Turning Data into Information

(Leveraging SQL Edition)

Power VUG June 2021

Doug Mack
Db2 for i Analytics Consultant
mackd@us.ibm.com

Db2 Web Query Team
QU2@us.ibm.com

IBM i Anywhere
IBM i Everywhere

IBM

Who Uses Db2 Web Query?

Executives - Dashboards to monitor Key Performance Indicators

Finance Dept – they love their spreadsheets!

Business Analysts and Data Scientists – Cobble together data and analyze on premise or in the cloud

Users on the Go - Mobile Device Support

Applications - URL API to Embed Reports in Apps

And YES, **IBM i Admins and Developers** – Monitor System and Security Metrics

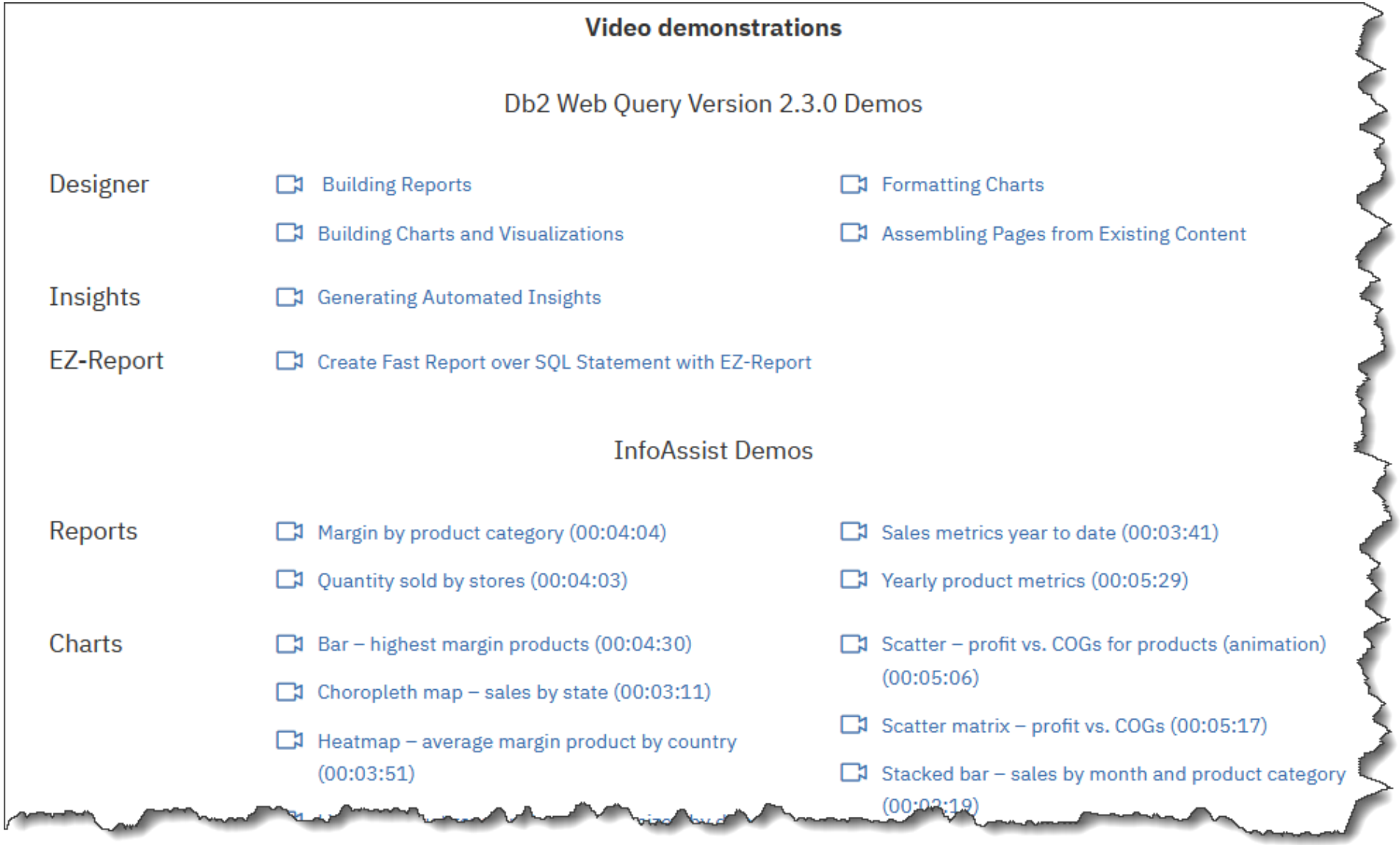
FAST START: INSTALL with EZ-Install…..PLEASE

- EZ-Install is **HIGHLY RECOMMENDED** for installing webquery or upgrading from previous versions
  - Request it by sending an email to QU2@us.ibm.com, including name, company name, and s/n
  - It provides **VALUE ADD** way beyond just restoring the license program products
    - Sample Reports, Tutorials, Utilities to help you get a **FAST START**
      - Query/400 Discovery Tool
      - Create Date Dimension Table (really cool)
      - **Sample Reports for the Systems Administrator**
      - Business oriented sample reports backed by tutorials
  - Tutorials and additional “how to” documentation provide guides to show you how the sample reports were built

HELP us help you – make sure your IBM Business Partner is using EZ-Install to install or upgrade!

Request EZ-Install by emailing QU2@us.ibm.com. Include name, company name, serial number and OS level (ex. 7.3)

Video Demonstrations



Video demonstrations

Db2 Web Query Version 2.3.0 Demos

Designer	Building Reports	Formatting Charts
	Building Charts and Visualizations	Assembling Pages from Existing Content
Insights	Generating Automated Insights	
EZ-Report	Create Fast Report over SQL Statement with EZ-Report	

InfoAssist Demos

Reports	Margin by product category (00:04:04)	Sales metrics year to date (00:03:41)
	Quantity sold by stores (00:04:03)	Yearly product metrics (00:05:29)
Charts	Bar – highest margin products (00:04:30)	Scatter – profit vs. COGs for products (animation) (00:05:06)
	Choropleth map – sales by state (00:03:11)	Scatter matrix – profit vs. COGs (00:05:17)
	Heatmap – average margin product by country (00:03:51)	Stacked bar – sales by month and product category (00:03:19)

http://ibm.biz/db2webqueryi or http://ibm.biz/db2wq-230-videos

New Db2 Web Query Editions

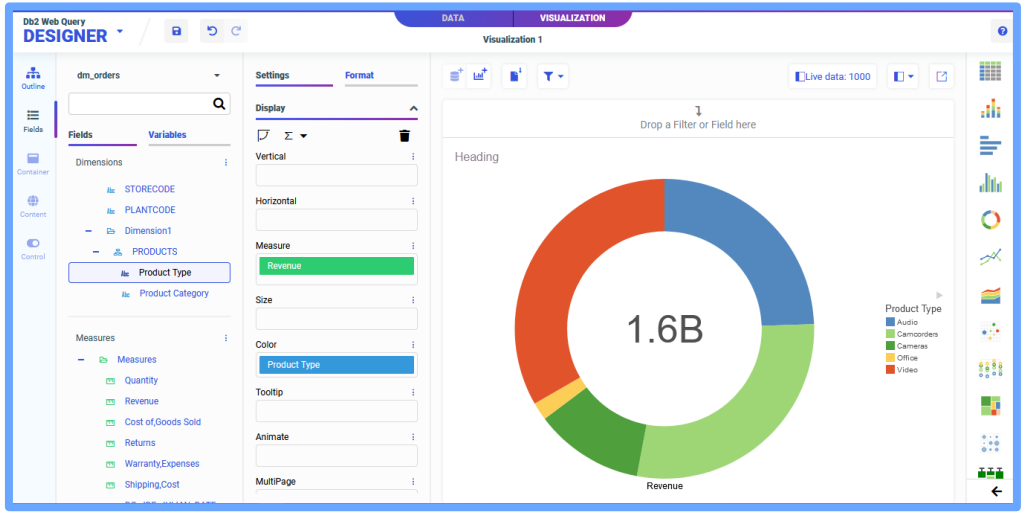
2020 iSight

Db2 Web Query **Scheduler Edition 5733-WQB**

– **Express + Job Scheduling**

– Unlimited report “consumers”

- Distributed via email, FTP, or placed on network drive
- Users can work with data offline
- Support Mobile or At Home Workers



Db2 Web Query **RunTime User Edition 5733-WQR**

– **Express + RunTime Licensing**

– Users can run interactive reports with live data

OVER 50% Savings for 20 user system

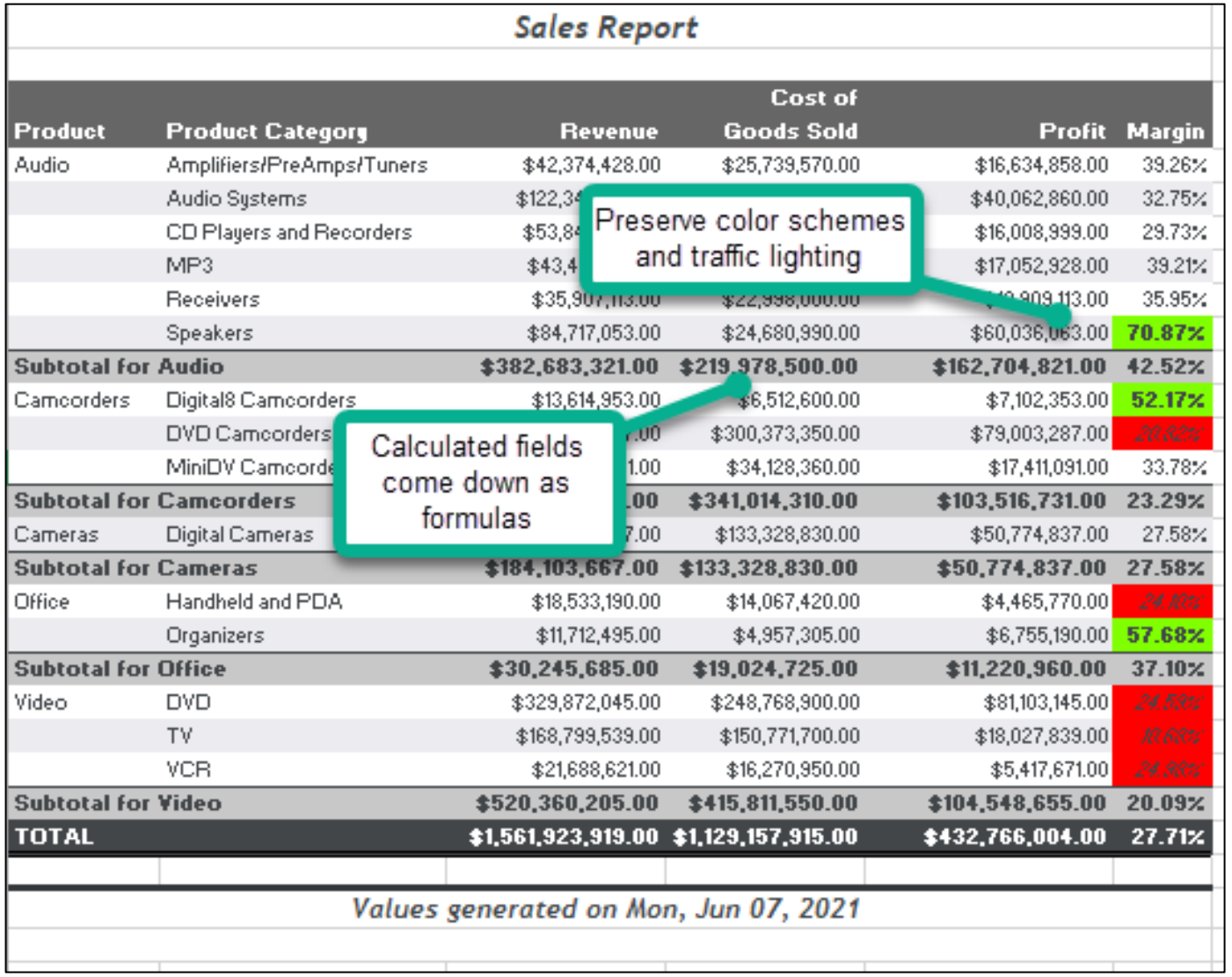
OVER 75% Savings for 50 user system

ibm.biz/db2wq-blog-neweditions

Savings compares adding user licenses to Express vs. Upgrading to new Edition
Calculated using U.S. List Prices and includes SW Maintenance
Assumes you already own Express Edition + 2 user licenses

