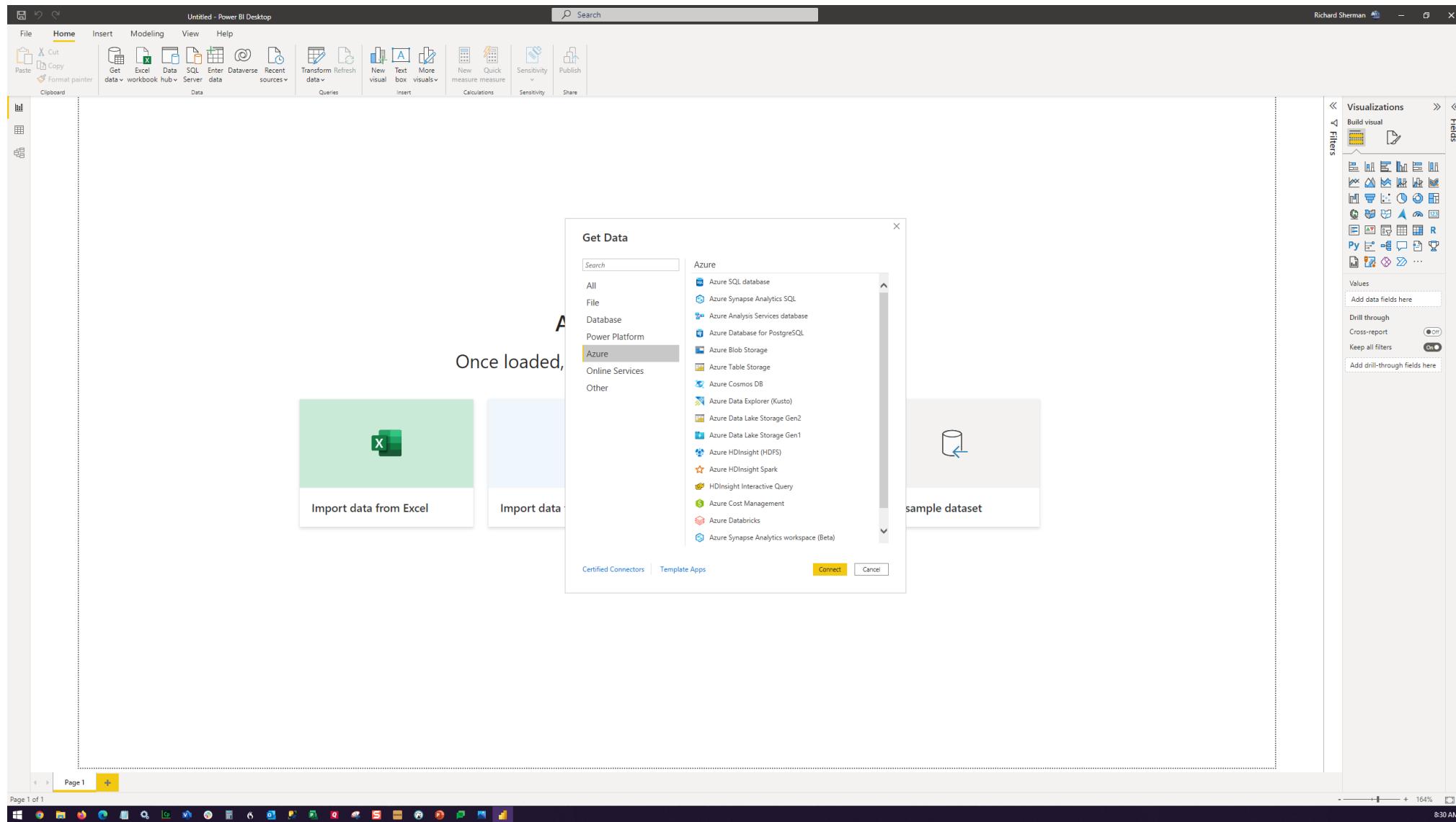
# Get Data



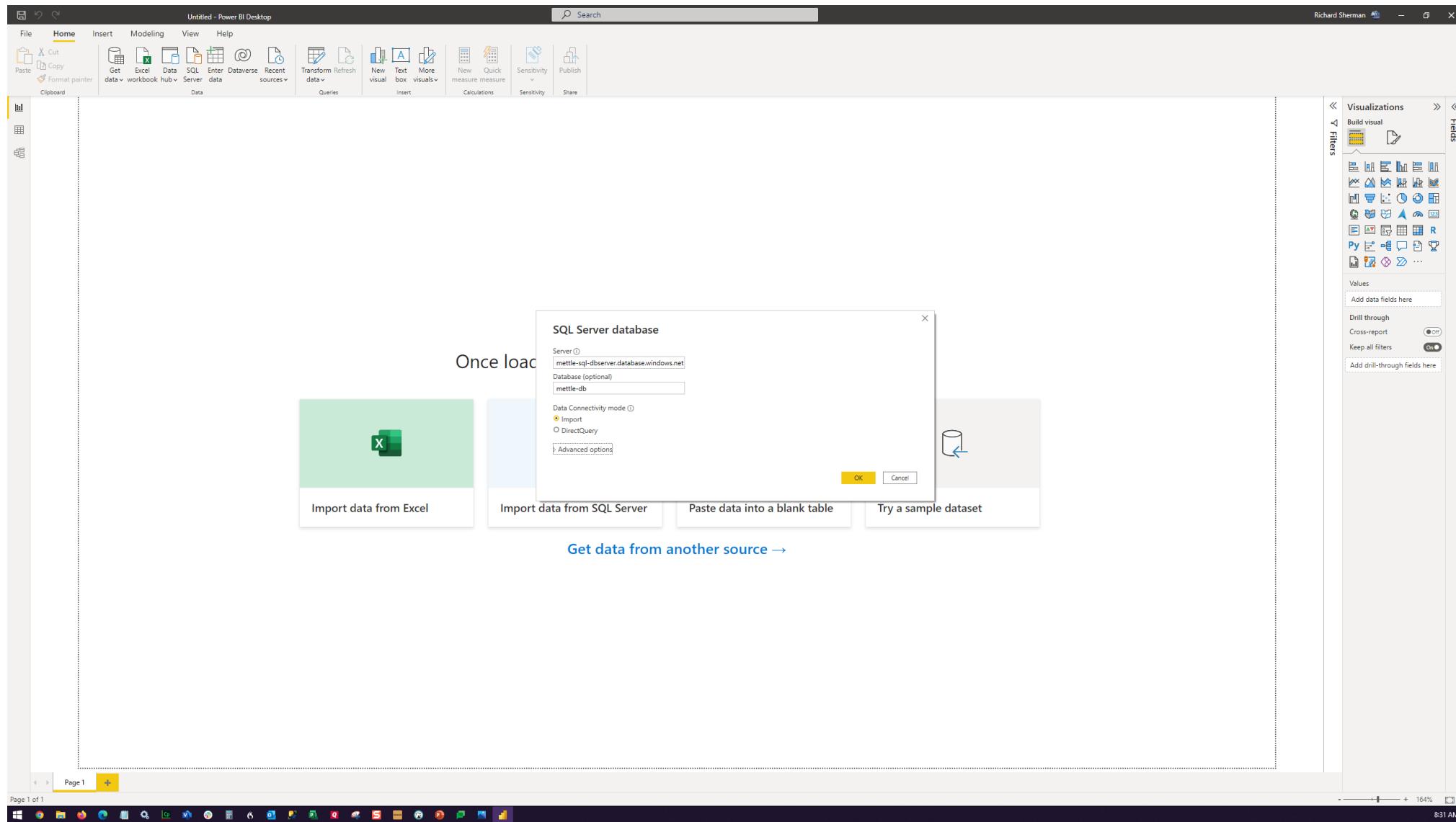
# Get Data



# Get Data



# Get Data



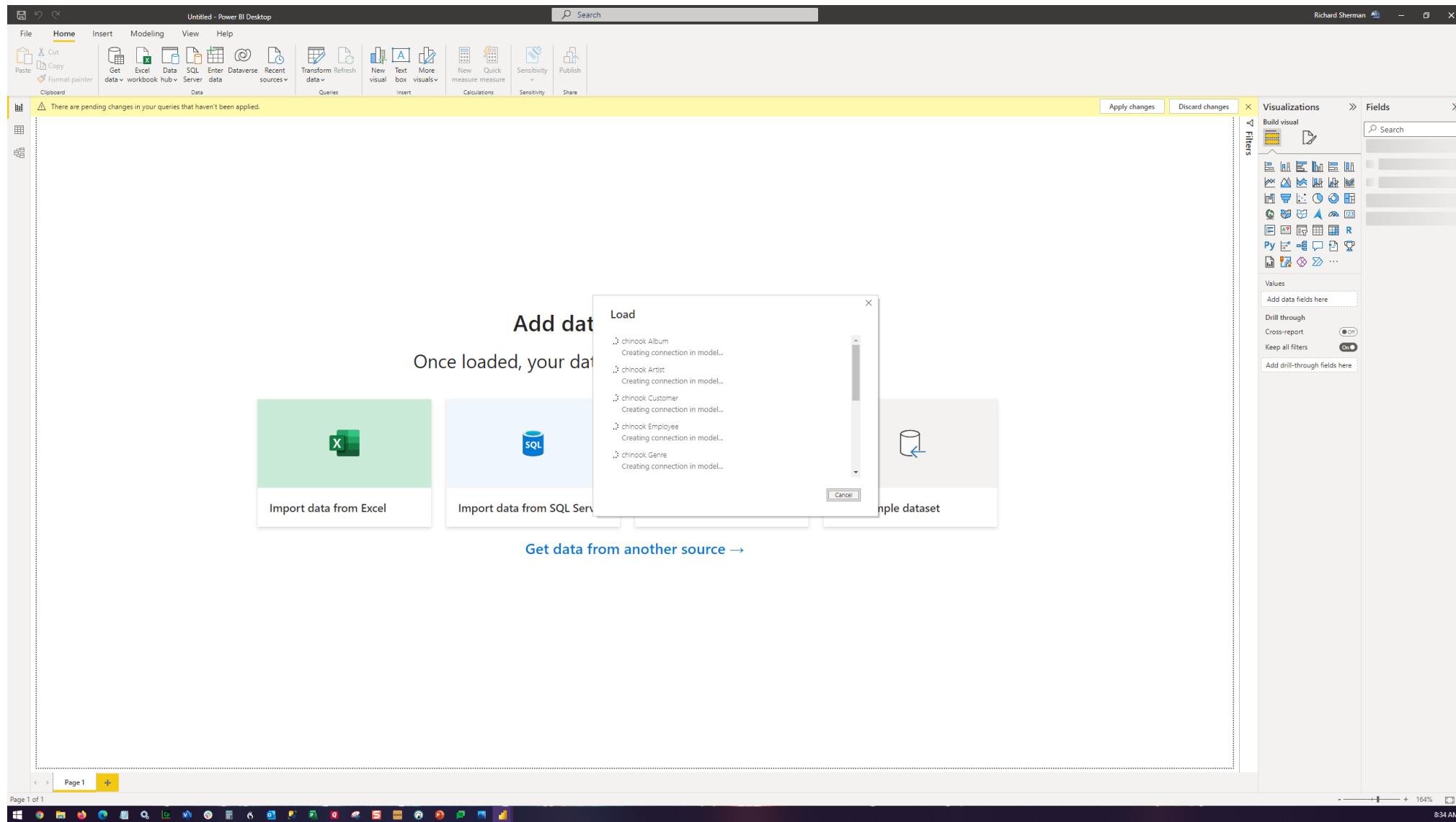
# Get Data

The screenshot shows the Power BI Desktop interface with the 'Home' tab selected. In the center, a 'Navigator' window displays a tree view of available data sources. Under the 'mettle-sql-database.windows.net: mettle-db [41]' node, several tables are listed, including 'SalesLT.vGetAllCategories', 'SalesLT.vProductAndDescription', 'SalesLT.vProductModelCatalogDescription', 'sys.database\_firewall\_rules', 'Album', 'Artist', 'BuildVersion', 'chonook.Album', 'chonook.Artist', 'chonook.Customer', 'chonook.Employee', 'chonook.Genre', 'chonook.Invoice', 'chonook.InvoiceLine', 'chonook.MediaType', 'chonook.Playlist', 'chonook.PlaylistTrack', 'chonook.Track', and 'Customer'. The 'chonook.Invoice' table is currently selected, and its schema is displayed in a table view below:

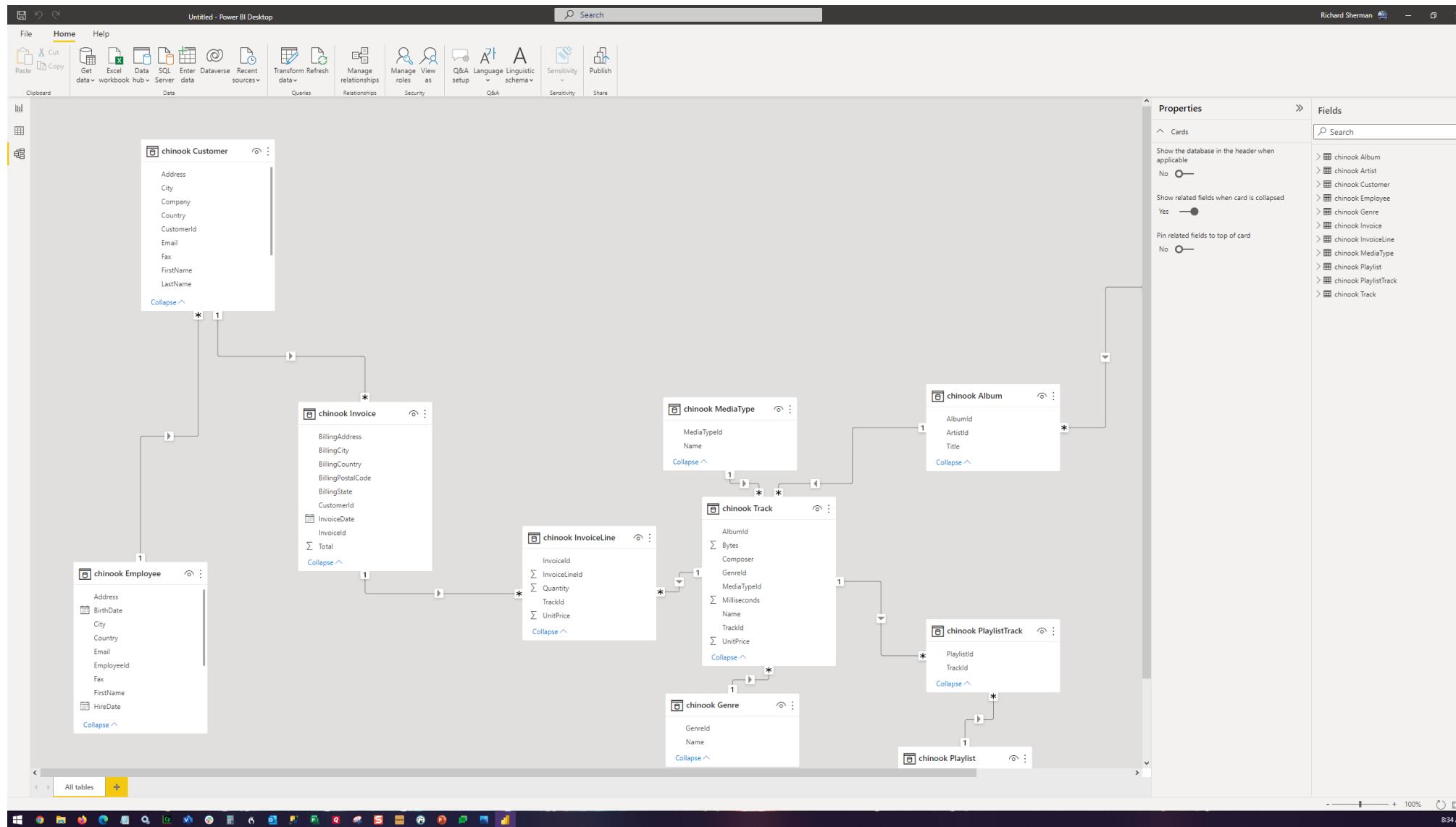
InvoiceId	CustomerId	InvoiceDate	BillingAddress	BillingCity	BillingState	BillingCountry	BillingPostalCode	Total	chonook.Customer	chonook.Invoice
1	2	1/1/2009 12:00:00 AM	Theodor-Heuss-Straße 34	Stuttgart		null Germany	70174	1.98	Value	Table
2	4	1/2/2009 12:00:00 AM	Ullevålsveien 14	Oslo		null Norway	0171	3.96	Value	Table
3	8	1/3/2009 12:00:00 AM	Grønnystraat 63	Brussels		null Belgium	1000	5.94	Value	Table
4	14	1/6/2009 12:00:00 AM	8210 111 ST NW	Edmonton	AB	Canada	T6G 2C7	8.91	Value	Table
5	23	1/11/2009 12:00:00 AM	69 Salem Street	Boston	MA	USA	2113	13.86	Value	Table
6	37	1/19/2009 12:00:00 AM	Berger Straße 10	Frankfurt		null Germany	60316	0.99	Value	Table
7	38	2/1/2009 12:00:00 AM	Barbarossastraße 19	Berlin		null Germany	10779	1.98	Value	Table
8	40	2/1/2009 12:00:00 AM	8, Rue Hanovre	Paris		null France	75002	1.98	Value	Table
9	42	2/2/2009 12:00:00 AM	9, Place Louis Barthou	Bordeaux		null France	33000	3.96	Value	Table
10	46	2/3/2009 12:00:00 AM	3 Chatham Street	Dublin	Ireland			5.94	Value	Table
11	52	2/6/2009 12:00:00 AM	202 Hoxton Street	London		null United Kingdom	N1 5LH	8.91	Value	Table
12	2	2/11/2009 12:00:00 AM	Theodor-Heuss-Straße 34	Stuttgart		null Germany	70174	13.86	Value	Table
13	16	2/19/2009 12:00:00 AM	1600 Amphitheatre Parkway	Mountain View	CA	USA	94043-1351	0.99	Value	Table
14	17	3/4/2009 12:00:00 AM	1 Microsoft Way	Redmond	WA	USA	98052-8300	1.98	Value	Table
15	19	3/4/2009 12:00:00 AM	1 Infinite Loop	Cupertino	CA	USA	95014	1.98	Value	Table
16	21	3/5/2009 12:00:00 AM	801 W 4th Street	Reno	NV	USA	89503	3.96	Value	Table
17	25	3/6/2009 12:00:00 AM	319 N. Frances Street	Madison	WI	USA	53703	5.94	Value	Table
18	31	3/9/2009 12:00:00 AM	194A Chain Lake Drive	Halifax	NS	Canada	B3J 1C5	8.91	Value	Table
19	40	3/14/2009 12:00:00 AM	8, Rue Hanovre	Paris		null France	75002	13.86	Value	Table
20	54	3/22/2009 12:00:00 AM	101 Raeburn Pl	Edinburgh		null United Kingdom	EHA 1HH	0.99	Value	Table
21	55	4/4/2009 12:00:00 AM	421 Bourke Street	Sidney	NSW	Australia	2010	1.98	Value	Table
22	57	4/4/2009 12:00:00 AM	Calle Lira, 198	Santiago		null Chile		1.98	Value	Table
23	59	4/5/2009 12:00:00 AM	3,Raj Bhavan Road	Bangalore		null India	560001	3.96	Value	Table