I am Required to Show This Slide

- Yes, Db2 Web Query Does Excel



Sales Report

Product	Product Category	Revenue	Cost of Goods Sold	Profit	Margin
Audio	Amplifiers/PreAmps/Tuners	$42,374,428.00	$25,739,570.00	$16,634,858.00	39.26%
	Audio Systems	$122,3		$40,062,860.00	32.75%
	CD Players and Recorders	$53,8		$16,008,999.00	29.73%
	MP3	$43,4		$17,052,928.00	39.21%
	Receivers	$35,907,113.00	$22,998,000.00	909,113.00	35.95%
	Speakers	$84,717,053.00	$24,680,990.00	$60,036,063.00	**70.87%**
Subtotal for Audio		**$382,683,321.00**	**$219,978,500.00**	**$162,704,821.00**	**42.52%**
Camcorders	Digital8 Camcorders	$13,614,953.00	$6,512,600.00	$7,102,353.00	**52.17%**
	DVD Camcorders	.00	$300,373,350.00	$79,003,287.00	*20.82%*
	MiniDV Camcorde	1.00	$34,128,360.00	$17,411,091.00	33.78%
Subtotal for Camcorders		**.00**	**$341,014,310.00**	**$103,516,731.00**	**23.29%**
Cameras	Digital Cameras	7.00	$133,328,830.00	$50,774,837.00	27.58%
Subtotal for Cameras		**$184,103,667.00**	**$133,328,830.00**	**$50,774,837.00**	**27.58%**
Office	Handheld and PDA	$18,533,190.00	$14,067,420.00	$4,465,770.00	*24.10%*
	Organizers	$11,712,495.00	$4,957,305.00	$6,755,190.00	**57.68%**
Subtotal for Office		**$30,245,685.00**	**$19,024,725.00**	**$11,220,960.00**	**37.10%**
Video	DVD	$329,872,045.00	$248,768,900.00	$81,103,145.00	*24.59%*
	TV	$168,799,539.00	$150,771,700.00	$18,027,839.00	*10.68%*
	VCR	$21,688,621.00	$16,270,950.00	$5,417,671.00	*24.98%*
Subtotal for Video		**$520,360,205.00**	**$415,811,550.00**	**$104,548,655.00**	**20.09%**
TOTAL		**$1,561,923,919.00**	**$1,129,157,915.00**	**$432,766,004.00**	**27.71%**

Values generated on Mon, Jun 07, 2021

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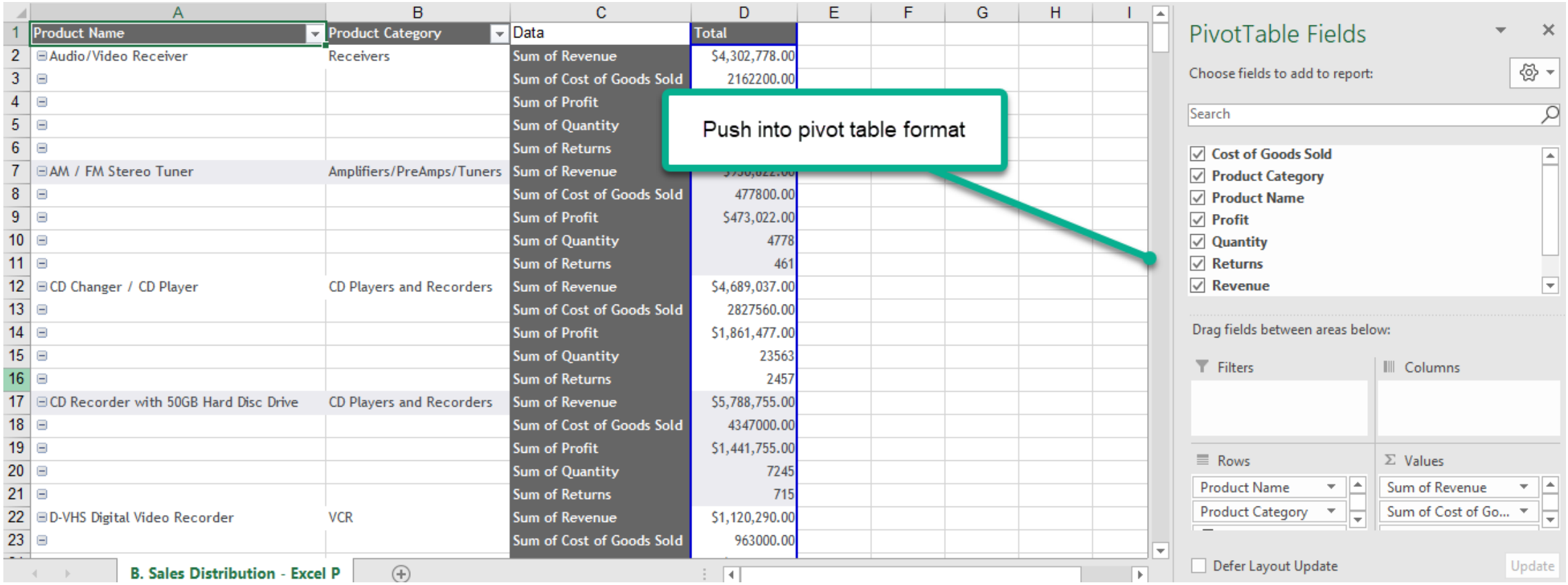
- Yes, Db2 Web Query Does Excel



	A	B	C	D
1	Product Name	Product Category	Data	Total
2	Audio/Video Receiver	Receivers	Sum of Revenue	$4,302,778.00
3			Sum of Cost of Goods Sold	2162200.00
4			Sum of Profit	
5			Sum of Quantity	
6			Sum of Returns	
7	AM / FM Stereo Tuner	Amplifiers/PreAmps/Tuners	Sum of Revenue	
8			Sum of Cost of Goods Sold	477800.00
9			Sum of Profit	$473,022.00
10			Sum of Quantity	4778
11			Sum of Returns	461
12	CD Changer / CD Player	CD Players and Recorders	Sum of Revenue	$4,689,037.00
13			Sum of Cost of Goods Sold	2827560.00
14			Sum of Profit	$1,861,477.00
15			Sum of Quantity	23563
16			Sum of Returns	2457
17	CD Recorder with 50GB Hard Disc Drive	CD Players and Recorders	Sum of Revenue	$5,788,755.00
18			Sum of Cost of Goods Sold	4347000.00
19			Sum of Profit	$1,441,755.00
20			Sum of Quantity	7245
21			Sum of Returns	715
22	D-VHS Digital Video Recorder	VCR	Sum of Revenue	$1,120,290.00
23			Sum of Cost of Goods Sold	963000.00

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- Yes, Db2 Web Query Does Excel

	A	B	C	D	E	F	G
1	Country	Region	Product Type	Product Category	Revenue	Cost of Goods Sold	Quantity
2	Canada	Eastern Canada	Audio	Amplifiers/PreAmps/Tuners	$3,641,071.00	$2,218,820.00	9,429
3				Audio Systems	$13,874,740.00	$9,273,870.00	8,960
4				CD Players and Recorders	$4,862,691.00	$3,444,240.00	7,709
5				MP3	$4,078,820.00	$2,448,510.00	20,800
6				Receivers	$3,325,818.00	$2,145,300.00	7,472
7				Speakers	$7,833,814.00	$2,315,320.00	27,336
8			Camcorders	Digital8 Camcorders	$1,324,991.00	$625,940.00	5,419
9				DVD Camcorders	$38,773,168.00	$30,594,150.00	26,222
10				MiniDV Camcorders	$5,137,588.00	$3,390,510.00	5,302
11			Cameras	Digital Cameras	$18,378,011.00	$13,264,700.00	36,519
12			Office	Handheld and PDA	$1,491,653.00	$1,136,220.00	4,947
13				Organizers	$942,073.00	$395,360.00	16,817
14			Video	DVD		923,450.00	31,108
15				TV		247,900.00	4,654
16				VCR		467,150.00	6,001
17		Western Canada	Audio	Amplifiers/PreAmp		371,520.00	3,626
18				Audio Systems		327,440.00	796
19				CD Players and Re		525,240.00	1,137
20				MP3	$703,068.00	$373,900.00	4,002
21				Receivers	$536,107.00	$335,350.00	1,533
22				Speakers	$1,630,259.00	$465,280.00	5,151

Organize Data Into Tabs

Canada | France | Germany | Spain | United States

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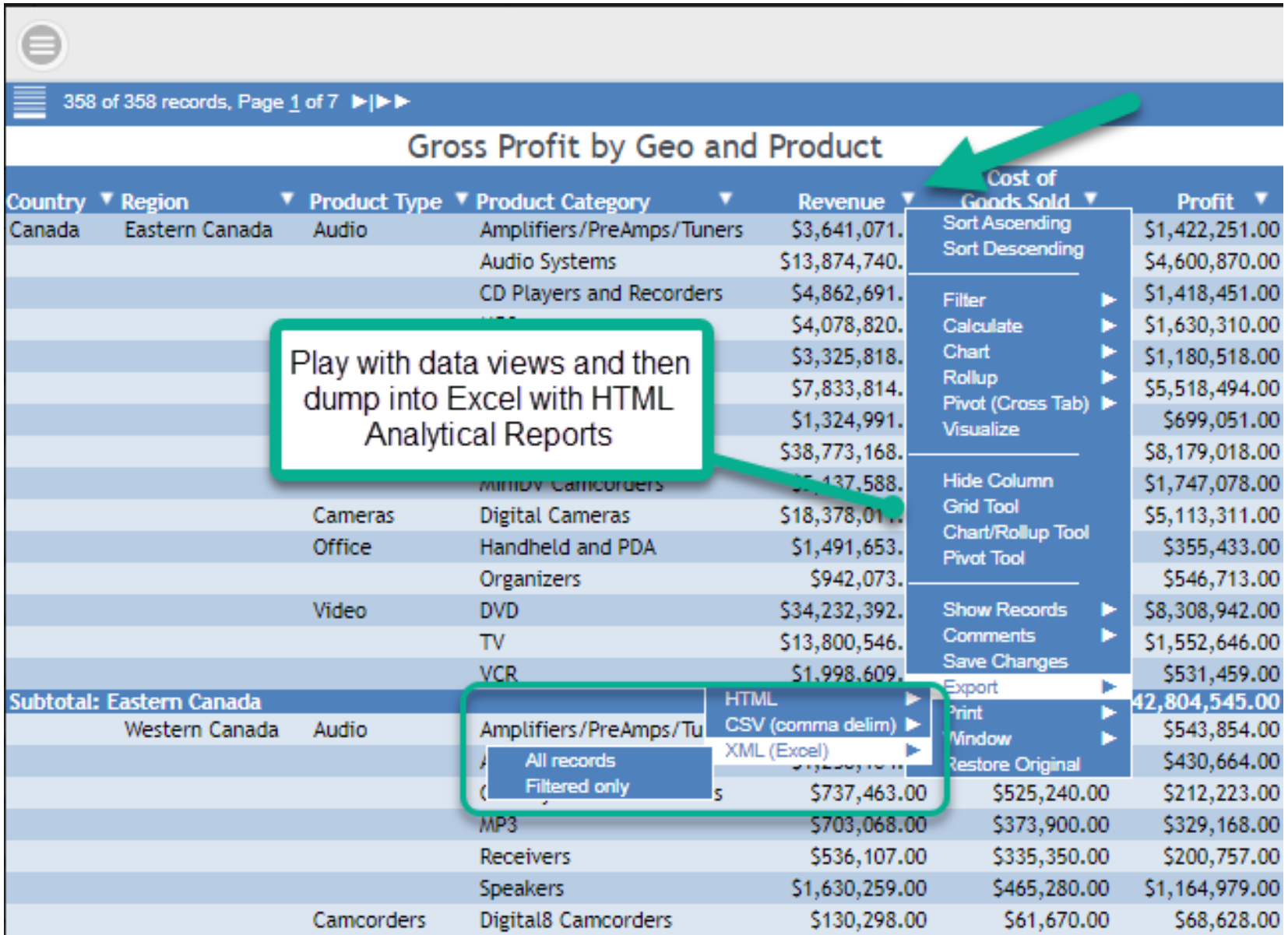

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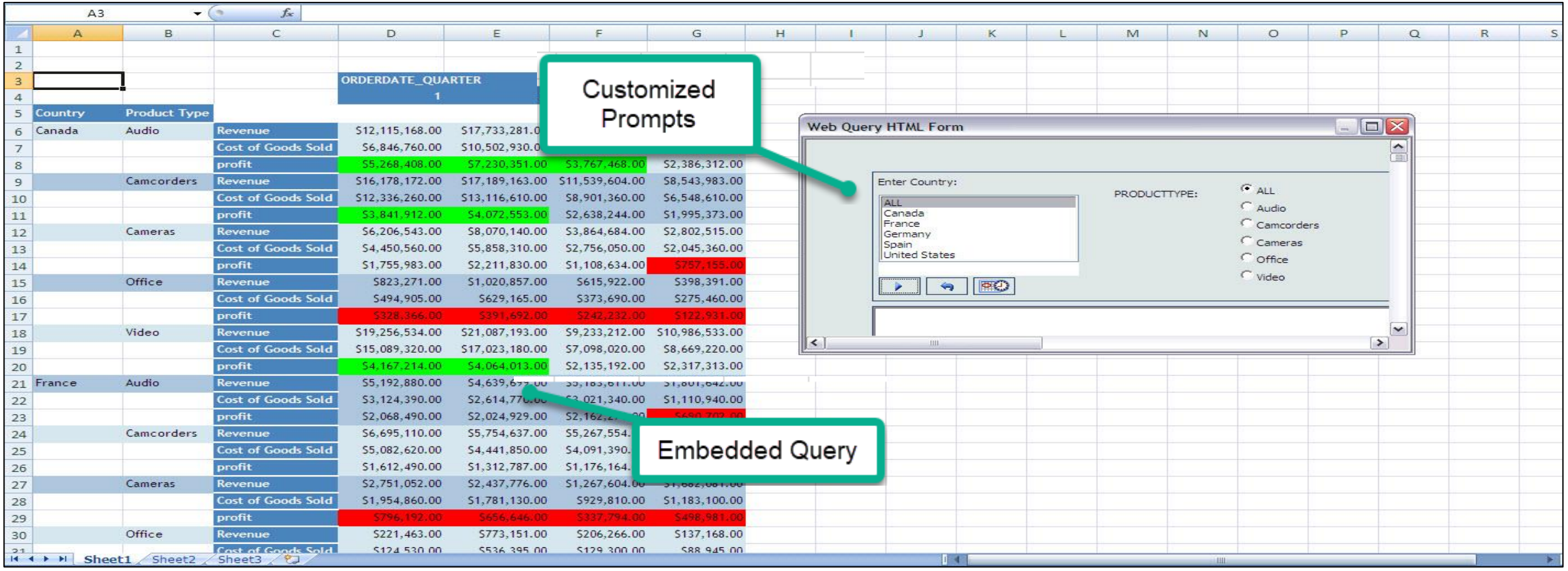
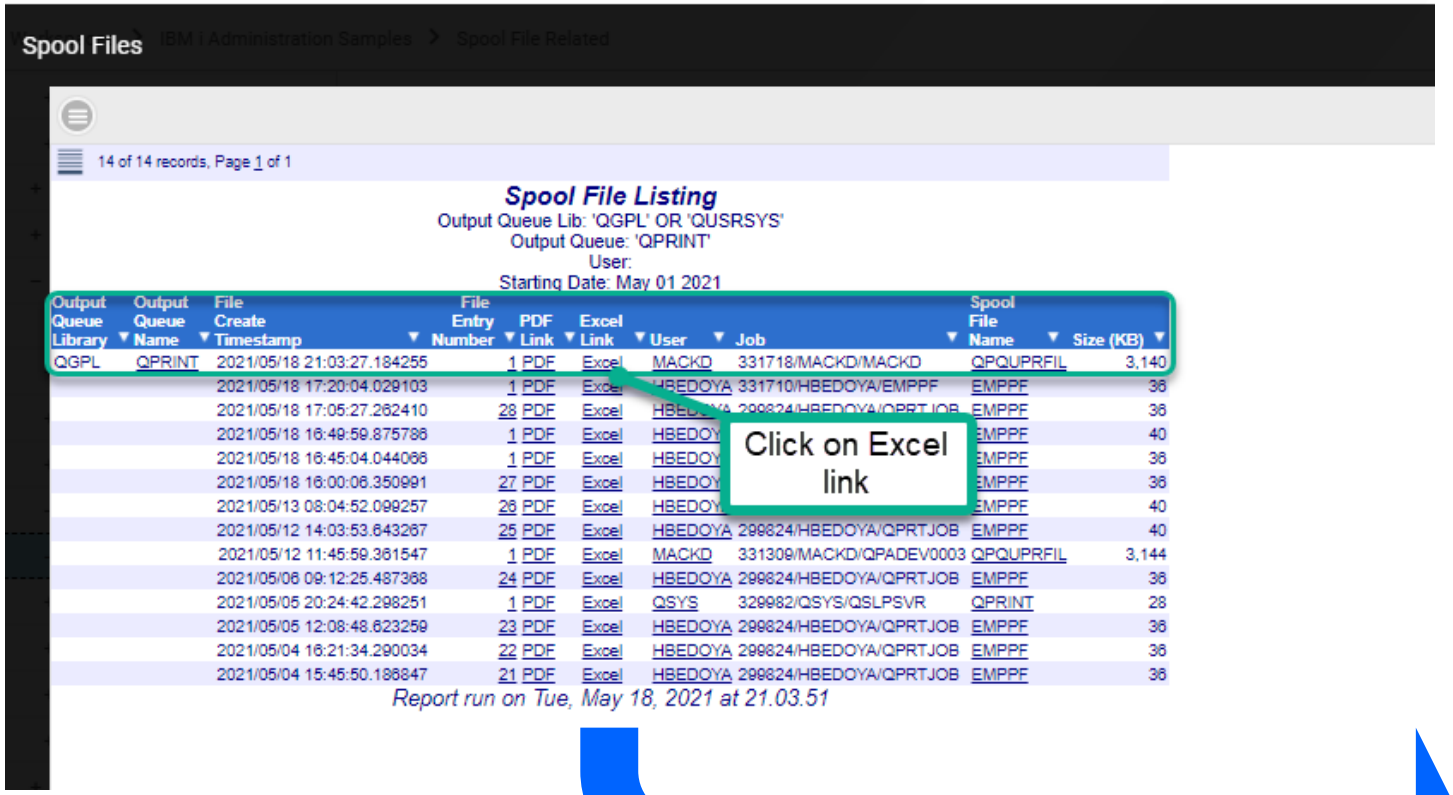


I’m not required to show this but I thought I would anyway

- Run Spool Files report to generate list of spooled files based on selection criteria



	A	B	C	D	E	F	G
1	5/18/2021	21:03:27					PAGE 1
2	Order	Order	Requested	Actual	Receive	Price	Cost
3	Number	Date	Ship Date	Ship Date	Date		
4	54390	12/29/2021	2/8/2022	4/23/2022	4/28/2022	199	100
5	54390	12/29/2021	3/29/2022	3/28/2022	4/13/2022	129	40
6	54390	12/29/2021	2/1/2022	2/17/2022	2/27/2022	199	150
7	54390	12/29/2021	2/13/2022	2/23/2022	3/24/2022	399	300
8	54390	12/29/2021	4/4/2022	4/1/2022	4/27/2022	899	750
9	54510	12/29/2021	2/19/2022	5/3/2022	5/30/2022	199	100
10	54510	12/29/2021	1/30/2022	4/14/2022	5/2/2022	129	60
11	54510	12/29/2021	3/22/2022	3/19/2022	4/6/2022	189	100
12	54510	12/29/2021	2/14/2022	2/5/2022	2/25/2022	279	150
13	54510	12/29/2021	2/12/2022	3/2/2022	3/8/2022	329	250
14	54510	12/29/2021	2/15/2022	2/23/2022	3/19/2022	459	350

Agenda

2020 iSight

- Concept of Meta Data (“Synonyms”)
  - Auto Generation Facilities
- To SQL or not to SQL
  - Examples
    - Olap
    - IBM i Services
- Automated Insights