At the bottom of the table view, there are buttons for 'Load', 'Transform Data', and 'Cancel'. The status bar at the bottom of the screen shows 'Page 1 of 1' and the date '8:33 AM'.

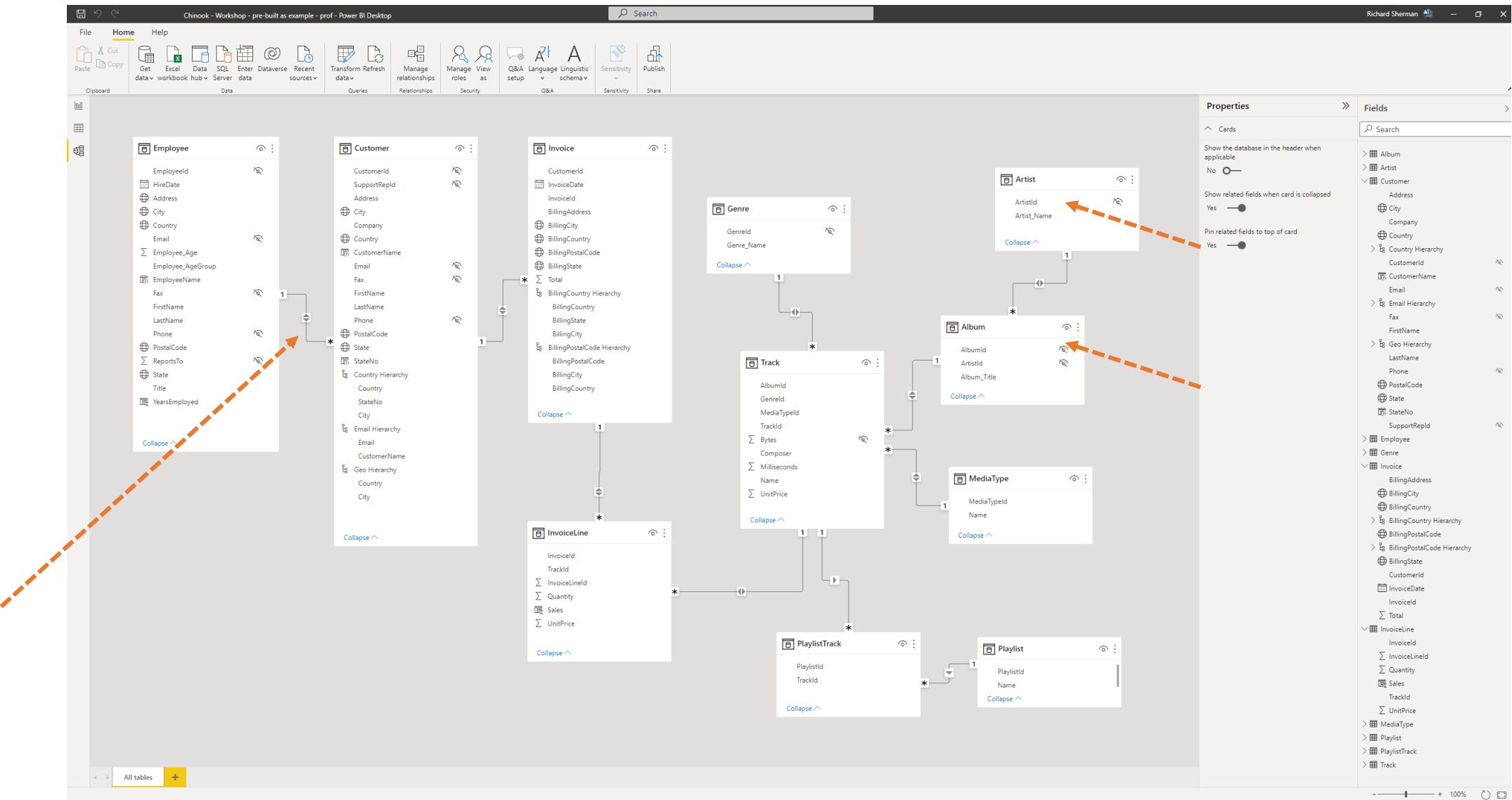
# Get Data



# Data Model i- Initial



# Chinook - Data Model



# Chinook - Data Tables

The screenshot shows the Power BI Desktop interface with the 'Invoice' table selected. The 'Customer' column is highlighted in yellow. The 'Column tools' pane on the right is open, displaying various options for managing columns:

- Name: CustomerId
- Data type: Whole number
- Format: Whole number
- Summarization: Don't summarize
- Data category: Uncategorized
- Sort by column
- Data groups
- Relationships
- New column
- Fields (Search bar)
- Customer (selected)
- Album
- Artist
- Customer
- Employee
- Genre
- Invoice
- BillingAddress
- BillingCity
- BillingCountry
- BillingCountry Hierarchy
- BillingPostalCode
- BillingPostalCode Hierarchy
- BillingState
- CustomerId
- InvoiceDate
- Invoicel
- Total
- InvoiceLine
- Invoicel
- InvoiceLineId
- Quantity
- Sales
- TrackId
- UnitPrice
- Media
- Playlist
- PlaylistTrack
- Track

Table: Invoice (412 rows) Column: CustomerId (59 distinct values)

- Assign data type & format
- Assign data category
- Designate summarization
- Hide columns
- Create Hierarchy
- Create new columns

# Chinook - Column additions (DAX formulas)

- Customer

CustomerName = CONCATENATE(Customer[LastName],CONCATENATE(" , ",Customer[FirstName]))

StateNo = if (ISBLANK(Customer[State]),Customer[City],Customer[State])

- Employee

EmployeeName = CONCATENATE(Employee[LastName],CONCATENATE(" , ",Employee[FirstName]))

YearsEmployed = DATEDIFF(Employee[HireDate],NOW(),YEAR)

- Invoice Line

Sales = InvoiceLine[Quantity] \* InvoiceLine[UnitPrice]

# Chinook - Data Tables

Chinook - Workshop - pre-built as example - prof - Power BI Desktop

File Home Help Table tools

Cut Copy Paste Get Excel Data SQL Enter Data Refresh Recent Transform New measure New quick New table Manage relationships Relationships Calculations Security Sensitivity Share

Clipboard First Name Last Name Company Address City State Country Postal Code Phone Fax Email Support Rep ID Customer Name State No

CustomerID

CustomerID	FirstName	LastName	Company	Address	City	State	Country	PostalCode	Phone	Fax	Email	SupportRepID	CustomerName	StateNo
1	Luis	Gonçalves	Embraer - Empresa Brasileira de Aeronáutica S.A.	Av. Brigadeiro Faria Lima, 2170	São José dos Campos	SP	Brazil	12227-000	+55 (12) 3923-5555	+55 (12) 3923-5566	luisg@embraer.com.br	3	Gonçalves, Luis	SP
2	Leonie	Köhler		Theodor-Heuss-Straße 34	Stuttgart		Germany	70174	+49 071 2842222		leonekohler@surfude.de	5	Köhler, Leonie	Stuttgart
3	François	Tremblay		1498 rue Bélanger	Montréal	QC	Canada	H2G 1A7	+1 (514) 721-4711		tremblay@gmail.com	3	Tremblay, François	QC
4	Bjørn	Hansen		Ullévalsvæien 14	Oslo		Norway	0171	+47 22 44 22 22		bjorn.hansen@yahoo.no	4	Hansen, Bjørn	Oslo
5	Franšek	Wichterlová	JetBrains s.r.o.	Klavova 9/506	Prague		Czech Republic	14700	+420 2 4172 5555	+420 2 4172 5555	frantisek@jetbrains.com	4	Wichterlová, František	Prague
6	Helví	Holý		Rilská 317/4	Prague		Czech Republic	14300	+420 2 4177 0449		holly@gmail.com	5	Holý, Helví	Prague
7	Astrid	Gruber		Rotenturmstraße 4, 1010 Innere Stadt	Vienne		Austria	1010	+43 01 5134505		astrid.gruber@apple.at	5	Gruber, Astrid	Vienne
8	Daan	Peeters		Gretzkystraat 63	Brussels		Belgium	1000	+32 02 219 03 03		daan_peeters@apple.be	4	Peeters, Daan	Brussels
9	Kara	Nielsen		Sønder Boulevard 51	Copenhagen		Denmark	1720	+45 3331 9991		kara.nielsen@jubii.dk	4	Nielsen, Kara	Copenhagen
10	Eduardo	Martins	Woodstock Discos	Rua Dr. Fausto Filho, 155	São Paulo	SP	Brazil	01007-010	+55 (11) 3033-5446	+55 (11) 3033-4564	eduardo@woodstock.com.br	4	Martins, Eduardo	SP
11	Alexandre	Rocha	Banco do Brasil S.A.	Av. Paulista, 2022	São Paulo	SP	Brazil	01310-200	+55 (11) 3055-3278	+55 (11) 3055-8131	alex@uol.com.br	3	Almeida, Roberto	RJ
12	Roberto	Almeida	Riotur	Praça Pio X, 119	Rio de Janeiro	RJ	Brazil	20040-020	+55 (21) 2271-7000	+55 (21) 2271-7070	roberto.almeida@riotur.gov.br	3	Almeida, Roberto	RJ
13	Fernanda	Ramos		Qd 7 Bloco G	Brasília	DF	Brazil	71020-677	+55 (61) 3363-5547	+55 (61) 3363-7855	fernadaramos@uol.com.br	4	Ramos, Fernanda	DF
14	Mark	Philips	Telus	8210 111 ST NW	Edmonton	AB	Canada	T6G 2C7	+1 (780) 434-4554	+1 (780) 434-5565	mphilips12@shaw.ca	5	Philips, Mark	AB
15	Jennifer	Peterson	Rogers Canada	700 W Pender Street	Vancouver	BC	Canada	V6C 1G8	+1 (604) 688-2255	+1 (604) 688-8756	jennifer@rogers.ca	3	Peterson, Jennifer	BC
16	Frank	Harris	Google Inc.	1600 Amphitheatre Parkway	Mountain View	CA	USA	94043-1351	+1 (650) 253-0000	+1 (650) 253-0000	farris@google.com	4	Harris, Frank	CA
17	Jack	Smith	Microsoft Corporation	1 Microsoft Way	Redmond	WA	USA	98052-8300	+1 (425) 882-8080	+1 (425) 882-8081	jacksmith@microsoft.com	5	Smith, Jack	WA
18	Michelle	Brooks		627 Broadway	New York	NY	USA	10012-2612	+1 (212) 221-3546	+1 (212) 221-4779	michelle@ad.com	3	Brooks, Michelle	NY
19	Tim	Goyer	Apple Inc.	1 Infinite Loop	Cupertino	CA	USA	95014	+1 (408) 996-1010	+1 (408) 996-1011	tgoyer@apple.com	3	Goyer, Tim	CA
20	Dan	Miller		541 Del Medio Avenue	Mountain View	CA	USA	94040-0111	+1 (650) 644-3358	+1 (650) 644-3358	dmler@comcast.com	4	Miller, Dan	CA
21	Kathy	Chase		801 W 4th Street	Reno	NV	USA	89503	+1 (775) 223-7765		kachase@hotmail.com	5	Chase, Kathy	NV
22	Heather	Leacock		120 S Orange Ave	Orlando	FL	USA	32801	+1 (407) 999-7788		hleacock@gmail.com	4	Leacock, Heather	FL
23	John	Gordon		69 Salem Street	Boston	MA	USA	2113	+1 (617) 522-1333		johngordon22@yahoo.com	4	Gordon, John	MA
24	Frank	Ralston		162 E Superior Street	Chicago	IL	USA	60611	+1 (312) 332-3232		fralston@gmail.com	3	Ralston, Frank	IL
25	Victor	Stevens		319 N. Frances Street	Madison	WI	USA	53703	+1 (608) 257-0597		vstevens@yahoo.com	5	Stevens, Victor	WI
26	Richard	Cunningham		2211 W Berry Street	Fort Worth	TX	USA	76110	+1 (817) 924-7272		ricunningham@hotmail.com	4	Cunningham, Richard	TX
27	Patrick	Gray		1033 N Park Ave	Tucson	AZ	USA	85719	+1 (520) 622-4200		patrick.gray@aoi.com	4	Gray, Patrick	AZ
28	Julia	Barnett		302 S 700 E	San Luis Park	UT	USA	84100	+1 (801) 531-7272		jubarrett@mail.com	5	Barnett, Julia	UT
29	Robert	Brown		796 Dundas Street West	Toronto	ON	Canada	M6J 1V1	+1 (416) 363-8888		robbrown@shaw.ca	3	Brown, Robert	ON
30	Edward	Francis		230 Elgin Street	Ottawa	ON	Canada	K2P 1L7	+1 (613) 234-3322		edfrancis@yahoo.ca	3	Francis, Edward	ON
31	Martha	Silk		1944 Chain Lake Drive	Halifax	NS	Canada	B3S 1C5	+1 (902) 450-0450		marthasilk@gmail.com	5	Silk, Martha	NS
32	Aaron	Mitchell		696 Osborne Street	Winnipeg	MB	Canada	R3L 2B9	+1 (204) 452-6452		aaronmitchell@yahoo.ca	4	Mitchell, Aaron	MB
33	Ellie	Sullivan		5112 48 Street	Yellowknife	NT	Canada	X1A 1N6	+1 (867) 920-2233		ellie.sullivan@shaw.ca	3	Sullivan, Ellie	NT
34	João	Fernandes		Rua da Assunção 53	Lisbon		Portugal		+351 (213) 466-111		jfernandes@yahoo.pt	4	Fernandes, João	Lisbon
35	Madalen	Sampaio		Rua dos Campeões Europeus de Viena, 4350	Porto		Portugal		+351 (225) 022-448		masampaio@sapo.pt	4	Sampaio, Madalen	Porto
36	Hannah	Schneider		Tautenburgstraße 8	Berlin		Germany	10789	+49 030 26550280		hanah.schneider@yahoo.de	5	Schneider, Hannah	Berlin
37	Fynn	Zimmermann		Berger Straße 10	Frankfurt		Germany	60315	+49 069 4098888		fzimmermann@yahoo.de	3	Zimmermann, Fynn	Frankfurt
38	Niklas	Schröder		Bärbarossastraße 19	Berlin		Germany	10779	+49 030 2141444		nschroeder@surfer.de	3	Schröder, Niklas	Berlin
39	Camille	Bernard		4, Rue Milton	Paris		France	75009	+33 01 49 70 65 65		camille.bernard@yahoo.fr	4	Bernard, Camille	Paris
40	Dominique	Lefebvre		8, Rue Hanovre	Paris		France	75002	+33 01 47 42 71 71		dominiquelefebvre@gmail.com	4	Lefebvre, Dominique	Paris
41	Marc	Dubois		11, Place Bellecour	Lyon		France	69002	+33 04 78 30 30 30		marc.dubois@hotmail.com	5	Dubois, Marc	Lyon
42	Wyatt	Girard		9, Place Louis Barthou	Bordeaux		France	33000	+33 05 56 96 96 96		wyatt.girard@yahoo.fr	3	Girard, Wyatt	Bordeaux
43	Isabelle	Mercier		68, Rue Joubert	Dijon		France	21000	+33 03 80 73 66 99		isabelle_mercier@apple.fr	3	Mercier, Isabelle	Dijon
44	Terhi	Häմäläinen		Porthankinanta 9	Helsinki		Finland	00530	+358 09 870 2000		terhi.hamalainen@apple.fi	3	Häմäläinen, Terhi	Helsinki
45	Ladislav	Kovács		Erzsébet krt. 58.	Budapest		Hungary	H-1073			ladislav_kovacs@apple.hu	3	Kovács, Ladislav	Budapest
46	Hugh	O'Reilly		3 Chatham Street	Dublin	Ireland			+353 01 6792424		hughoreilly@apple.ie	3	O'Reilly, Hugh	Dublin
47	Lucas	Mancini		Via Degli Scipioni, 43	Rome	RM	Italy	00192	+39 06 39733434		luca.mancini@yahoo.it	5	Mancini, Lucas	RM
48	Johannes	Van der Berg		Uitvaartweg 120bg	Amsterdam	VV	Netherlands	10116	+31 020 6223130		johavanderberg@yahoo.nl	5	Van der Berg, Johannes	VV
49	Stanisław	Wójcik		Orydnicka 10	Warsaw		Poland	00-358	+48 22 828 37 39		stanislaw.wojcik@wp.pl	4	Wójcik, Stanisław	Warsaw
50	Enrique	Muñoz		C/San Bernardo 85	Madrid		Spain	28015	+34 914 454 454		enrique_muñoz@yahoo.es	5	Muñoz, Enrique	Madrid
51	Joakim	Johansson		Celsingatan 9	Stockholm		Sweden	11230	+46 08-651 52 52		joakim.johansson@yahoo.se	5	Johansson, Joakim	Stockholm
52	Emma	Jones		202 Hoxton Street	London		United Kingdom	N1 5LH	+44 020 7707 0707		emma_jones@hotmail.com	3	Jones, Emma	London
53	Phil	Hughes		113 Lupton St	London		United Kingdom	SW1V 3EN	+44 020 7976 5722		phil.hughes@gmail.com	3	Hughes, Phil	London
54	Steve	Murray		110 Raeburn Pl	Edinburgh		United Kingdom	E4 1HH	+44 0131 315 3300		steve.murray@yahoo.uk	5	Murray, Steve	Edinburgh
55	Mark	Taylor		421 Bourke Street	Sidney	NSW	Australia	2010	+61 (02) 9332 5633		mark.taylor@yahoo.au	4	Taylor, Mark	NSW
56	Nileen	Gumárez		307 Maracha Glemac	Riobamba		Ecuador	1106	+593 2 211 4333		nileen.gumarez@yahoo.ar	4	Gumárez, Nileen	Riobamba

Table: Customer (59 rows)

Fields

- Customer
- Address
- City
- Company
- Country
- Customer
- CustomerName
- Email
- Fax
- FirstName
- Geo Hierarchy
- Last Name
- Phone
- PostalCode
- State
- StateNo
- SupportRepId
- Track
- Genre
- Invoice
- InvoiceLine
- MediaType
- Playlist
- PlaylistTrack
- Track

# Chinook

## Data Visualizations

# Chinook - Total Sales

Filter: Country

<input type="checkbox"/> Select all
<input type="checkbox"/> Argentina
<input type="checkbox"/> Australia
<input type="checkbox"/> Austria
<input type="checkbox"/> Belgium
<input type="checkbox"/> Brazil
<input type="checkbox"/> Canada
<input type="checkbox"/> Chile
<input type="checkbox"/> Czech Republic
<input type="checkbox"/> Denmark
<input type="checkbox"/> Finland
<input type="checkbox"/> France
<input type="checkbox"/> Germany
<input type="checkbox"/> Hungary
<input type="checkbox"/> India
<input type="checkbox"/> Ireland
<input type="checkbox"/> Italy
<input type="checkbox"/> Netherlands
<input type="checkbox"/> Norway
<input type="checkbox"/> Poland
<input type="checkbox"/> Portugal
<input type="checkbox"/> Spain
<input type="checkbox"/> Sweden
<input type="checkbox"/> United Kingdom
<input type="checkbox"/> USA

Filter: Movie Genre

<input type="checkbox"/> Select all
<input type="checkbox"/> Alternative
<input type="checkbox"/> Alternative & Punk
<input type="checkbox"/> Blues
<input type="checkbox"/> Bossa Nova
<input type="checkbox"/> Classical
<input type="checkbox"/> Comedy
<input type="checkbox"/> Drama
<input type="checkbox"/> Easy Listening
<input type="checkbox"/> Electronica/Dance
<input type="checkbox"/> Heavy Metal
<input type="checkbox"/> Hip Hop/Rap
<input type="checkbox"/> Jazz
<input type="checkbox"/> Latin
<input type="checkbox"/> Metal
<input type="checkbox"/> Opera
<input type="checkbox"/> Pop
<input type="checkbox"/> R&B/Soul
<input type="checkbox"/> Reggae
<input type="checkbox"/> Rock
<input type="checkbox"/> Rock And Roll
<input type="checkbox"/> Sci Fi & Fantasy
<input type="checkbox"/> Science Fiction
<input type="checkbox"/> Soundtrack
<input type="checkbox"/> TV Shows
<input type="checkbox"/> World

Sales from Invoice Line

Sales  
\$2,328.60

Sales from Invoice Line



Total from Invoice

Total  
\$2,328.60

Total from Invoice



# Chinook - Total sales

Filter: Country

Country
<input type="checkbox"/> Select all
<input type="checkbox"/> Argentina
<input type="checkbox"/> Australia
<input type="checkbox"/> Austria
<input type="checkbox"/> Belgium
<input type="checkbox"/> Brazil
<input type="checkbox"/> Canada
<input type="checkbox"/> Chile
<input type="checkbox"/> Czech Republic
<input type="checkbox"/> Denmark
<input type="checkbox"/> Finland
<input type="checkbox"/> France
<input type="checkbox"/> Germany
<input type="checkbox"/> Hungary
<input type="checkbox"/> India
<input type="checkbox"/> Ireland
<input type="checkbox"/> Italy
<input type="checkbox"/> Netherlands
<input type="checkbox"/> Norway
<input type="checkbox"/> Poland
<input type="checkbox"/> Portugal
<input type="checkbox"/> Spain
<input type="checkbox"/> Sweden
<input type="checkbox"/> United Kingdom
<input type="checkbox"/> USA
World

Filter: Movie Genre

Genre_Name
<input type="checkbox"/> Select all
<input type="checkbox"/> Alternative
<input type="checkbox"/> Alternative & Punk
<input type="checkbox"/> Blues
<input type="checkbox"/> Bossa Nova
<input type="checkbox"/> Classical
<input type="checkbox"/> Comedy
<input type="checkbox"/> Drama
<input type="checkbox"/> Easy Listening
<input type="checkbox"/> Electronica/Dance
<input type="checkbox"/> Heavy Metal
<input type="checkbox"/> Hip Hop/Rap
<input type="checkbox"/> Jazz
<input type="checkbox"/> Latin
<input type="checkbox"/> Metal
<input type="checkbox"/> Opera
<input type="checkbox"/> Pop
<input type="checkbox"/> R&B/Soul
<input type="checkbox"/> Reggae
<input type="checkbox"/> Rock
<input type="checkbox"/> Rock And Roll
<input type="checkbox"/> Sci Fi & Fantasy
<input type="checkbox"/> Science Fiction
<input type="checkbox"/> Soundtrack
<input type="checkbox"/> TV Shows
<input type="checkbox"/> World

Sales from Invoice Line

Sales  
\$2,328.60

Total from Invoice

Total  
\$2,328.60

NO BAD Viz!!! What value does this Viz provide?

Sales from Invoice Line



Total from Invoice



NO BAD Viz!!! Why use gauges if they do NOT move

Sales from Invoice Line



Total from Invoice



# Chinook - Total sales

**Filter: Country**

<input type="checkbox"/> Select all
<input type="checkbox"/> Argentina
<input type="checkbox"/> Australia
<input type="checkbox"/> Austria
<input type="checkbox"/> Belgium
<input type="checkbox"/> Brazil
<input type="checkbox"/> Canada
<input type="checkbox"/> Chile
<input type="checkbox"/> Czech Republic
<input type="checkbox"/> Denmark
<input type="checkbox"/> Finland
<input type="checkbox"/> France
<input type="checkbox"/> Germany
<input type="checkbox"/> Hungary
<input type="checkbox"/> India
<input type="checkbox"/> Ireland
<input type="checkbox"/> Italy
<input type="checkbox"/> Netherlands
<input type="checkbox"/> Norway
<input type="checkbox"/> Poland
<input type="checkbox"/> Portugal
<input type="checkbox"/> Spain
<input type="checkbox"/> Sweden
<input type="checkbox"/> United Kingdom
<input type="checkbox"/> USA

**Filter: Movie Genre**

<input type="checkbox"/> Select all
<input type="checkbox"/> Alternative
<input type="checkbox"/> Alternative & Punk
<input type="checkbox"/> Blues
<input type="checkbox"/> Bossa Nova
<input type="checkbox"/> Classical
<input type="checkbox"/> Comedy
<input type="checkbox"/> Drama
<input type="checkbox"/> Easy Listening
<input type="checkbox"/> Electronica/Dance
<input type="checkbox"/> Heavy Metal
<input type="checkbox"/> Hip Hop/Rap
<input type="checkbox"/> Jazz
<input type="checkbox"/> Latin
<input type="checkbox"/> Metal
<input type="checkbox"/> Opera
<input type="checkbox"/> Pop
<input type="checkbox"/> R&B/Soul
<input type="checkbox"/> Reggae
<input type="checkbox"/> Rock
<input type="checkbox"/> Rock And Roll
<input type="checkbox"/> Sci Fi & Fantasy
<input type="checkbox"/> Science Fiction
<input type="checkbox"/> Soundtrack
<input type="checkbox"/> TV Shows
<input type="checkbox"/> World

**Filter\_ Artist**

<input type="checkbox"/> Artist_Name
<input type="checkbox"/> Search
<input type="checkbox"/> Select all
<input type="checkbox"/> A Cor Do Som
<input type="checkbox"/> Aaron Copland & London Symp...
<input type="checkbox"/> Aaron Goldberg
<input type="checkbox"/> AC/DC
<input type="checkbox"/> Academy of St. Martin in the Fiel...
<input type="checkbox"/> Academy of St. Martin in the Fiel...
<input type="checkbox"/> Academy of St. Martin in the Fiel...
<input type="checkbox"/> Academy of St. Martin in the Fiel...
<input type="checkbox"/> Academy of St. Martin in the Fiel...
<input type="checkbox"/> Accept
<input type="checkbox"/> Adrian Leaper & Doreen de Feis
<input type="checkbox"/> Aerosmith
<input type="checkbox"/> Aerosmith & Sierra Leone's Refu...
<input type="checkbox"/> Aisha Duo
<input type="checkbox"/> Alanis Morissette
<input type="checkbox"/> Alberto Turco & Nova Schola Gr...
<input type="checkbox"/> Alice In Chains
<input type="checkbox"/> Amy Winehouse
<input type="checkbox"/> Anne-Sophie Mutter, Herbert Vo...
<input type="checkbox"/> Antal Doráti & London Symphon...
<input type="checkbox"/> Antônio Carlos Jobim
<input type="checkbox"/> Apocalyptica
<input type="checkbox"/> Aquaman
<input type="checkbox"/> Audioslave
<input type="checkbox"/> Avril Lavigne
<input type="checkbox"/> Azymuth
<input type="checkbox"/> Baby Consuelo
<input type="checkbox"/> BackBeat
<input type="checkbox"/> Banda Black Rio
<input type="checkbox"/> Barão Vermelho

Sales from Invoice Line

Sales

\$2,328.60

Sales from  
Invoice Line

\$2,329

Total from Invoice

Total

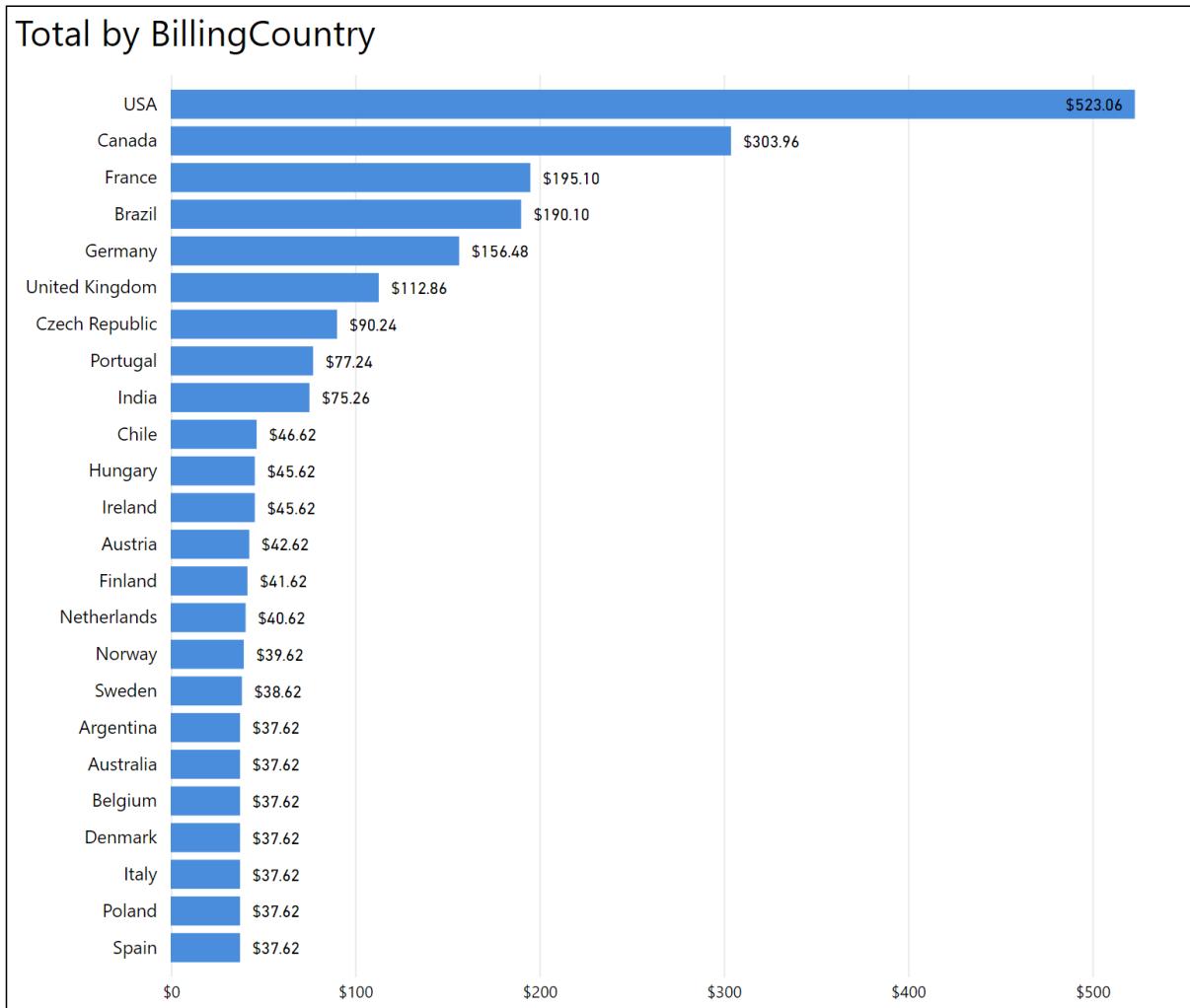
\$2,328.60

Total from  
Invoice

\$2,329

## Total sales by country – ranked

BillingCountry	Total
USA	\$523.06
Canada	\$303.96
France	\$195.10
Brazil	\$190.10
Germany	\$156.48
United Kingdom	\$112.86
Czech Republic	\$90.24
Portugal	\$77.24
India	\$75.26
Chile	\$46.62
Hungary	\$45.62
Ireland	\$45.62
Austria	\$42.62
Finland	\$41.62
Netherlands	\$40.62
Norway	\$39.62
Sweden	\$38.62
Argentina	\$37.62
Australia	\$37.62
Belgium	\$37.62
Denmark	\$37.62
Italy	\$37.62
Poland	\$37.62
Spain	\$37.62
<b>Total</b>	<b>\$2,328.60</b>