Synonyms Describe (and simplify) the Data Source

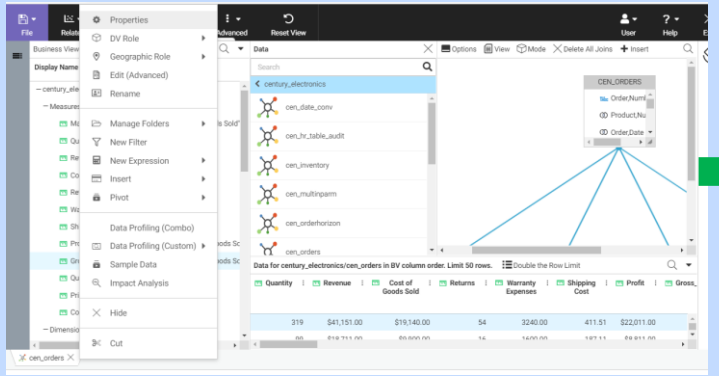
IBM i Anywhere
IBM i Everywhere

Data Sources

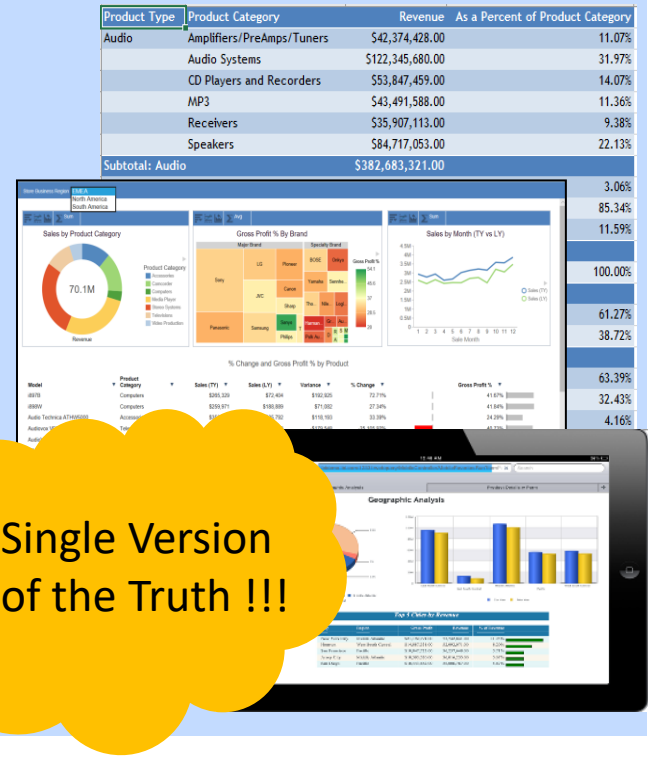
- Db2 for i Files/Tables
- Query/400 Definitions
- Log Files (Journal Receivers)
  - Mostly for ETL purposes
- **Db2 or RPG Stored Procedures**
- **Db2 SQL Views**
- **SQL Statements**
  - **EZ-Report makes this v… EASY**
- Non Db2 Databases
  - Postgres, MySQL, S… Oracle, et.al.
- **IBM i Services**

Report Writer Productivity

Simplified Data Perspective
"Meta data"



SYNONYMS



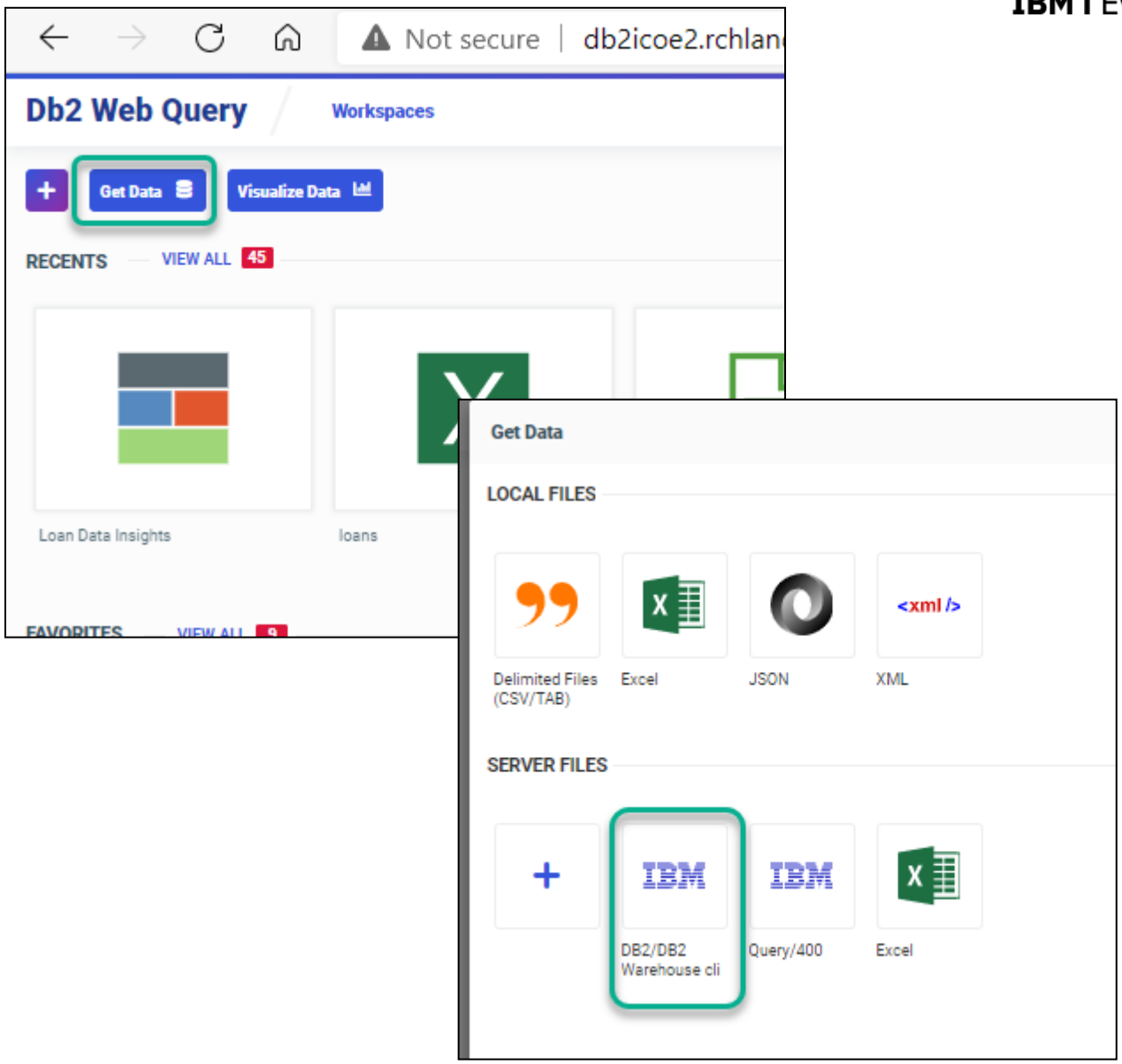
Product Type	Product Category	Revenue	As a Percent of Product Category
Audio	Amplifiers/PreAmps/Tuners	$42,374,428.00	11.07%
	Audio Systems	$122,345,680.00	31.97%
	CD Players and Recorders	$53,847,459.00	14.07%
	MP3	$43,491,588.00	11.36%
	Receivers	$35,907,113.00	9.38%
	Speakers	$84,717,053.00	22.13%
Subtotal: Audio		$382,683,321.00	

Single Version of the Truth !!!

AND ALL ON IBM i

Building a Synonym

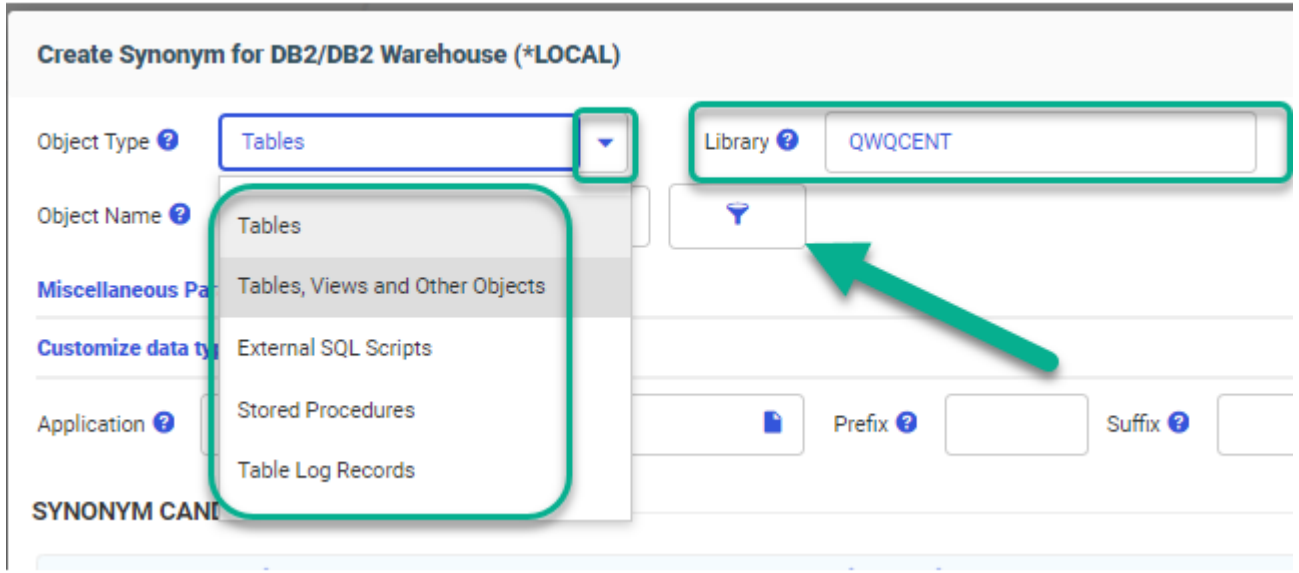
- Get Data to create a new Synonym
- Choose Db2/Db2 Warehouse Adapter



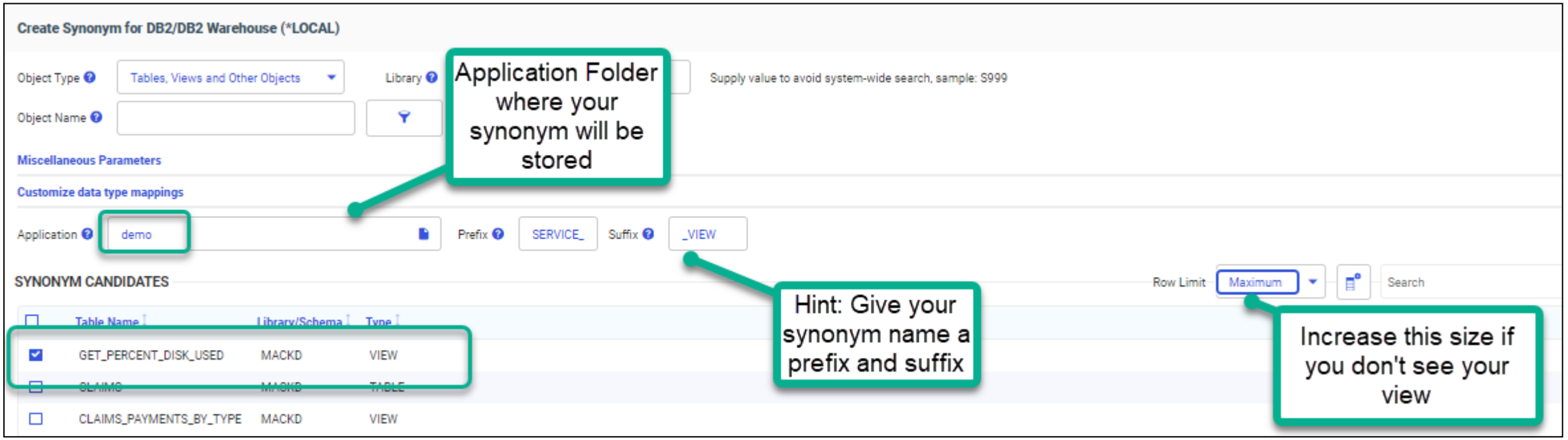
Building a Synonym from Scratch

- Choose *LOCAL for Db2 database in the same partition/server where Db2 Web Query is installed
  - Note you can also choose remote server adapters to access remote databases