# Chinook - Total sales by country, state & city

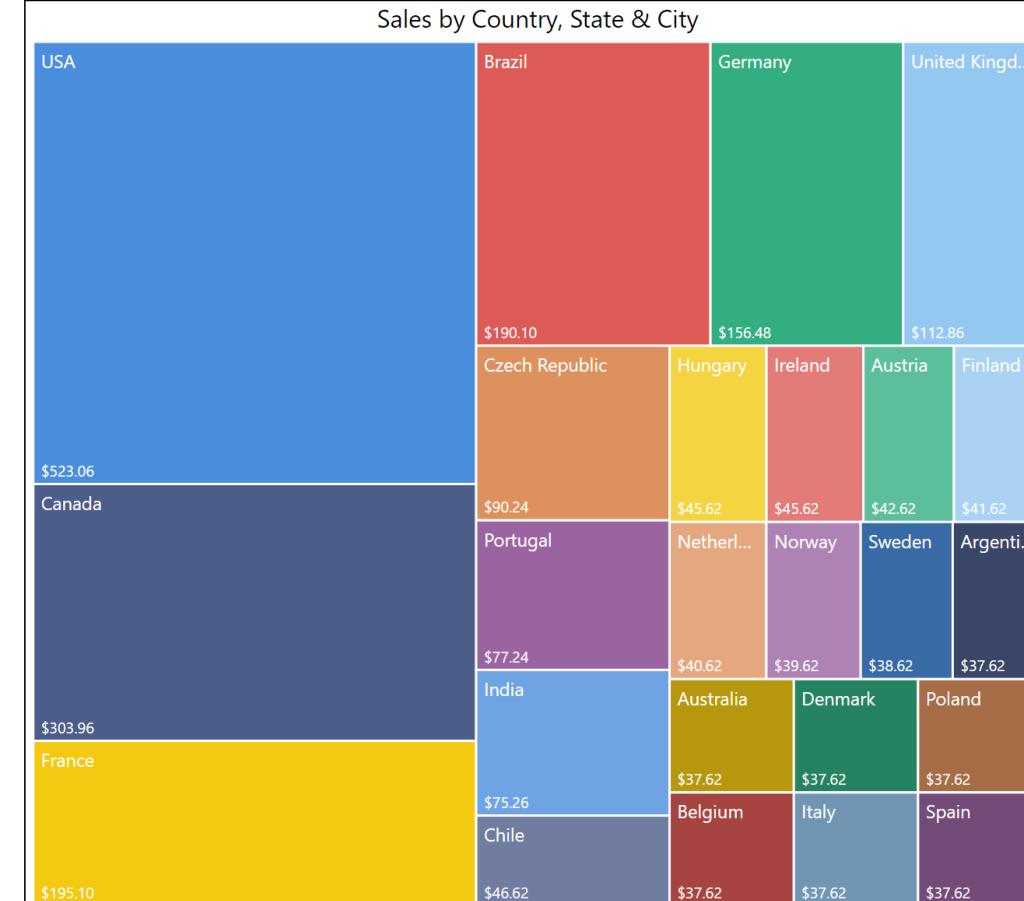
Sales by Country

Country	Sales
USA	\$523.06
Canada	\$303.96
France	\$195.10
Brazil	\$190.10
Germany	\$156.48
United Kingdom	\$112.86
Czech Republic	\$90.24
Portugal	\$77.24
India	\$75.26
Chile	\$46.62
Hungary	\$45.62
Ireland	\$45.62
Austria	\$42.62
Finland	\$41.62
Netherlands	\$40.62
Norway	\$39.62
Sweden	\$38.62
Argentina	\$37.62
Australia	\$37.62
Belgium	\$37.62
Denmark	\$37.62
Italy	\$37.62
Poland	\$37.62
Spain	\$37.62
<b>Total</b>	<b>\$2,328.60</b>

Sales by Country, State & City

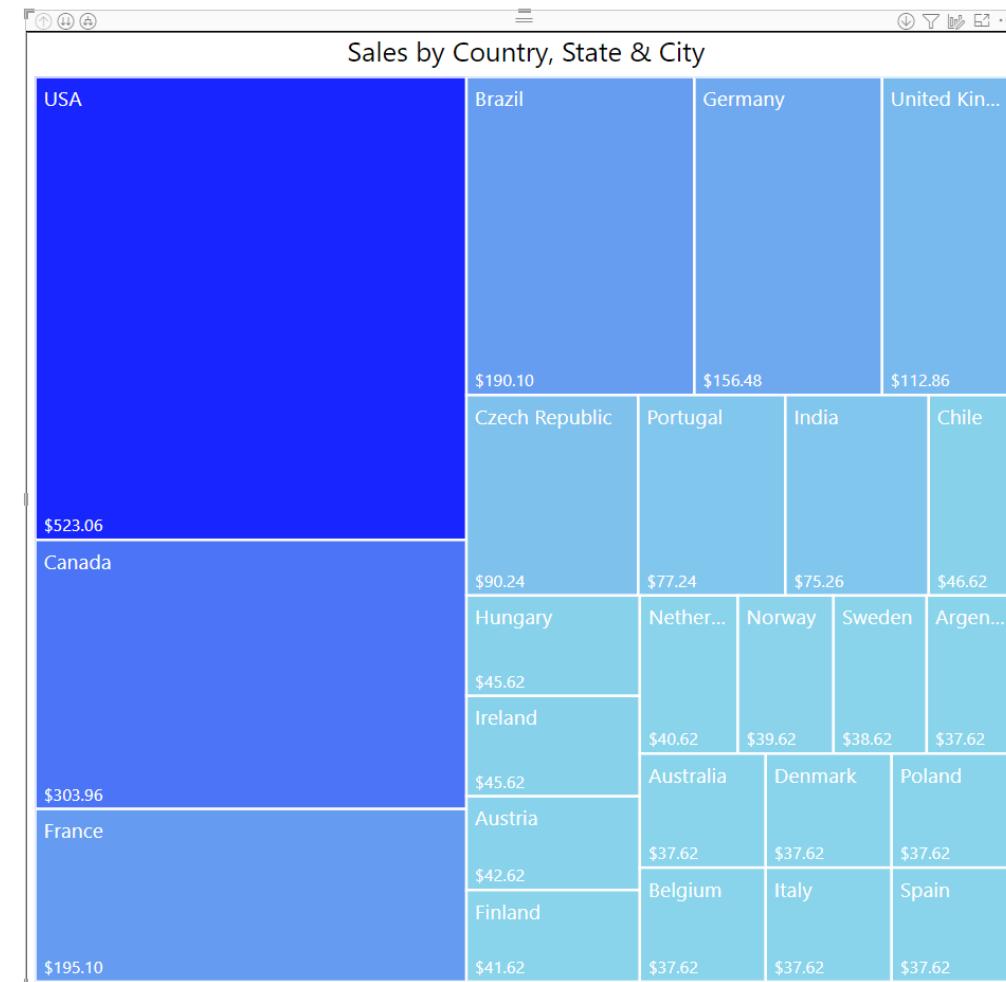
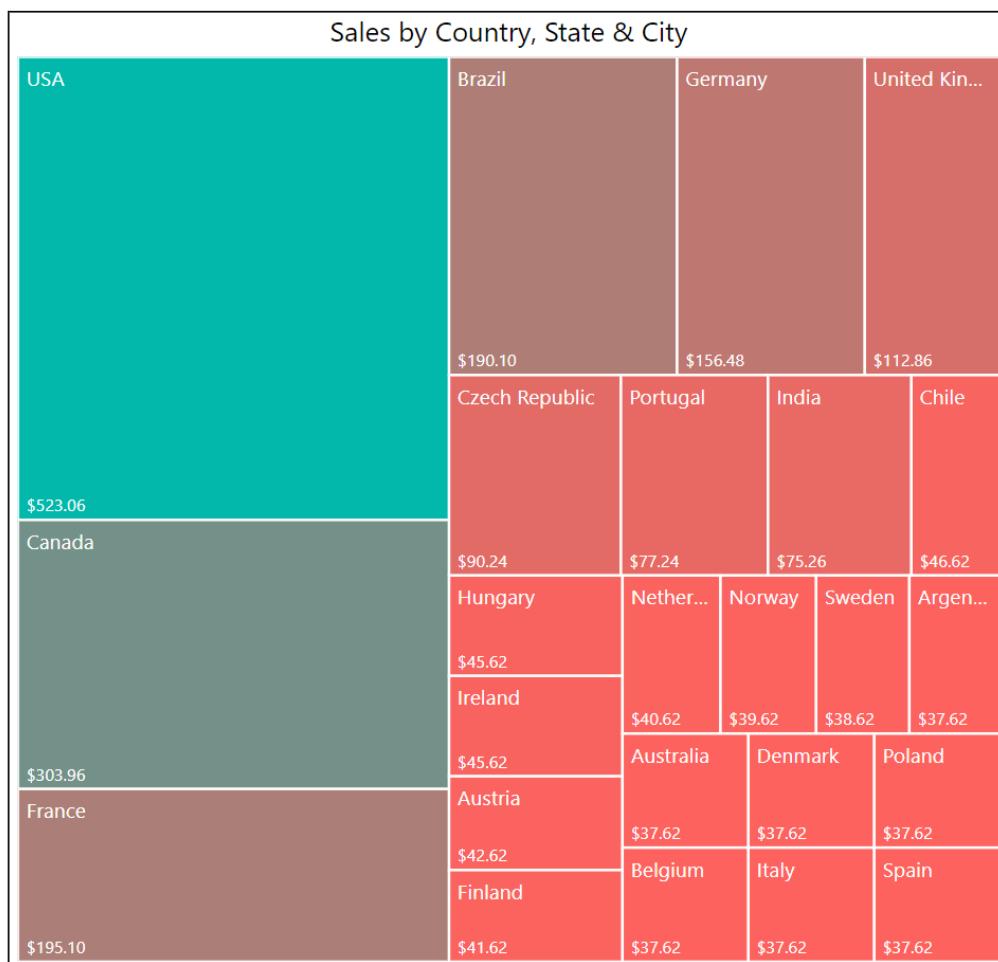
Country	StateNo	City	Sales
Canada	AB	Edmonton	\$37.62
USA	A7	Tucson	\$37.62
India	Bangalore	Bangalore	\$36.64
Canada	BC	Vancouver	\$38.62
Germany	Berlin	Berlin	\$75.24
France	Bordeaux	Bordeaux	\$39.62
Belgium	Brussels	Brussels	\$37.62
Hungary	Budapest	Budapest	\$45.62
Argentina	Buenos Aires	Buenos Aires	\$37.62
USA	CA	Cupertino	\$38.62
USA	CA	Mountain View	\$77.24
Denmark	Copenhagen	Copenhagen	\$37.62
India	Delhi	Delhi	\$38.62
Brazil	DF	Brasília	\$37.62
France	Dijon	Dijon	\$40.62
Ireland	Dublin	Dublin	\$45.62
United Kingdom	Edinburgh	Edinburgh	\$37.62
USA	FL	Orlando	\$39.62
Germany	Frankfurt	Frankfurt	\$43.62
Finland	Helsinki	Helsinki	\$41.62
USA	IL	Chicago	\$43.62
Portugal	Lisbon	Lisbon	\$39.62
United Kingdom	London	London	\$75.24
France	Lyon	Lyon	\$37.62
USA	MA	Boston	\$37.62
Spain	Madrid	Madrid	\$37.62
Canada	MB	Winnipeg	\$37.62
Canada	NS	Halifax	\$37.62
<b>Total</b>			<b>\$2,328.60</b>

Sales by Country, State & City



"Rainbow colors" - bad viz!!!! - next tab "fixes"

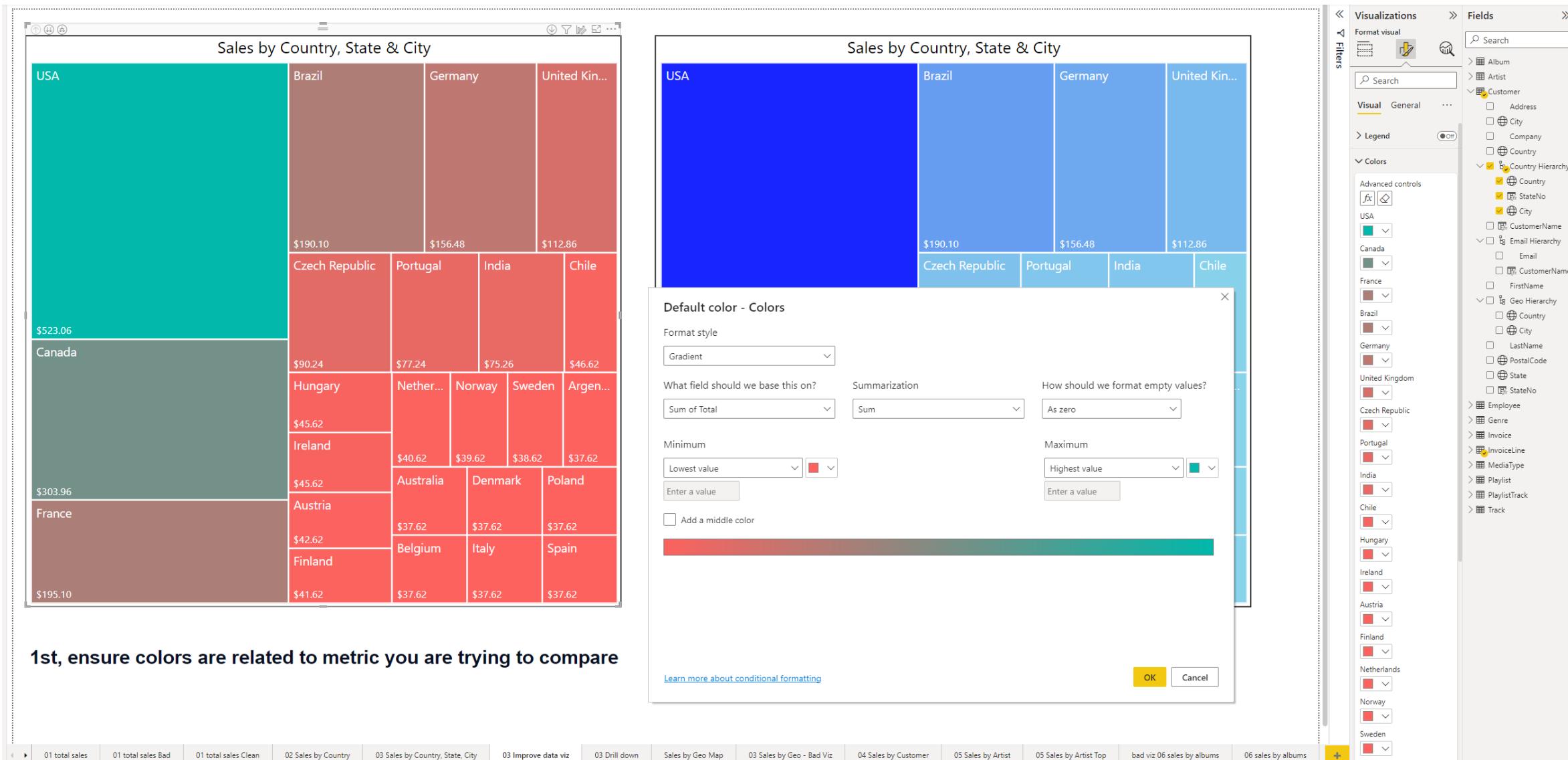
# Chinook - Total sales by country, state & city



1st, ensure colors are related to metric you are trying to compare

2nd, try to make color gradient easier to tell story

## Chinook - Total sales by country, state & city



# Chinook - Total sales by country, state & city

Sales by Country, State & City

Default color - Colors

Format style: Gradient

What field should we base this on?: Sum of Total

Summarization: Sum

How should we format empty values?: As zero

Minimum: Lowest value

Maximum: Highest value

19 Learn more about conditional formatting OK Cancel

Sales by Country, State & City

USA (\$190.10)

Czech Republic (\$156.48)

Portugal (\$112.86)

India

Chile

\$523.06

Canada (\$90.24)

Hungary (\$45.62)

Ireland (\$45.62)

France (\$303.96)

Austria (\$42.62)

Finland (\$195.10)

Nether... (\$77.24)

Norway (\$75.26)

Sweden (\$46.62)

Argen... (\$37.62)

Australia (\$40.62)

Denmark (\$39.62)

Poland (\$38.62)

\$37.62

Belgium (\$41.62)

Italy (\$37.62)

Spain (\$37.62)

Visualizations

Format visual

Filters

Search

Visual General ...

Legend

Colors

Advanced controls

USA

Canada

France

Brazil

Germany

United Kingdom

Czech Republic

Portugal

India

Chile

Hungary

Ireland

Austria

Finland

Netherlands

Norway

Sweden

Customer

Address

City

Company

Country

Country Hierarchy

Country

StateNo

City

CustomerName

Email

CustomerName

FirstName

Email Hierarchy

LastName

PostalCode

State

StateNo

Employee

Genre

Invoice

InvoiceLine

MediaType

Playlist

PlaylistTrack

Track

Fields

Search

Album

Artist

Customer

Address

City

Company

Country

Country Hierarchy

Country

StateNo

City

CustomerName

Email

CustomerName

FirstName

Email Hierarchy

LastName

PostalCode

State

StateNo

Employee

Genre

Invoice

InvoiceLine

MediaType

Playlist

PlaylistTrack

Track

2nd, try to make color gradient easier to tell story

Slide 37

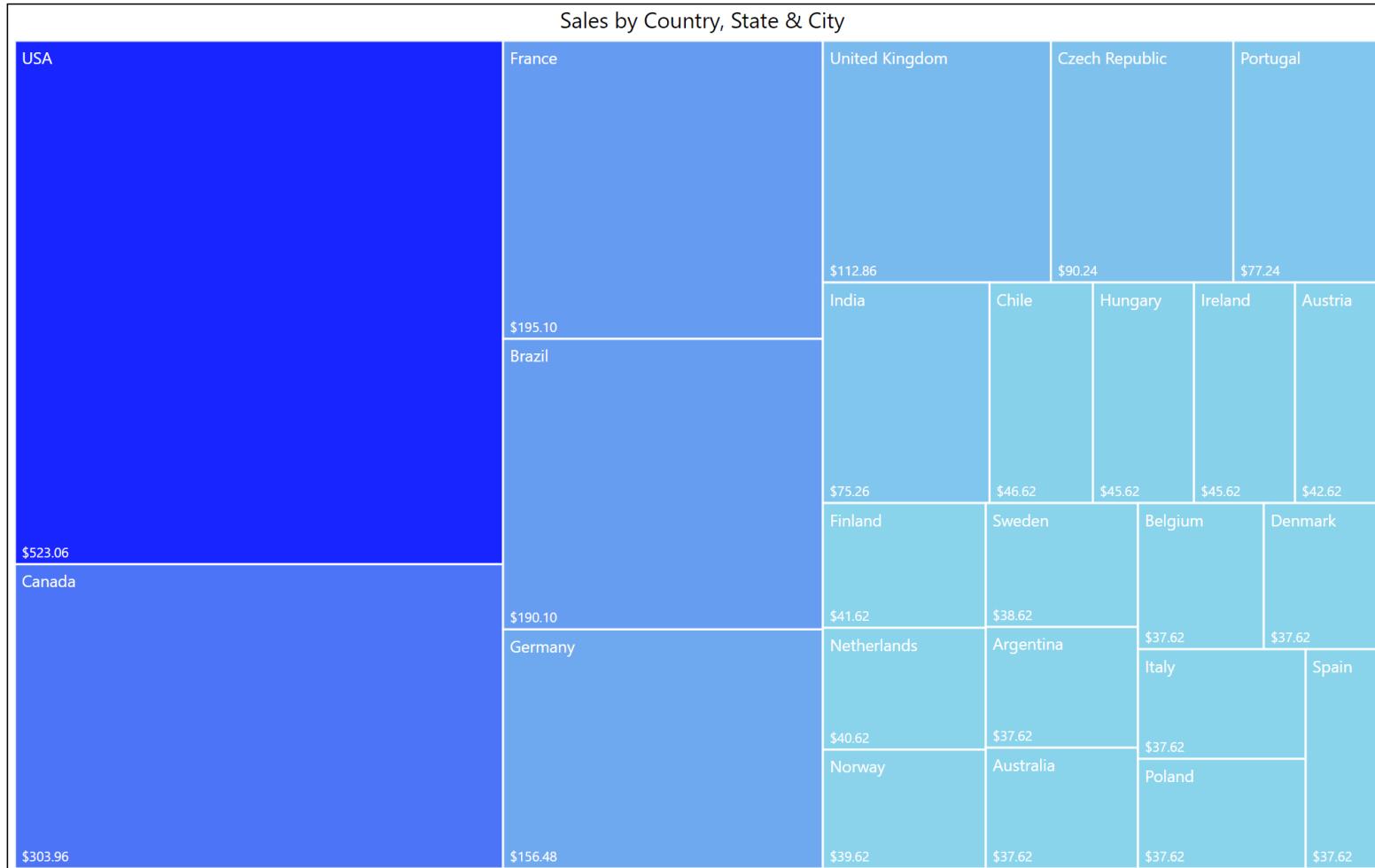
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ATHENA  
IT SOLUTIONS

# Chinook - Total sales by country, state & city

Drilling Down

- 1) Drill into a country vs
- 2) Drill into overall data



# Chinook - Total sales by country, state & city

Drilling Down

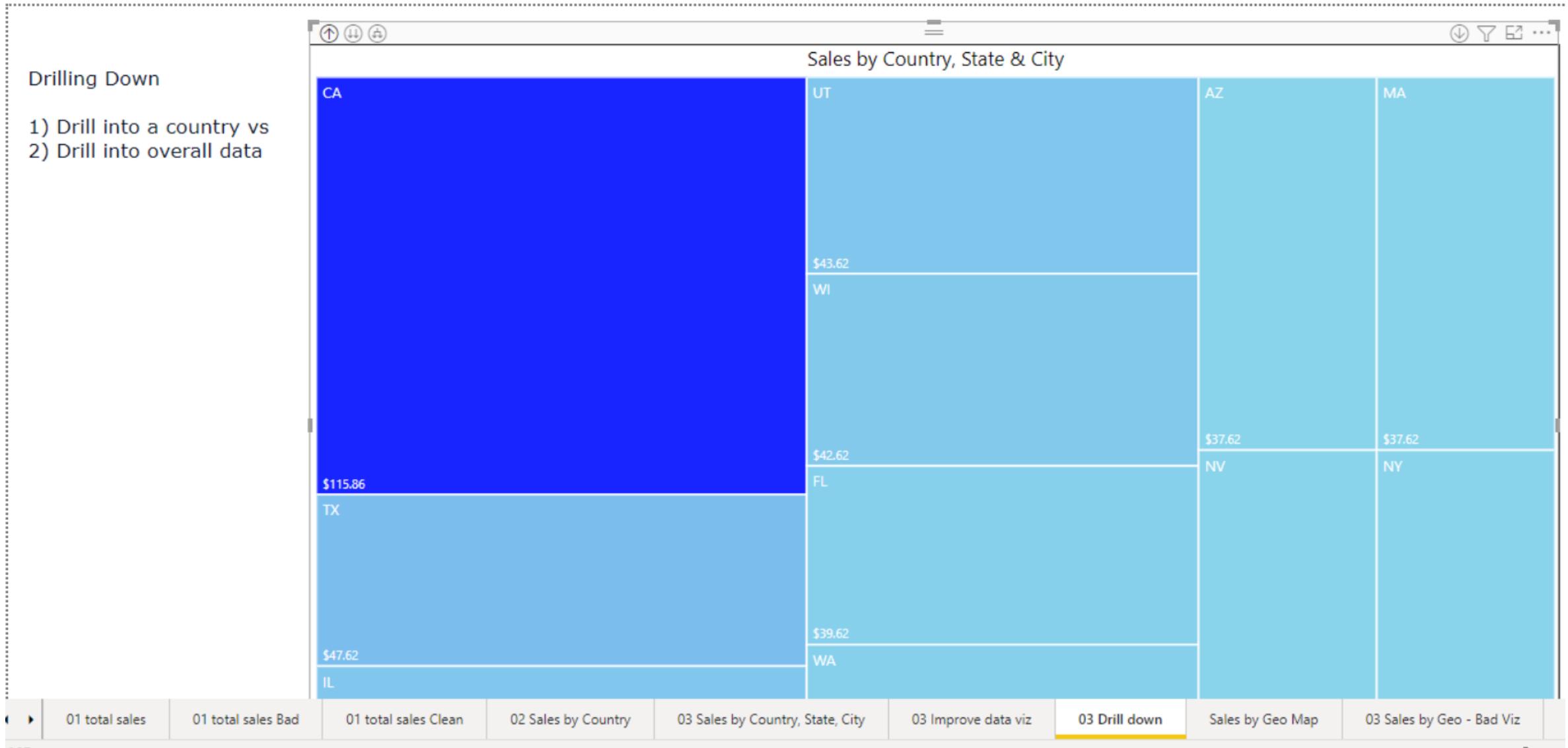
1) Drill into a country vs  
2) Drill into overall data

The screenshot shows a treemap visualization titled "Sales by Country, State & City". The visualization is divided into several colored regions representing different countries and their sub-regions. The USA region is highlighted in blue and has a context menu open over it. The menu includes options such as "Drill down", "Show data point as a table", "Show as a table", "Show next level", "Expand to next level", "Include", "Exclude", "Summarize", and "Copy". Other visible regions include France, United Kingdom, Czech Republic, Portugal, India, Chile, Hungary, Ireland, Austria, Finland, Sweden, Belgium, Denmark, Germany, Netherlands, Argentina, Italy, and Spain. Numerical values representing sales are displayed within many of these regions, such as \$523.06 for Canada, \$195.10 for Brazil, \$112.86 for France, \$90.24 for United Kingdom, \$77.24 for Portugal, \$75.26 for India, \$46.62 for Chile, \$45.62 for Hungary, \$45.62 for Ireland, \$42.62 for Austria, \$41.62 for Finland, \$38.62 for Sweden, \$37.62 for Belgium, \$37.62 for Denmark, \$41.62 for Germany, \$38.62 for Netherlands, \$37.62 for Argentina, \$37.62 for Italy, and \$37.62 for Spain.

Country	Sub-Country/Region	Sales Value
USA	Canada	\$523.06
France	Brazil	\$195.10
United Kingdom	India	\$112.86
Czech Republic	Chile	\$90.24
Portugal	Hungary	\$77.24
India	Ireland	\$75.26
Chile	Austria	\$46.62
Hungary	Finland	\$45.62
Ireland	Sweden	\$45.62
Austria	Belgium	\$42.62
Finland	Denmark	\$37.62
Sweden	Italy	\$37.62
Belgium	Spain	\$37.62
Denmark		
Germany	Netherlands	\$41.62
Netherlands	Argentina	\$38.62
Argentina	Italy	\$37.62
Italy	Spain	\$37.62

01 total sales    01 total sales Bad    01 total sales Clean    02 Sales by Country    03 Sales by Country, State, City    03 Improve data viz    **03 Drill down**    Sales by Geo Map    03 Sales by Geo - Bad Viz

# Chinook - Total sales by country, state & city



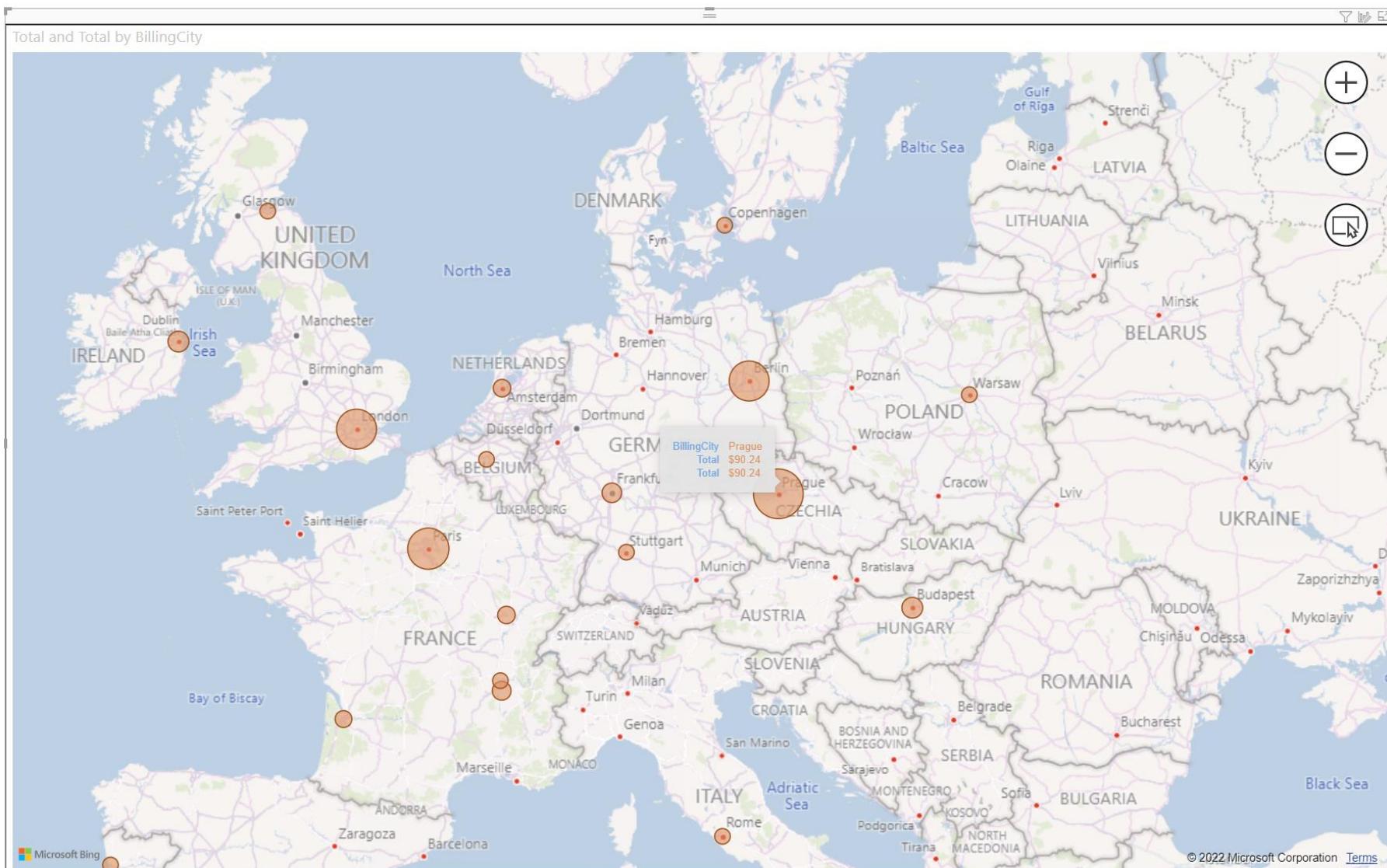
# Chinook - Total sales by country, state & city