- Use the Object Type Drop down to select your source
  - **Tables, Views, and Other Objects**
  - **Uploaded SQL Script File**
    - Note: I'm not going to cover this option because you now have EZ-Report to auto generate synonym and report
  - **Stored Procedure**
    - HINT: When you create a synonym over a stored procedure, you MUST enter valid values for the INPUT fields during creation

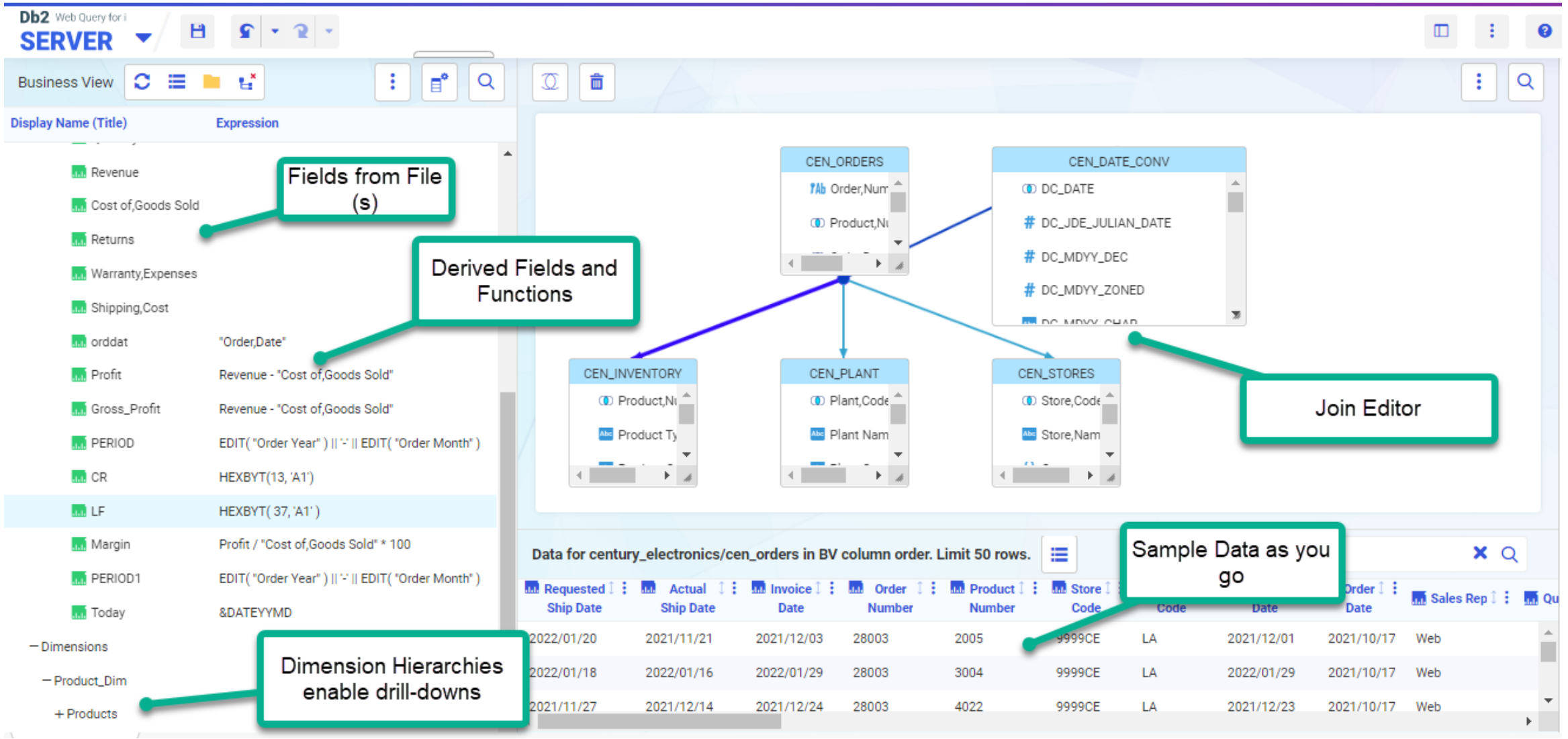


Building a Synonym from Scratch



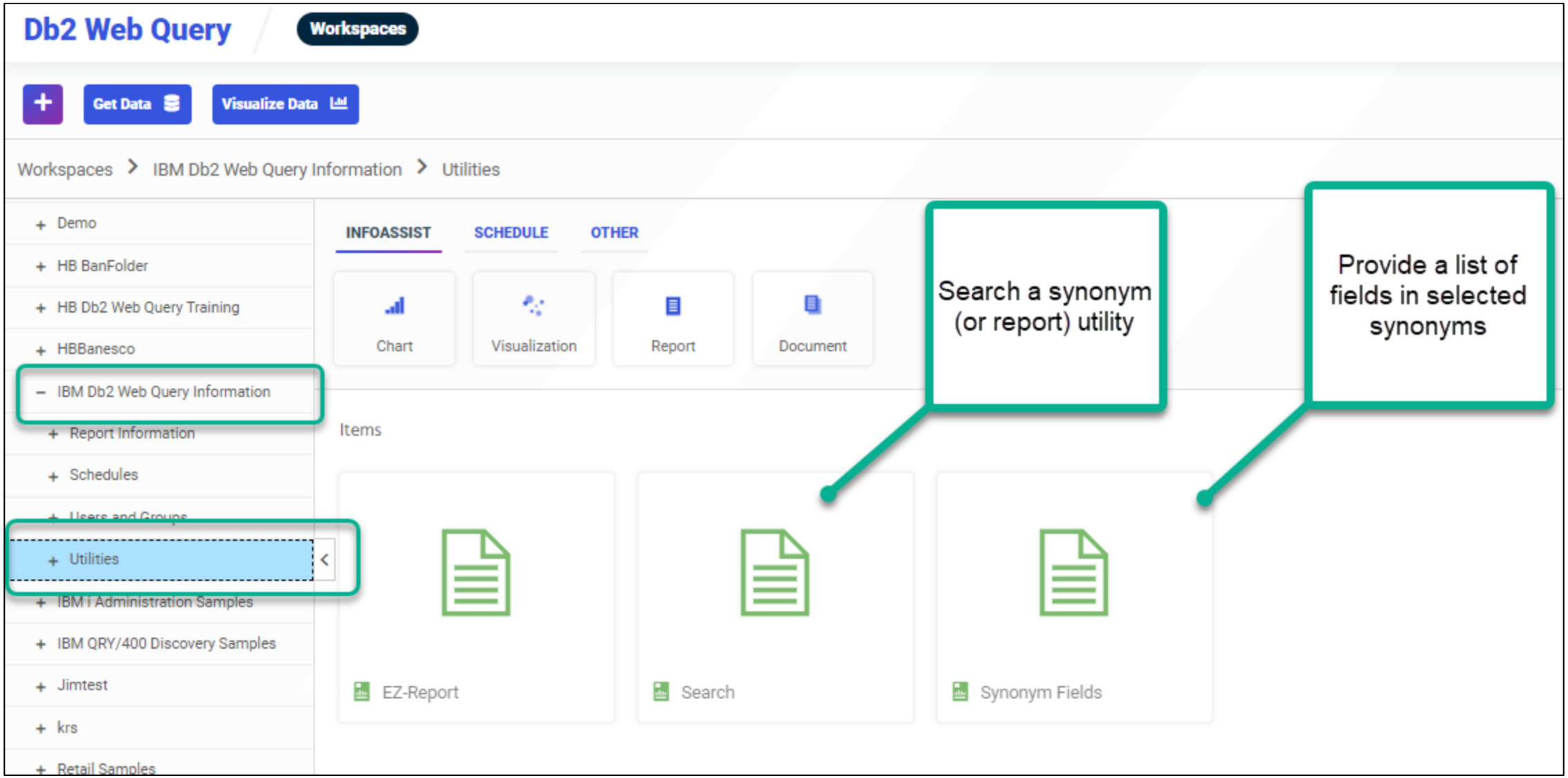
- Make (multiple?) Selections, click on ADD
- Creating a synonym over a bunch of files is a very short exercise, but then…..you might want to
  - Create file relationships (joins, dimensions)
  - Format fields (add Euro/Pound sign to monetary fields)
  - Deal with those pesky LEGACY Date Fields (join to a date dimension table)
  - Create Derived (calculated) Fields using Express Builder and Built-in (or Db2 SQL) FUNCTIONS

Building a Synonym from Scratch



Building a Synonym from Scratch

- Use SYNONYM REPORT and SEARCH function to aid report authors in knowing how to point to the appropriate data source representation



Auto Generation Facilities in Db2 Web Query

- Query/400 Import function using Query/400 Adapter
  - Auto generates a synonym AND a report from one or more Query/400 Definitions
  - MODERNIZE – enhance the report and/or synonym

- Spreadsheet Upload
  - Auto generates a synonym after uploading Excel data into Db2 table (stored in web query's REPOSITORY)
    - Enhance the synonym (maybe JOIN to your production files represented by another synonym)

- **Automated Insights**
  - Generates a handful of charts providing correlations, outliers and time-series analysis
  - More on this later ☺

- **EZ-Report**
  - Generates a synonym and a report from an SQL statement (or over a file)
  - More on this later ☺

To SQL, or Not to SQL

Monday, February 19, 2018

To SQL or not to SQL - with Db2 Web Query

Sometimes I find myself talking out of both sides of my mouth when discussing Db2 Web Query capabilities. The term is related to contradicting yourself – maybe saying one thing to one person, and another, opposite thing to another.

While certainly not trying to deceive anyone, the association with Db2 Web Query is about whether you need to be an SQL programmer to use it. The short answer is, ABSOLUTELY NOT. However, out the other side of my mouth, I have to say, it certainly can be an advantage if you do know SQL!

Db2 Web Query provides a graphical interface to building reports, dashboards, and BI applications. With the metadata interface simplifying the database structures for report authors, the graphical interface is easily used by those other than programmers and database experts. The "Business Analyst" is a classic power user of Db2 Web Query, building reports from scratch and never having to code at an SQL or RPG level to accomplish their goals – because under the covers Db2 Web Query generates the necessary code to access the data and provide the report logic, formatting, etc.

While we strongly discourage you from editing any of that code, you can see what is generated by right clicking on a report or chart and choosing (if you have authority) to open ***with text editor.*** The code probably won't make any sense to you, and you definitely DO NOT want to edit anything there as it might mess up the execution of the report. The code is stored in IBM i in something we call the repository.