## Map



# Chinook - Total sales by country, state & city

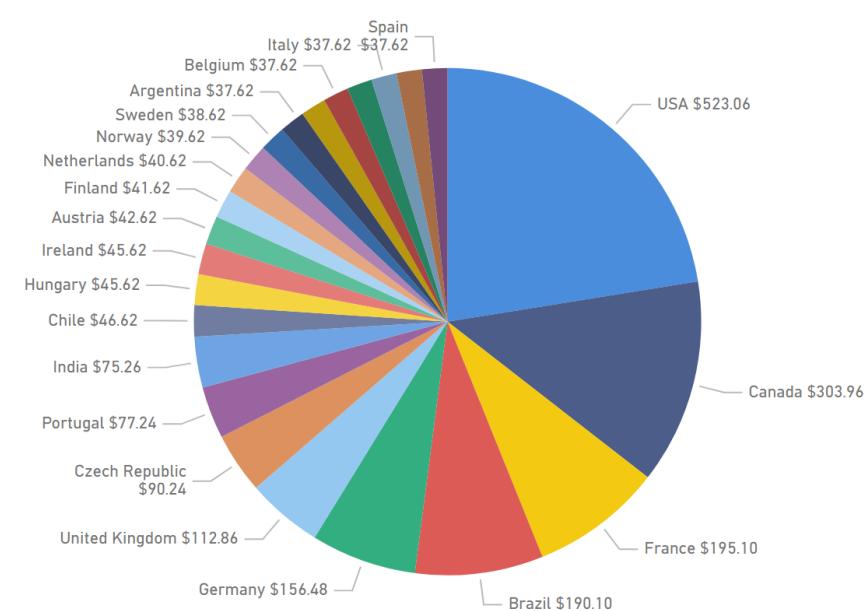
## Map – Zoom to Europe



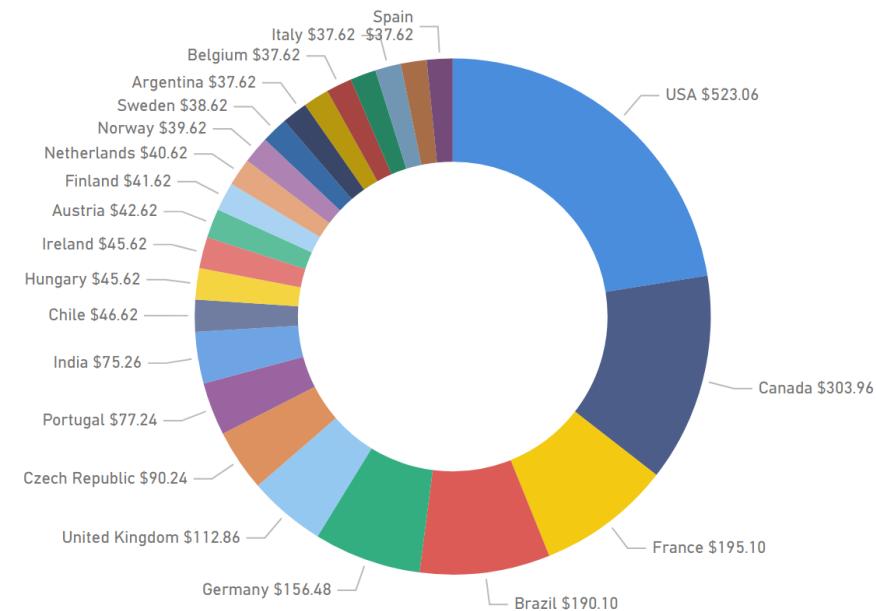
# Chinook - Total sales by country, state & city

## Bad Visualizations

Total by BillingCountry



Total by BillingCountry



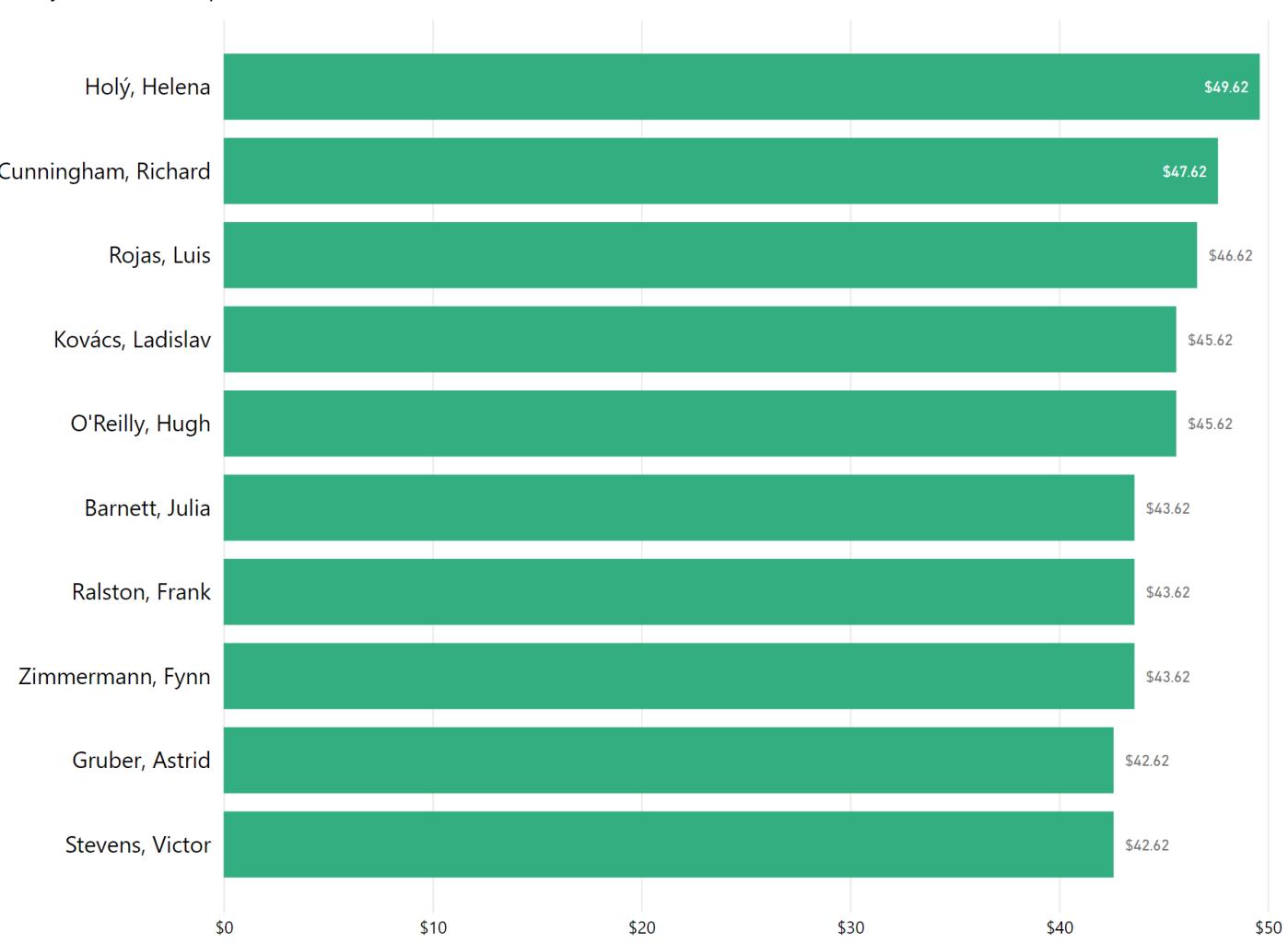
**Donuts & Pies are fine to eat but BAD for Data Visualizations**

- Cannot quickly discern values and in fact are distracting
- this example has "rainbow" colors resulting in further distractions

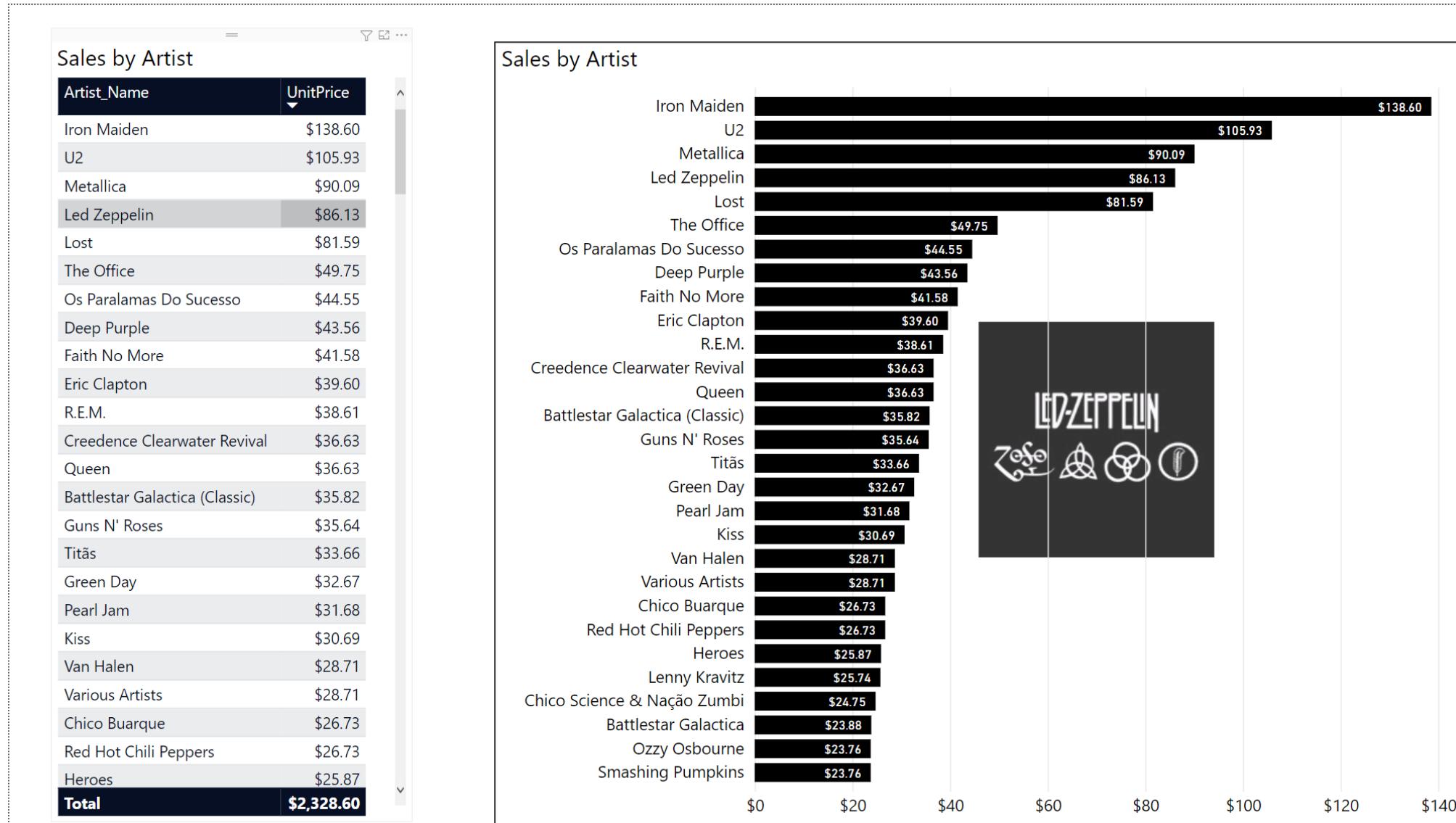
## Total sales by customer – ranked

Sales by Customer	
CustomerName	Sales
Holý, Helena	\$49.62
Cunningham, Richard	\$47.62
Rojas, Luis	\$46.62
Kovács, Ladislav	\$45.62
O'Reilly, Hugh	\$45.62
Barnett, Julia	\$43.62
Ralston, Frank	\$43.62
Zimmermann, Fynn	\$43.62
Gruber, Astrid	\$42.62
Stevens, Victor	\$42.62
Hämäläinen, Terhi	\$41.62
Mercier, Isabelle	\$40.62
Van der Berg, Johannes	\$40.62
Wichterlová, František	\$40.62
Fernandes, João	\$39.62
Girard, Wyatt	\$39.62
Gonçalves, Luís	\$39.62
Hansen, Bjørn	\$39.62
Leacock, Heather	\$39.62
Miller, Dan	\$39.62
Smith, Jack	\$39.62
Tremblay, François	\$39.62
Bernard, Camille	\$38.62
Goyer, Tim	\$38.62
<b>Total</b>	<b>\$2,328.60</b>