Many people have asked the Db2 Web Query team if you can write your own, or leverage existing SQL code in a report. So out the other side of my mouth I say "Absolutely!" Reports, charts, and dashboards can contain data from many different data sources. Db2 file/tables are the most obvious data source, but did you know you can also leverage existing Query/400 definitions, SQL Views, SQL (or any HLL) stored procedures, Db2 functions (including user defined functions), and uploaded SQL

Links

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About Me

Doug Mack

Doug Mack leads the Analytics team within the DB2 for i Lab Services group. The broader DB2

http://db2webqueryi.blogspot.com/2018/02/to-sql-or-not-to-sql-with-db2-web-query.html

Synonyms Over SQL Objects Can be Very Useful

- You want to leverage already existing SQL objects that cobble together data
  - Note you could also build a synonym over an (“externalized”) RPG Program

- Not all Db2 Join options are supported in a Synonym
  - Exception Joins, UNIONS
    - **New news:** Unions aren’t supported in a synonym, but are supported in a new “data flow” object!

- Dealing with Multiple Member Files
  - Use SQL Aliases

- Data Wrangling is required and more efficient in SQL
  - When a report is run you need to do a lot of data processing like what you might do with RPG and use of temp or work files or with a CHAINED (multiple pass) Query/400 report
  - You want to consolidate data from multiple systems into a single report

- Complex data relationship requirements are easier using advanced SQL Functions
  - Use of Advanced SQL to pre-process data
    - OLAP, Hierarchical queries, Common Table Expressions, Pivoting Data

Pushing the work to Db2 will always be more efficient

Example #1

- Human Resources Request for Salary Comparison Report
  - By department, give me every employee's salary, and comparisons to the employees with the closest two salaries but under theirs, and the closest two above theirs
    - Include the values and % difference

Salary Comparison Report

WORKDEPT	EMPNO	SALARY	Next Salary Above	Plus One Difference	Plus One Percentage	Second Salary Above	Plus Two Difference	Plus Two Percentage	Next Salary Below	Minus One Difference	Minus One Percentage	Second Salary Below	Minus Two Difference	Minus Two Percentage
A00	000120	29250.00	29250.00	.00	.00%	46500.00	-17,250.00	-58.97%	N/A	.00	.00%	N/A	.00	.00
	200120	29250.00	46500.00	-17,250.00	-58.97%	46500.00	-17,250.00	-58.97%	29250.00	.00	.00%	N/A	.00	.00
	000110	46500.00	46500.00	.00	.00%	52750.00	-6,250.00	-13.44%	29250.00	17,250.00	37.10%	29250.00	17,250.00	37.10
	200010	46500.00	52750.00	-6,250.00	-13.44%	N/A	.00	100.00%	46500.00	.00	.00%	29250.00	17,250.00	37.10
	000010	52750.00	N/A	.00	100.00%	N/A	.00	100.00%	46500.00	6,250.00	11.85%	46500.00	6,250.00	11.85
B01	000020	41250.00	N/A	.00	100.00%	N/A	.00	100.00%	N/A	.00	.00%	N/A	.00	.00
C01	000130	23800.00	28420.00	-4,620.00	-19.41%	28420.00	-4,620.00	-19.41%	N/A	.00	.00%	N/A	.00	.00
	000140	28420.00	28420.00	.00	.00%	38250.00	-9,830.00	-34.59%	23800.00	4,620.00	16.26%	N/A	.00	.00
	200140	28420.00	38250.00	-9,830.00	-34.59%	N/A	.00	100.00%	28420.00	.00	.00%	23800.00	4,620.00	16.26
	000030	38250.00	N/A	.00	100.00%	N/A	.00	100.00%	28420.00	9,830.00	25.70%	28420.00	9,830.00	25.70
D11	000210	18270.00	20450.00	-2,180.00	-11.93%	21340.00	-3,070.00	-16.80%	N/A	.00	.00%	N/A	.00	.00
	000190	20450.00	21340.00	-890.00	-4.35%	22250.00	-1,800.00	-8.80%	18270.00	2,180.00	10.66%	N/A	.00	.00
	000180	21340.00	22250.00	-910.00	-4.26%	24680.00	-3,340.00	-15.65%	20450.00	890.00	4.17%	18270.00	3,070.00	14.39
	000160	22250.00	24680.00	-2,430.00	-10.92%	24680.00	-2,430.00	-10.92%	21340.00	910.00	4.09%	20450.00	1,800.00	8.09
	000170	24680.00	24680.00	.00	.00%	25280.00	-600.00	-2.43%	22250.00	2,430.00	9.85%	21340.00	3,340.00	13.53
	200170	24680.00	25280.00	-600.00	-2.43%	27740.00	-3,060.00	-12.40%	24680.00	.00	.00%	22250.00	2,430.00	9.85
	000150	25280.00	27740.00	-2,460.00	-9.73%	29840.00	-4,560.00	-18.04%	24680.00	600.00	2.37%	24680.00	600.00	2.37
	000200	27740.00	29840.00	-2,100.00	-7.57%	29840.00	-2,100.00	-7.57%	25280.00	2,460.00	8.87%	24680.00	3,060.00	11.03
	000220	29840.00	29840.00	.00	.00%	32250.00	-2,410.00	-8.08%	27740.00	2,100.00	7.04%	25280.00	4,560.00	15.28
	200220	29840.00	32250.00	-2,410.00	-8.08%	N/A	.00	100.00%	29840.00	.00	.00%	27740.00	2,100.00	7.04
	000060	32250.00	N/A	.00	100.00%	N/A	.00	100.00%	29840.00	2,410.00	7.47%	29840.00	2,410.00	7.47
D21	000260	17250.00	19180.00	-1,930.00	-11.19%	22180.00	-4,930.00	-28.58%	N/A	.00	.00%	N/A	.00	.00
	000250	19180.00	22180.00	-3,000.00	-15.64%	27380.00	-8,200.00	-42.75%	17250.00	1,930.00	10.06%	N/A	.00	.00
	000230	22180.00	27380.00	-5,200.00	-23.44%	28760.00	-6,580.00	-29.67%	19180.00	3,000.00	13.53%	17250.00	4,930.00	22.23
	000270	27380.00	28760.00	-1,380.00	-5.04%	28760.00	-1,380.00	-5.04%	22180.00	5,200.00	18.99%	19180.00	8,200.00	29.95
	000240	28760.00	28760.00	.00	.00%	36170.00	-7,410.00	-25.76%	27380.00	1,380.00	4.80%	22180.00	6,580.00	22.88
	200240	28760.00	36170.00	-7,410.00	-25.76%	N/A	.00	100.00%	28760.00	.00	.00%	27380.00	1,380.00	4.80
	000070	36170.00	N/A	.00	100.00%	N/A	.00	100.00%	28760.00	7,410.00	20.49%	28760.00	7,410.00	20.49
E01	000050	40175.00	N/A	.00	100.00%	N/A	.00	100.00%	N/A	.00	.00%	N/A	.00	.00
E11	000290	15340.00	15900.00	-560.00	-3.65%	15900.00	-560.00	-3.65%	N/A	.00	.00%	N/A	.00	.00

Example

- Db2 for i OLAP Functions to the Rescue!

C:\Users\DouglasMack\Documents\SQL Scripts\COMMON SPRING 2021\create laglead vew.sql* - Run SQL Scripts - db2icoe2.rchland.ibm.com

File Edit Search View Connection Run Explain Monitor Tools Help

```
1  SELECT      WORKDEPT, EMPNO, SALARY,
2         LEAD(SALARY, 1) OVER (PARTITION BY WORKDEPT
3                               ORDER BY SALARY) as LEAD_SALARY_1,
4         LEAD(SALARY, 2) OVER (PARTITION BY WORKDEPT
5                 ORDER BY SALARY) as LEAD_SALARY_2,
6         LAG(SALARY, 1)  OVER (PARTITION BY WORKDEPT
7                 ORDER BY SALARY) as LAG_SALARY_1,
8         LAG(SALARY, 2)  OVER (PARTITION BY WORKDEPT
9                 ORDER BY SALARY) as LAG_SALARY_2
10 FROM        SAMPLEDB.EMPLOYEE;
11
12
13
```

WORKDEPT	EMPNO	SALARY	LEAD_SALARY_1	LEAD_SALARY_2	LAG_SALARY_1	LAG_SALARY_2
A00	000120	29250.00	29250.00	46500.00	-	-
A00	200120	29250.00	46500.00	46500.00	29250.00	-
A00	000110	46500.00	46500.00	52750.00	29250.00	29250.00
A00	200010	46500.00	52750.00	-	46500.00	29250.00
A00	000010	52750.00	-	-	46500.00	46500.00
B01	000020	41250.00	-	-	-	-
C01	000130	23800.00	28420.00	28420.00	-	-
C01	000140	28420.00	28420.00	38250.00	23800.00	-
C01	200140	28420.00	38250.00	-	28420.00	23800.00
C01	000030	38250.00	-	-	28420.00	28420.00
D11	000210	18270.00	20450.00	21340.00	-	-
D11	000190	20450.00	21340.00	22250.00	18270.00	-
D11	000180	21340.00	22250.00	24680.00	20450.00	18270.00
D11	000160	22250.00	24680.00	24680.00	21340.00	20450.00
D11	000170	24680.00	24680.00	25280.00	22250.00	21340.00
D11	200170	24680.00	25280.00	27740.00	24680.00	22250.00
D11	000150	25280.00	27740.00	29840.00	24680.00	24680.00
D11	000200	27740.00	29840.00	29840.00	25280.00	24680.00