Sales by Customer - Top 10



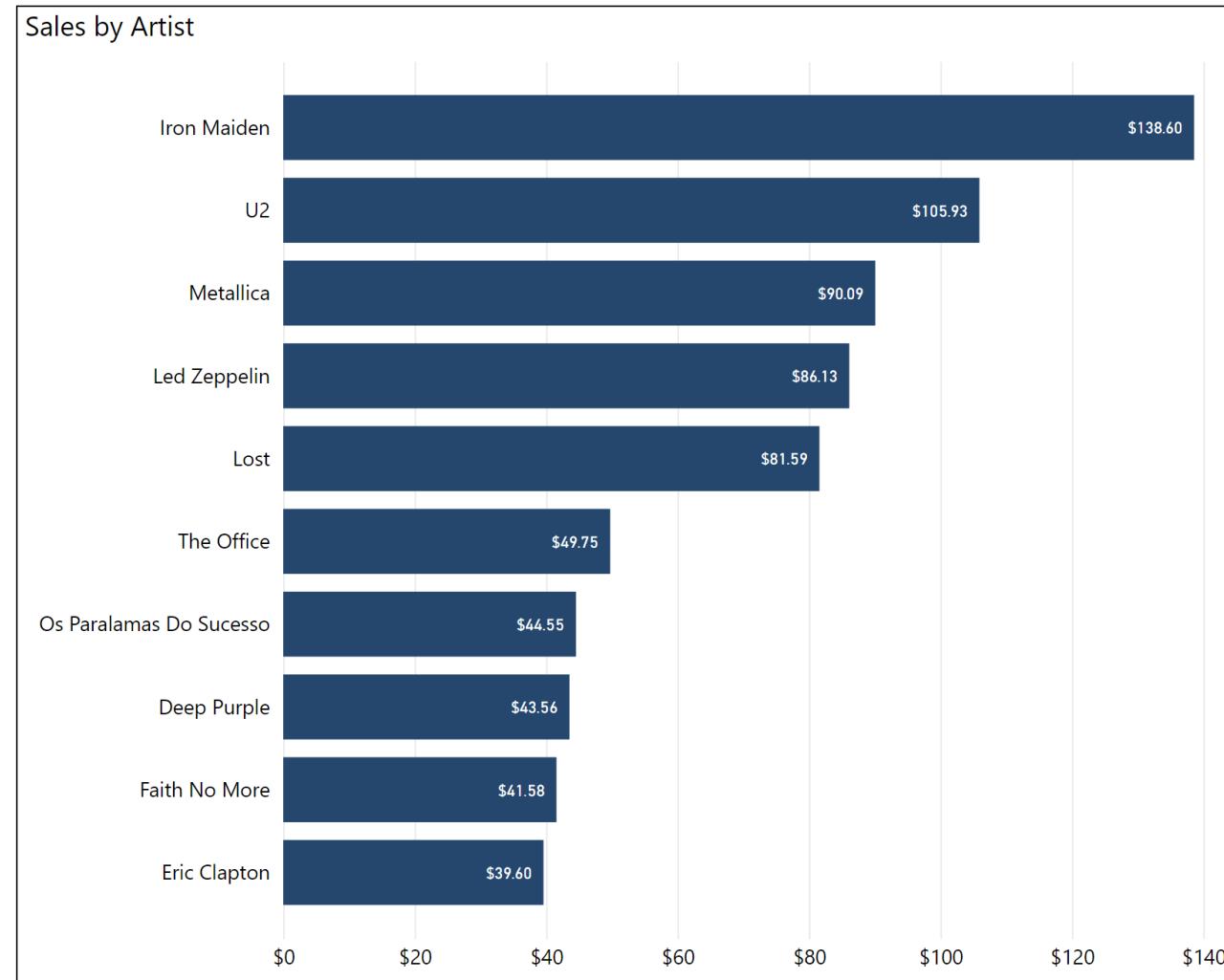
## Total sales by artist – ranked



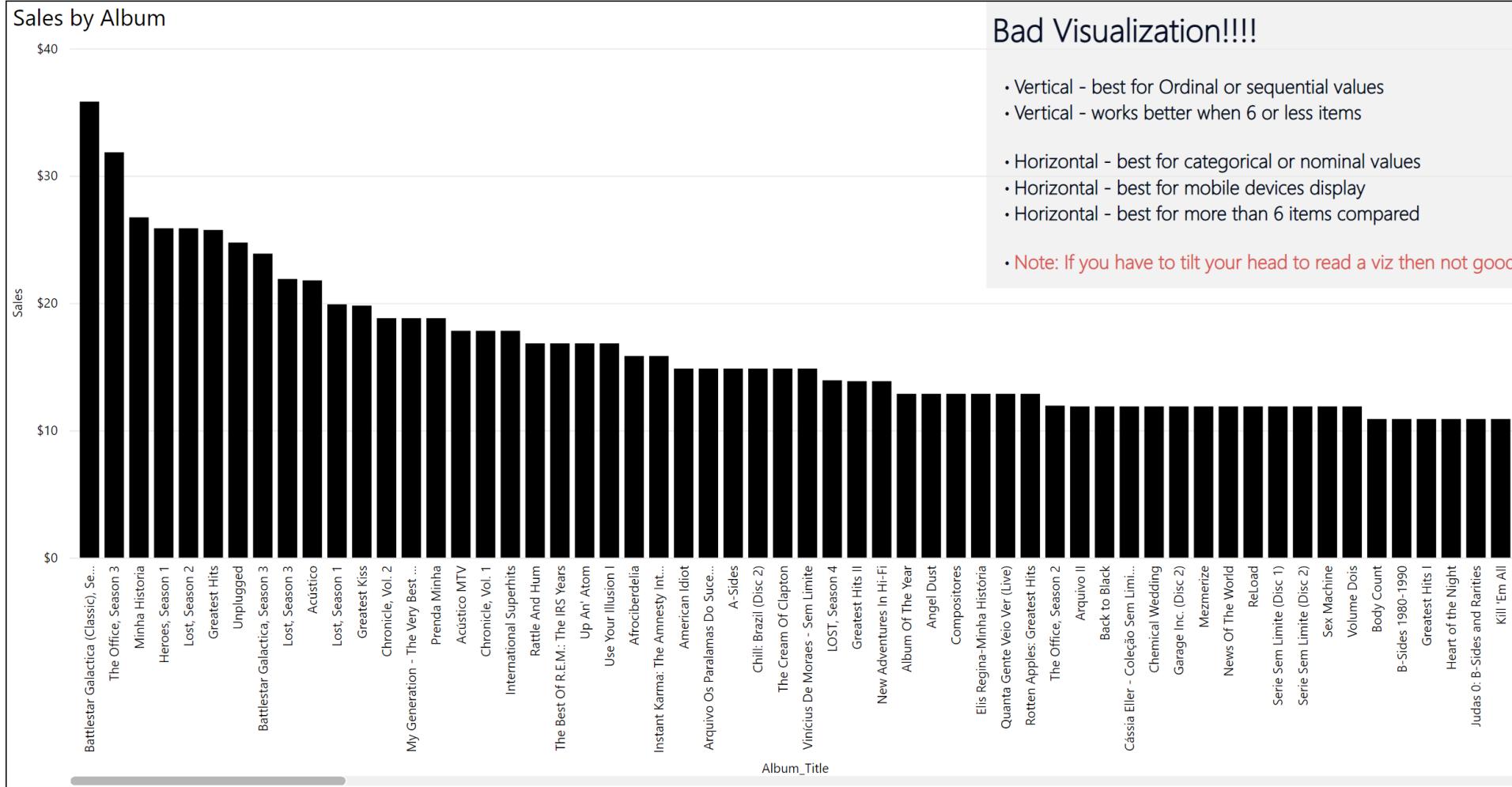
## Total sales by artist – ranked top 10

Filters:

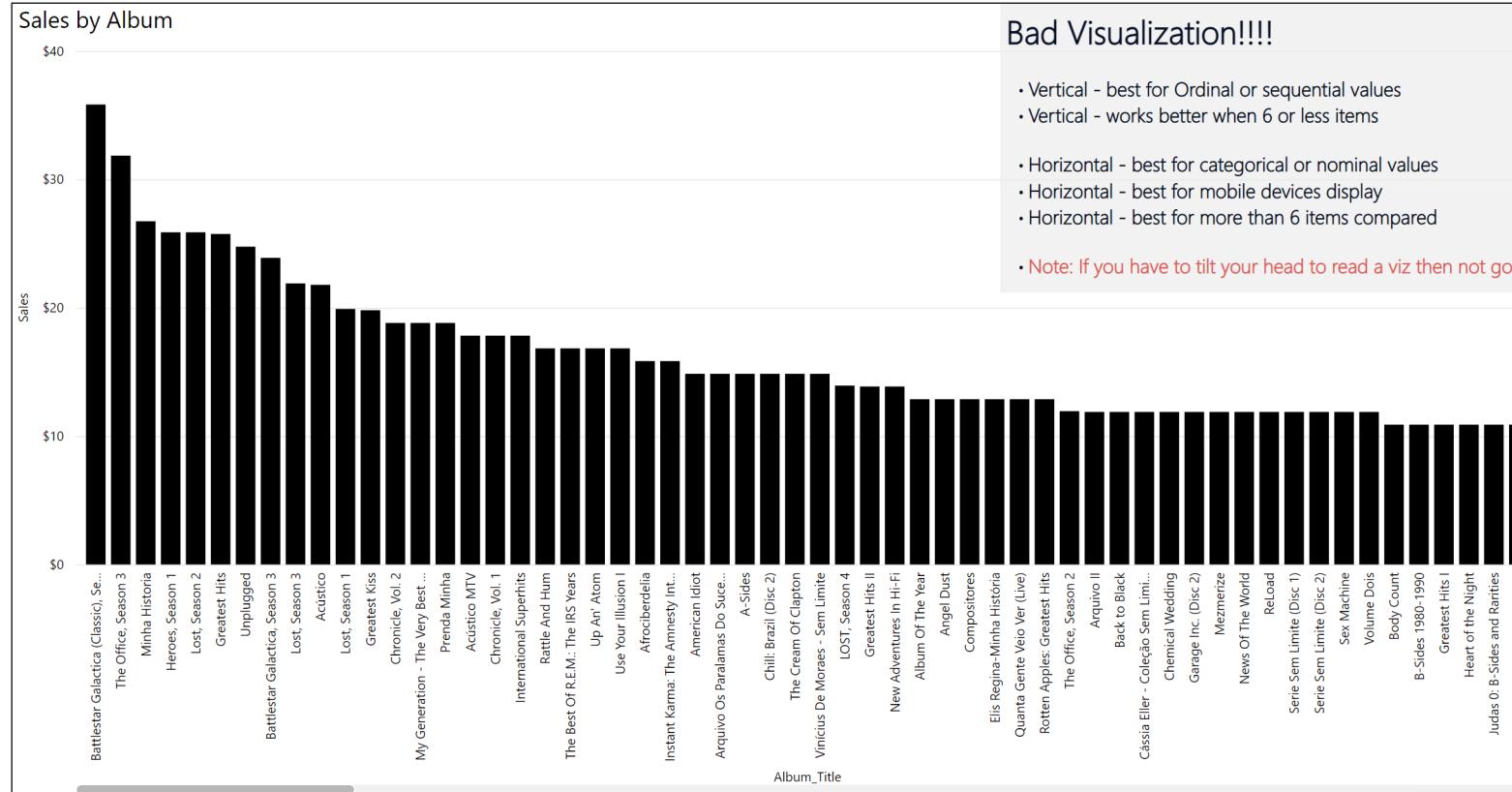
- 1) Use Top N for Artists by Sales



## Total sales by albums



## Total sales by albums – Bad Viz



### Vertical bar charts

- Appropriate for limited number of values

### Ordinal or sequential values

### Horizontal bar charts

- Can you read X-axis labels?
- Appropriate for unlimited number of values
- This will be display on mobile devices (iPhones & iPads)
- Categorical or nominal values

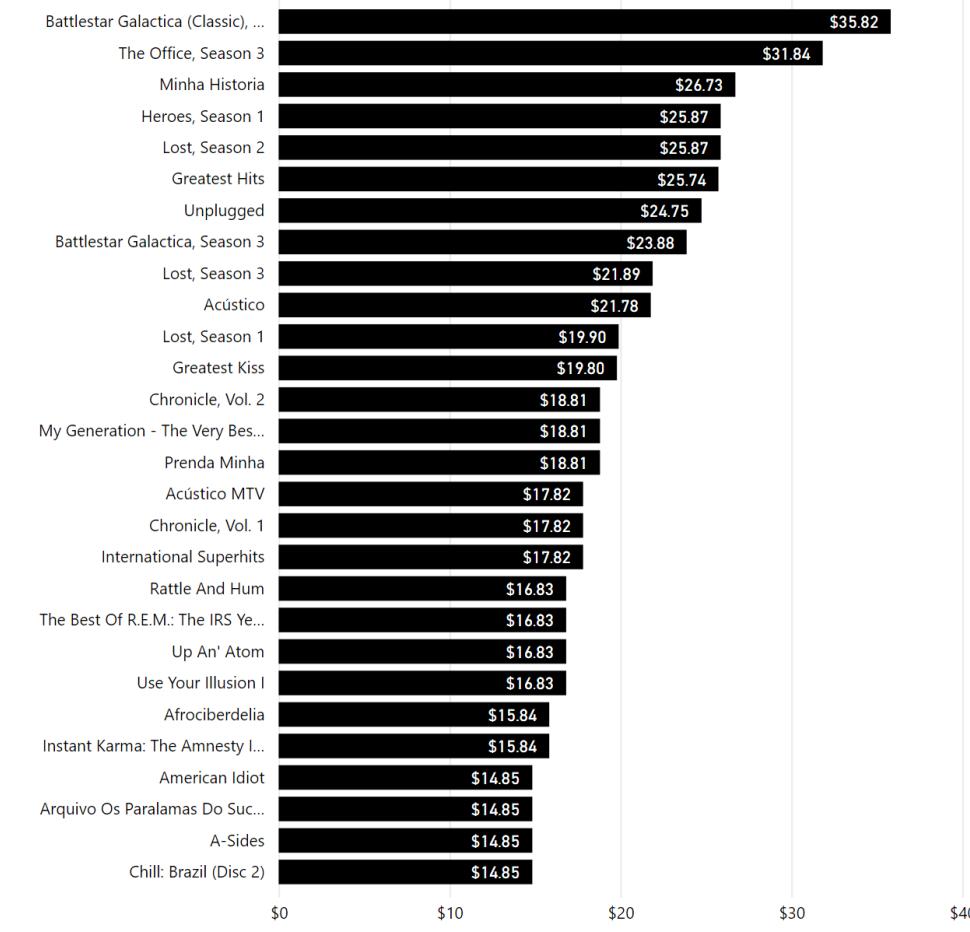
### Filter: Genre

- Select all
- Alternative
- Alternative & Punk
- Blues
- Bossa Nova
- Classical
- Comedy
- Drama
- Easy Listening
- Electronica/Dance
- Heavy Metal
- Hip Hop/Rap
- Jazz
- Latin
- Metal
- Opera
- Pop
- R&B/Soul
- Reggae
- Rock
- Rock And Roll
- Sci Fi & Fantasy
- Science Fiction
- Soundtrack
- TV Shows
- World

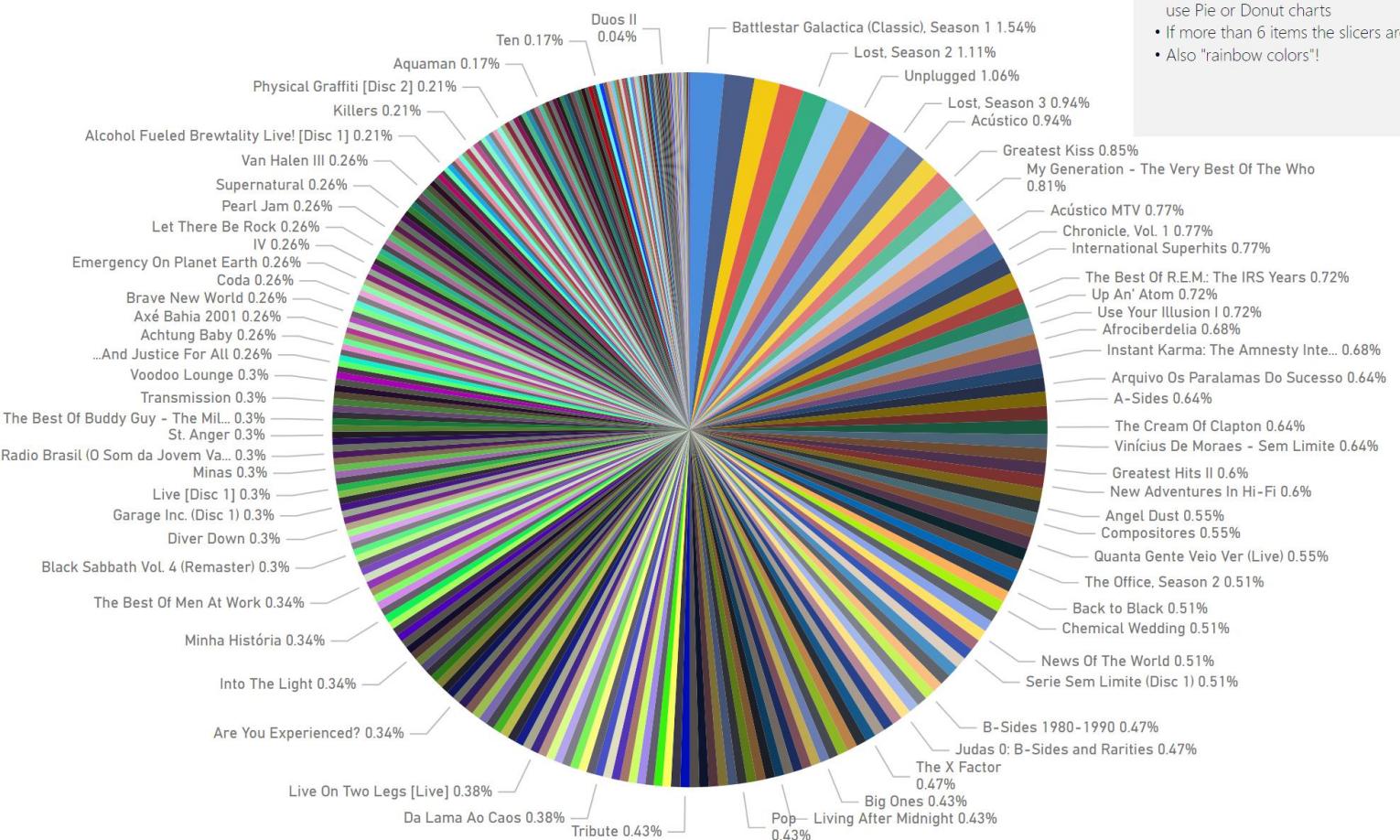
### Sales by Album

Album Title	Sales
Battlestar Galactica (Classic), Season 1	\$35.82
The Office, Season 3	\$31.84
Minha Historia	\$26.73
Heroes, Season 1	\$25.87
Lost, Season 2	\$25.87
Greatest Hits	\$25.74
Unplugged	\$24.75
Battlestar Galactica, Season 3	\$23.88
Lost, Season 3	\$21.89
Acústico	\$21.78
Lost, Season 1	\$19.90
Greatest Kiss	\$19.80
Chronicle, Vol. 2	\$18.81
My Generation - The Very Best Of The Who	\$18.81
Prenda Minha	\$18.81
Acústico MTV	\$17.82
Chronicle, Vol. 1	\$17.82
International Superhits	\$17.82
Rattle And Hum	\$16.83
The Best Of R.E.M.: The IRS Years	\$16.83
Up An' Atom	\$16.83
Use Your Illusion I	\$16.83
Afrociberdelia	\$15.84
Instant Karma: The Amnesty International Campaign to Save Darfur	\$15.84
American Idiot	\$14.85
Arquivo Os Paralamas Do Sucesso	\$14.85
A-Sides	\$14.85
Total	<b>\$2,328.60</b>

### Sales by Album



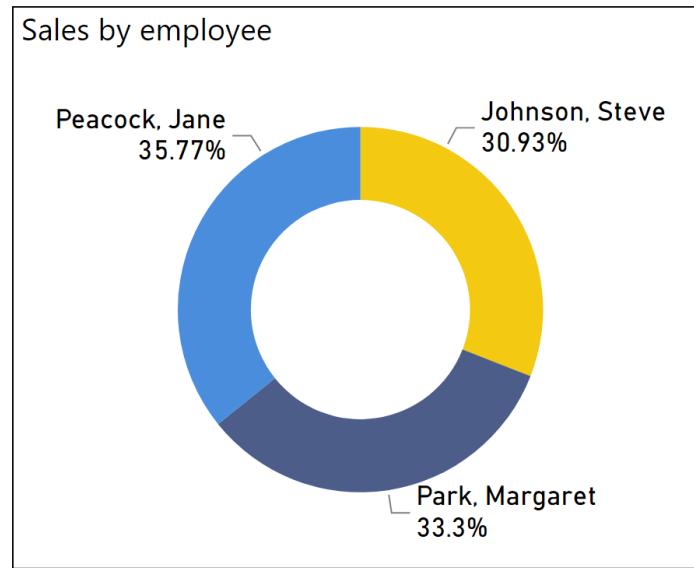
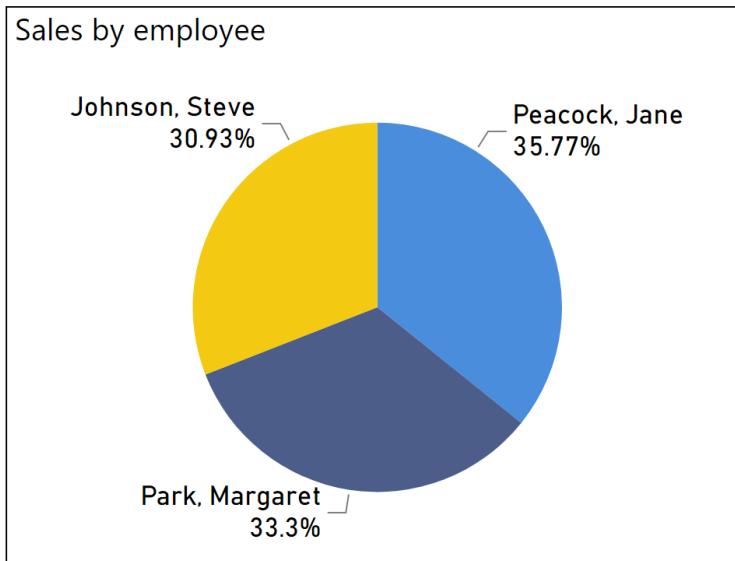
## Sales by Album\_Title



## Bad Visualization!!!!

- This is the reason maybe viz experts suggest NEVER to use Pie or Donut charts
- If more than 6 items the slicers are to small to differentiate
- Also "rainbow colors"!

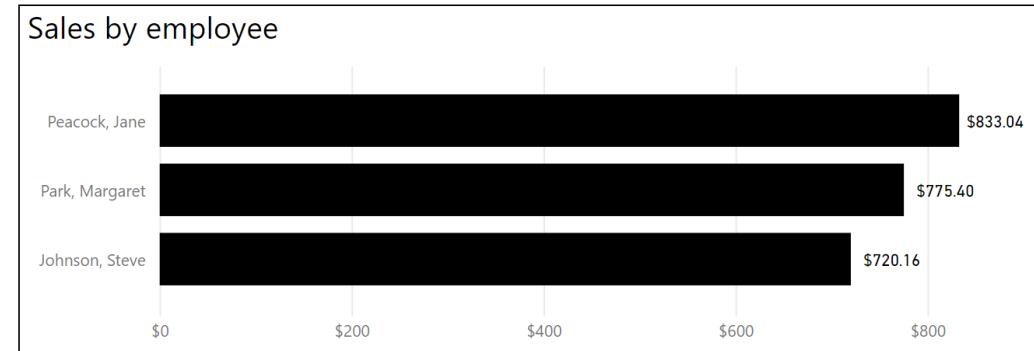
## Total sales by salesperson (employee)



Note: Colors are the same for two donut charts.

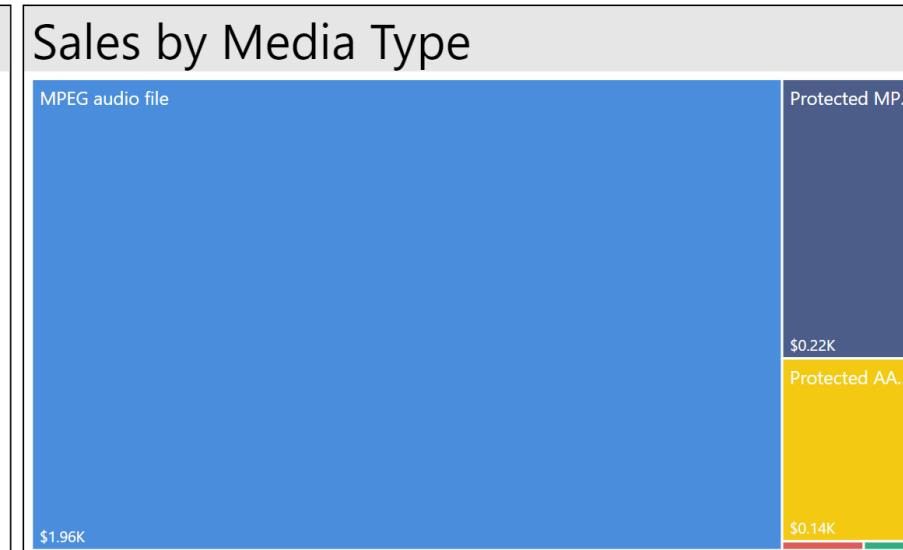
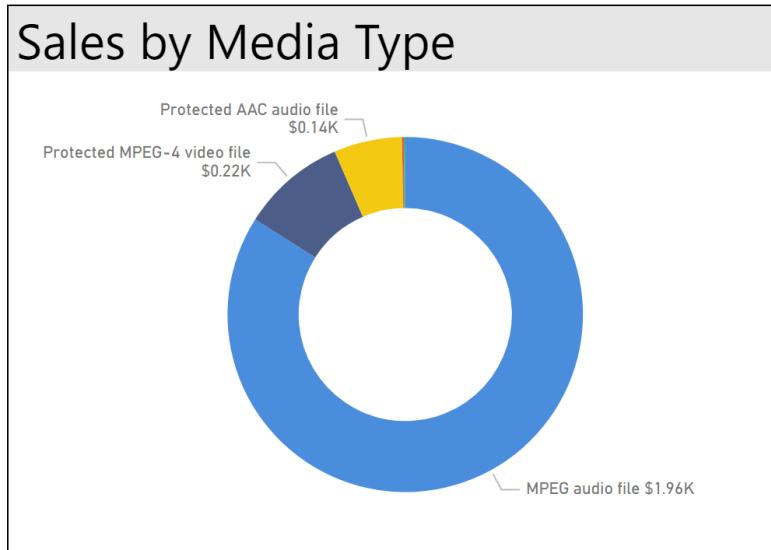
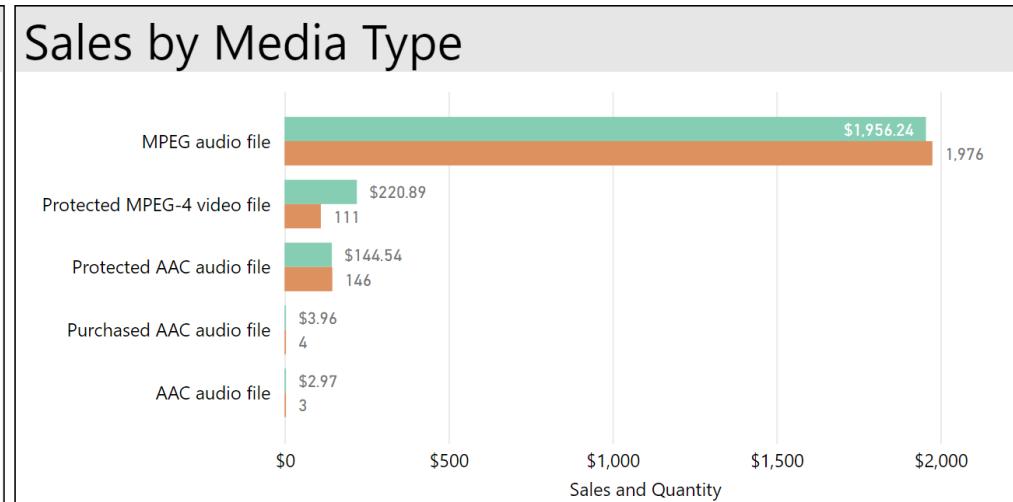
Sales by employee

EmployeeName	Sales	Quantity	Employee_AgeGroup	
Peacock, Jane	\$833.04	796	40-49	
Park, Margaret	\$775.40	760	50+	
Johnson, Steve	\$720.16	684	50+	
<b>Total</b>	<b>\$2,328.60</b>	<b>2,240</b>		



## Total tracks bought and total revenue by media type

Sales by Media Type		
Name	Sales	Quantity
MPEG audio file	\$1,956.24	1,976
Protected MPEG-4 video file	\$220.89	111
Protected AAC audio file	\$144.54	146
Purchased AAC audio file	\$3.96	4
AAC audio file	\$2.97	3
<b>Total</b>	<b>\$2,328.60</b>	<b>2,240</b>

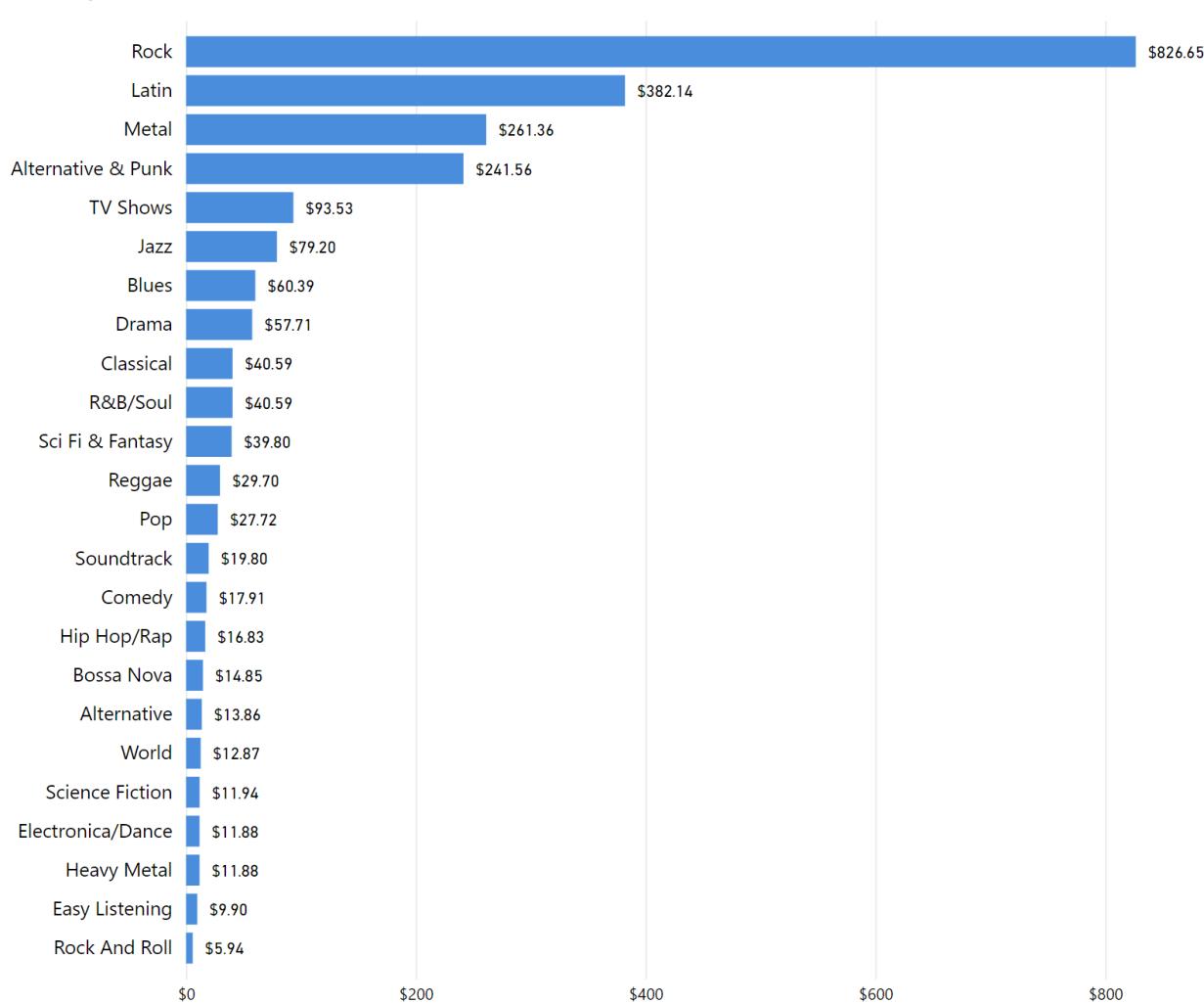


Note: Colors are the same for two charts.

## Total Sales by Genre

Sales by Genre	
Genre_Name	Sales
Rock	\$826.65
Latin	\$382.14
Metal	\$261.36
Alternative & Punk	\$241.56
TV Shows	\$93.53
Jazz	\$79.20
Blues	\$60.39
Drama	\$57.71
Classical	\$40.59
R&B/Soul	\$40.59
Sci Fi & Fantasy	\$39.80
Reggae	\$29.70
Pop	\$27.72
Soundtrack	\$19.80
Comedy	\$17.91
Hip Hop/Rap	\$16.83
Bossa Nova	\$14.85
Alternative	\$13.86
World	\$12.87
Science Fiction	\$11.94
Electronica/Dance	\$11.88
Heavy Metal	\$11.88
Easy Listening	\$9.90
Rock And Roll	\$5.94
<b>Total</b>	<b>\$2,328.60</b>

Sales by Genre

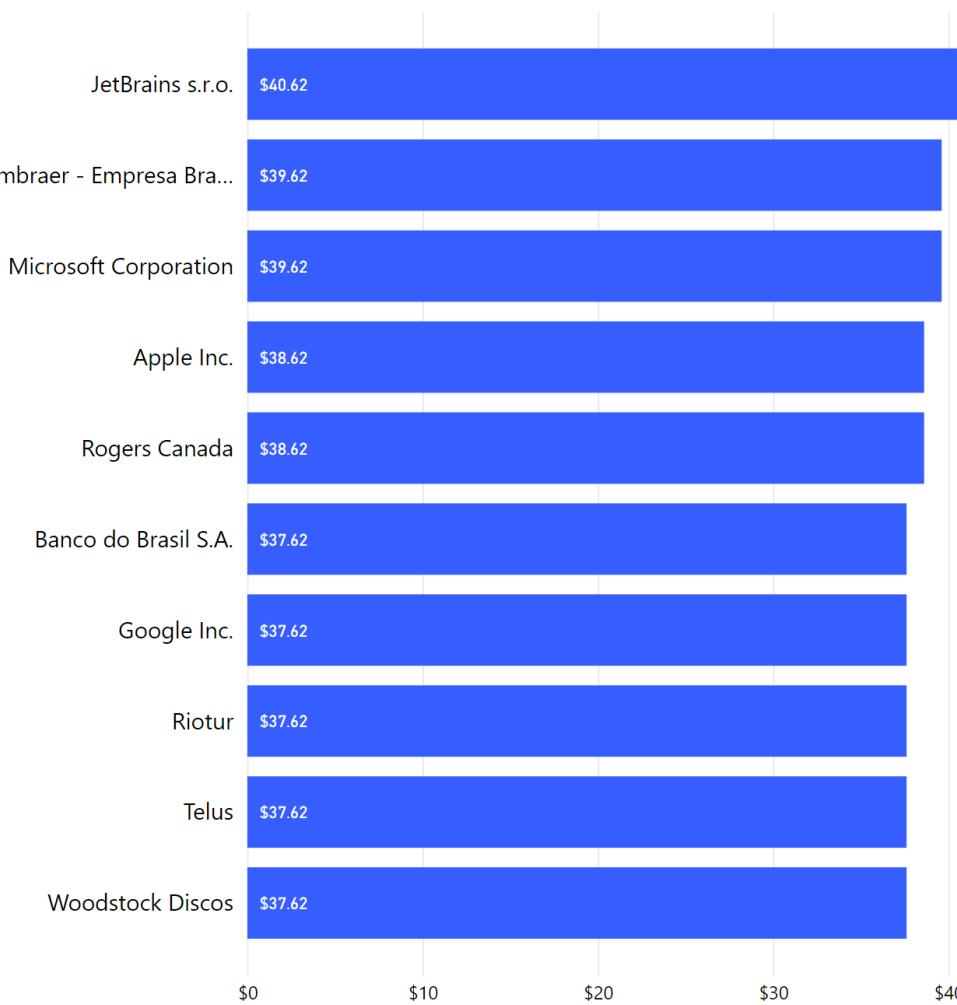


## Total sales by customer's company – ranked

Sales by Customer

Company	Sales
JetBrains s.r.o.	\$40.62
Embraer - Empresa Brasileira de Aeronáutica S.A.	\$39.62
Microsoft Corporation	\$39.62
Apple Inc.	\$38.62
Rogers Canada	\$38.62
Banco do Brasil S.A.	\$37.62
Google Inc.	\$37.62
Riotur	\$37.62
Telus	\$37.62
Woodstock Discos	\$37.62
<b>Total</b>	<b>\$385.20</b>

Sales by Customer



# Chinook – Q&A