LEAD(SALARY, 1) OVER (PARTITION BY WORKDEPT
ORDER BY SALARY) as LEAD_SALARY_1,

LAG(SALARY, 1) OVER (PARTITION BY WORKDEPT
ORDER BY SALARY) as LAG_SALARY_1

Example

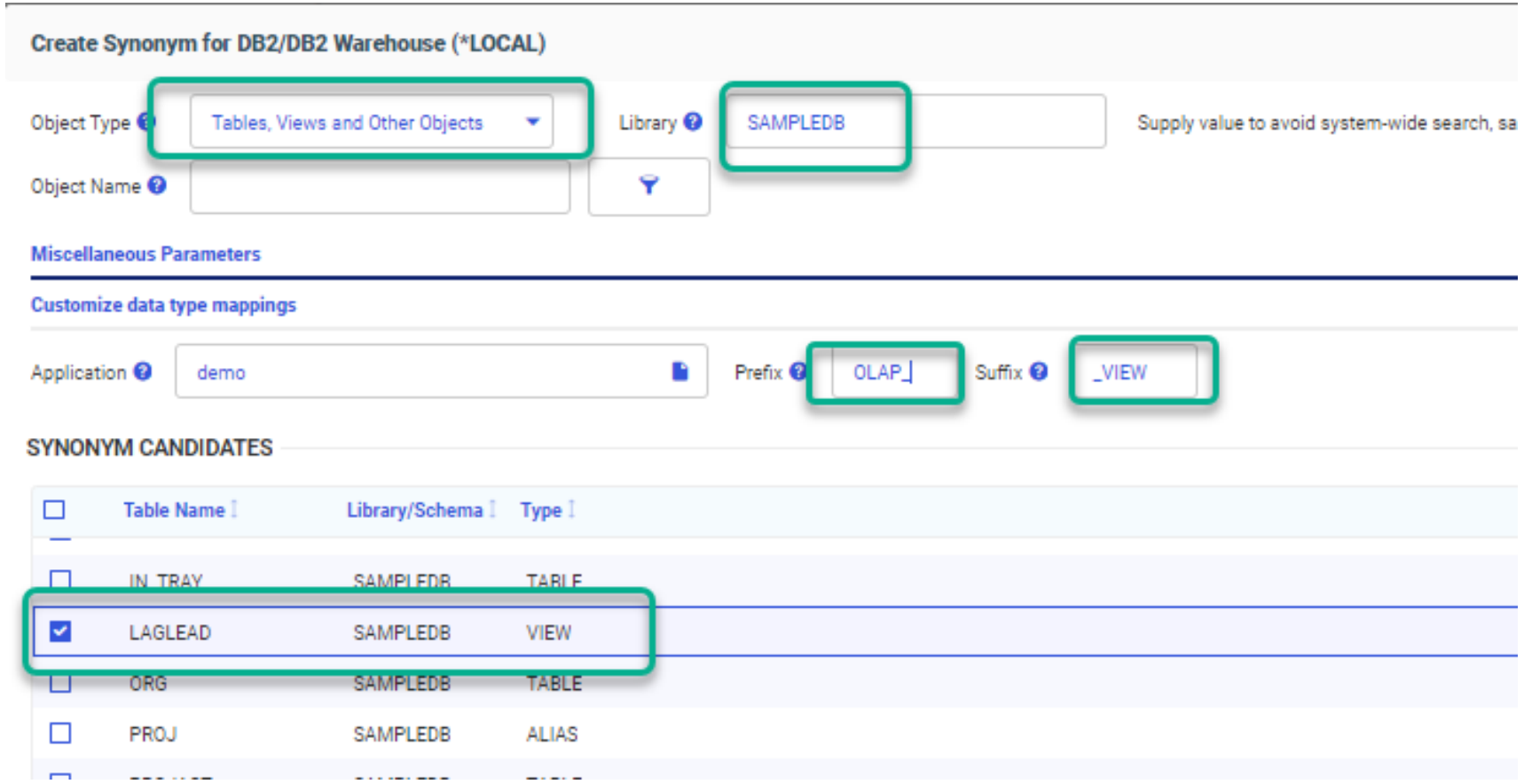
- Create (and test) a VIEW Object over your SQL

```
CREATE VIEW SAMPLEDB.LAGLEAD (
            WORKDEPT ,
            EMPNO,
            SALARY ,
            LEAD_SALARY_1,
            LEAD_SALARY_2,
            LAG_SALARY_1,
            LAG_SALARY_2  )
            AS
             SELECT                 WORKDEPT, EMPNO, SALARY,
                        LEAD(SALARY, 1)       OVER (PARTITION BY WORKDEPT
                                              ORDER BY SALARY) as LEAD_SALARY_1,
                        LEAD(SALARY, 2)       OVER (PARTITION BY WORKDEPT
                                              ORDER BY SALARY) as LEAD_SALARY_2,
                        LAG(SALARY, 1)        OVER (PARTITION BY WORKDEPT
                                              ORDER BY SALARY) as LAG_SALARY_1,
                        LAG(SALARY, 2)        OVER (PARTITION BY WORKDEPT
                                              ORDER BY SALARY) as LAG_SALARY_2
FROM                    SAMPLEDB.EMPLOYEE

            RCDFMT LAGLEAD     ;
```

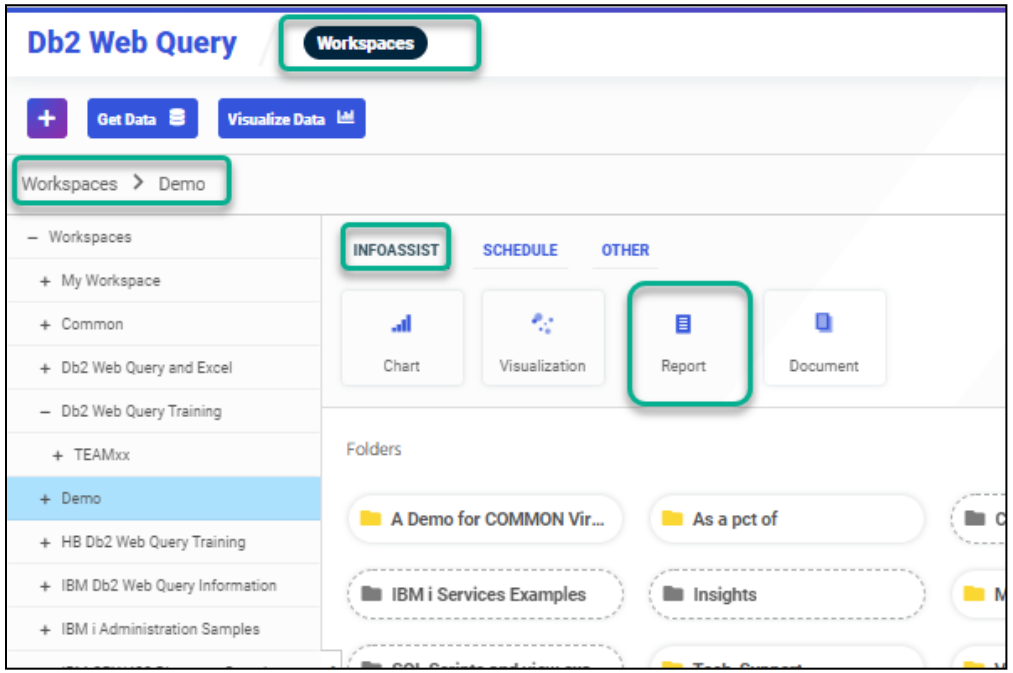
Example

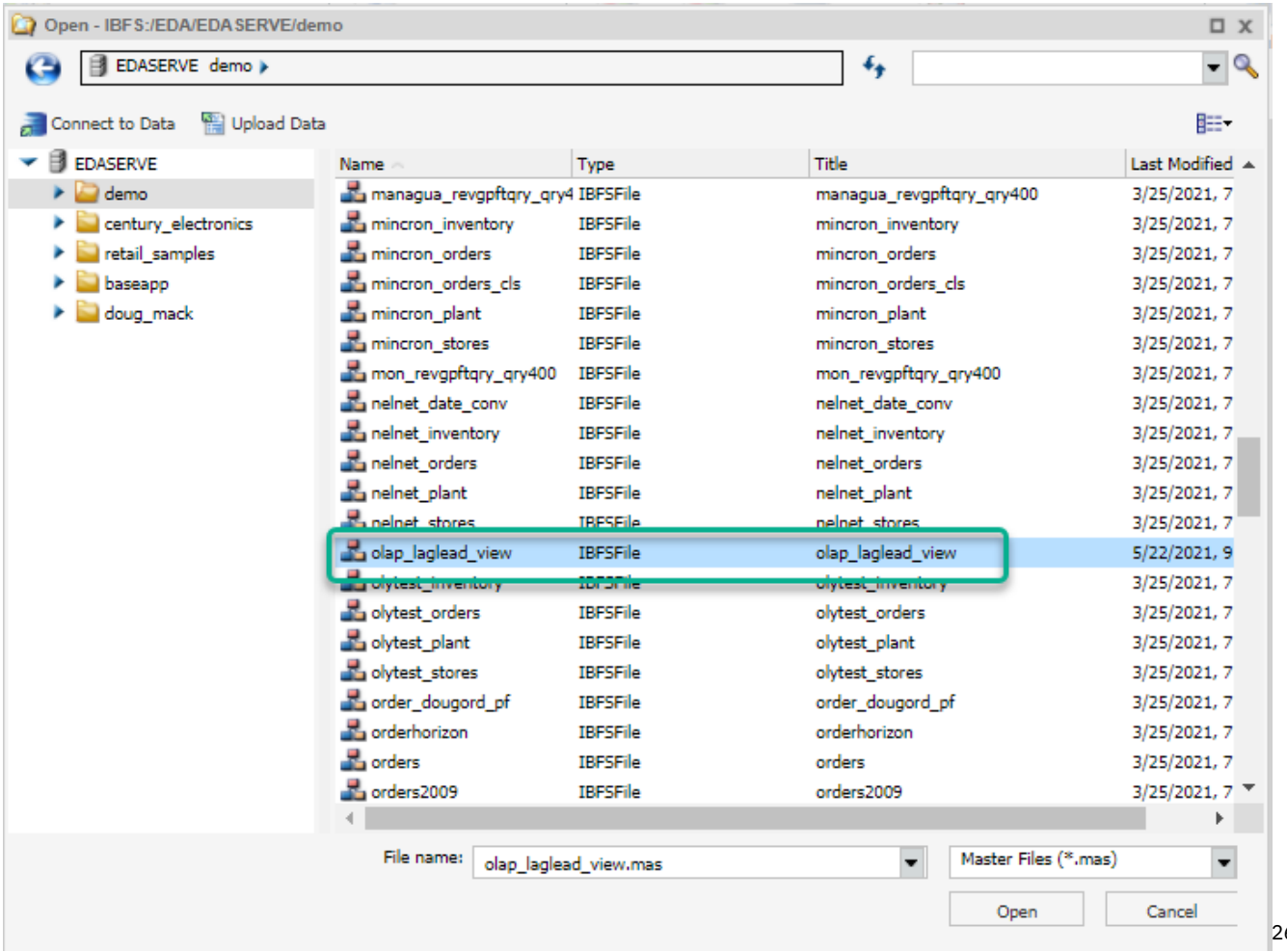
- Create Synonym over View



Example

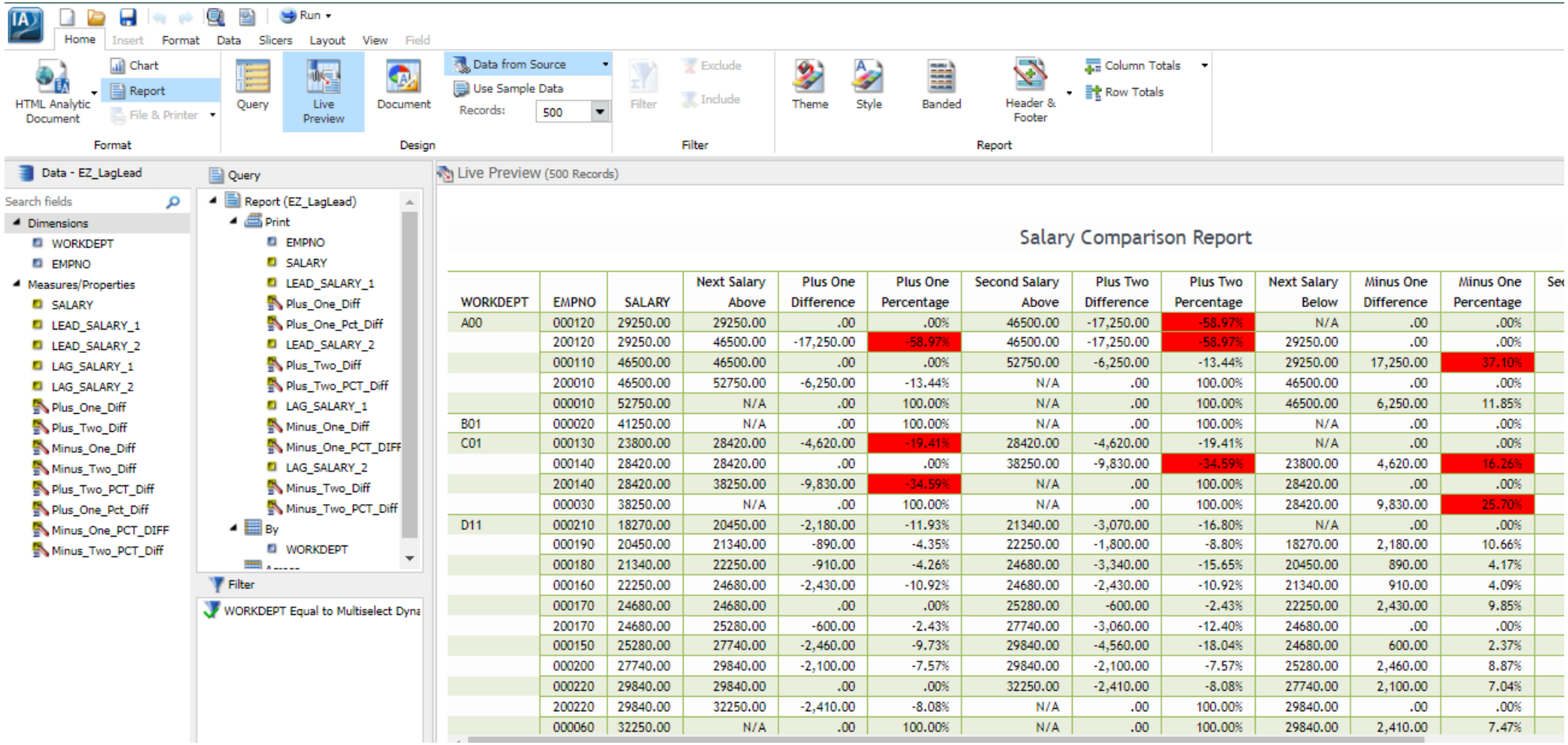
- Create InfoAssist Report
  - Choose your new Synonym





Example

- Enhance the Data Provided by the View
  - Add “differences” values and % differences with Expression Builder
  - Add Traffic Lighting
  - Schedule the report to run every Month and route to HR Management
    - Burst the report so Dept Managers only see THEIR Department



WORKDEPT	EMPNO	SALARY	Next Salary Above	Plus One Difference	Plus One Percentage	Second Salary Above	Plus Two Difference	Plus Two Percentage	Next Salary Below	Minus One Difference	Minus One Percentage	Se
A00	000120	29250.00	29250.00	.00	.00%	46500.00	-17,250.00	-58.97%	N/A	.00	.00%	
	200120	29250.00	46500.00	-17,250.00	-58.97%	46500.00	-17,250.00	-58.97%	29250.00	.00	.00%	
	000110	46500.00	46500.00	.00	.00%	52750.00	-6,250.00	-13.44%	29250.00	17,250.00	37.10%	
	200010	46500.00	52750.00	-6,250.00	-13.44%	N/A	.00	100.00%	46500.00	.00	.00%	
	000010	52750.00	N/A	.00	100.00%	N/A	.00	100.00%	46500.00	6,250.00	11.85%	
B01	000020	41250.00	N/A	.00	100.00%	N/A	.00	100.00%	N/A	.00	.00%	
C01	000130	23800.00	28420.00	-4,620.00	-19.41%	28420.00	-4,620.00	-19.41%	N/A	.00	.00%	
	000140	28420.00	28420.00	.00	.00%	38250.00	-9,830.00	-34.59%	23800.00	4,620.00	16.26%	
	200140	28420.00	38250.00	-9,830.00	-34.59%	N/A	.00	100.00%	28420.00	.00	.00%	
	000030	38250.00	N/A	.00	100.00%	N/A	.00	100.00%	28420.00	9,830.00	25.70%	
D11	000210	18270.00	20450.00	-2,180.00	-11.93%	21340.00	-3,070.00	-16.80%	N/A	.00	.00%	
	000190	20450.00	21340.00	-890.00	-4.35%	22250.00	-1,800.00	-8.80%	18270.00	2,180.00	10.66%	
	000180	21340.00	22250.00	-910.00	-4.26%	24680.00	-3,340.00	-15.65%	20450.00	890.00	4.17%	
	000160	22250.00	24680.00	-2,430.00	-10.92%	24680.00	-2,430.00	-10.92%	21340.00	910.00	4.09%	
	000170	24680.00	24680.00	.00	.00%	25280.00	-600.00	-2.43%	22250.00	2,430.00	9.85%	
	200170	24680.00	25280.00	-600.00	-2.43%	27740.00	-3,060.00	-12.40%	24680.00	.00	.00%	
	000150	25280.00	27740.00	-2,460.00	-9.73%	29840.00	-4,560.00	-18.04%	24680.00	600.00	2.37%	
	000200	27740.00	29840.00	-2,100.00	-7.57%	29840.00	-2,100.00	-7.57%	25280.00	2,460.00	8.87%	
	000220	29840.00	29840.00	.00	.00%	32250.00	-2,410.00	-8.08%	27740.00	2,100.00	7.04%	
	200220	29840.00	32250.00	-2,410.00	-8.08%	N/A	.00	100.00%	29840.00	.00	.00%	
	000060	32250.00	N/A	.00	100.00%	N/A	.00	100.00%	29840.00	2,410.00	7.47%	

EZ-Report: Auto Generate Report (and Synonym) from SQL

IBM i Anywhere
IBM i Everywhere

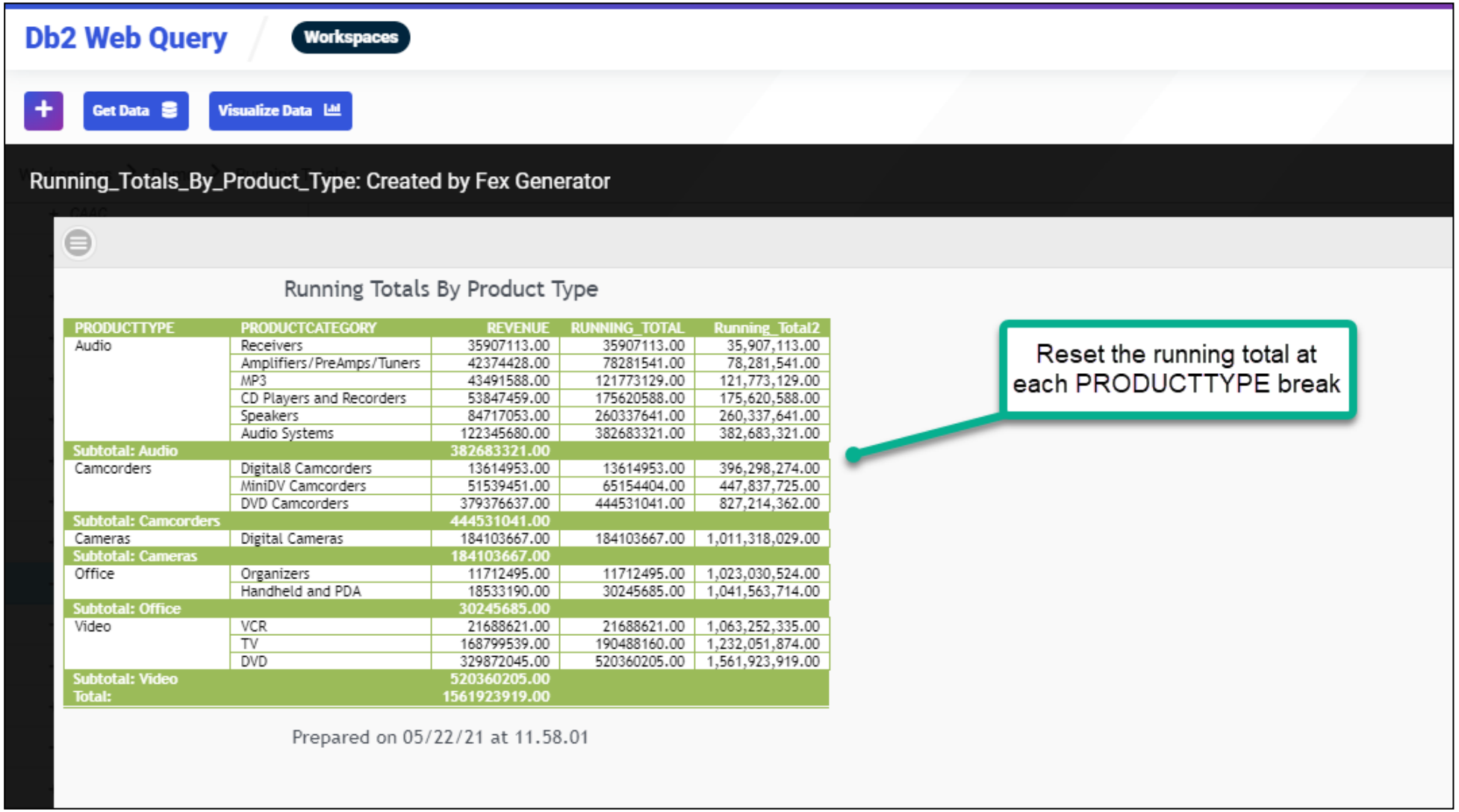
- Use Cases
  - Fast report over a Table/File
  - Fast report over IBM i Services
  - **Fast report over any SQL Statement**
  - Fast report over Security Compliance Tool “Consolidate Remote Files”
  - Conversion Tools

- What does it do?
  - Auto creates a synonym (meta data) over the data source
  - Auto creates a “fex” object (I.e., a report) in the folder you specify
  - Run report as is, or modify

- Need to be at Version 2.2.1 PTF Group Level 9 or 10 or Version 2.3.0 Level 1

Example #2

- Requirement is for a RUNNING TOTAL report but with one catch - you need to reset that running total at each Product Type break point. I.e., you want to see running totals WITHIN the Product Type aggregations



PRODUCTTYPE	PRODUCTCATEGORY	REVENUE	RUNNING_TOTAL	Running_Total2
Audio	Receivers	35907113.00	35907113.00	35,907,113.00
	Amplifiers/PreAmps/Tuners	42374428.00	78281541.00	78,281,541.00
	MP3	43491588.00	121773129.00	121,773,129.00
	CD Players and Recorders	53847459.00	175620588.00	175,620,588.00
	Speakers	84717053.00	260337641.00	260,337,641.00
	Audio Systems	122345680.00	382683321.00	382,683,321.00
Subtotal: Audio		**382683321.00**		
Camcorders	Digital8 Camcorders	13614953.00	13614953.00	396,298,274.00
	MiniDV Camcorders	51539451.00	65154404.00	447,837,725.00
	DVD Camcorders	379376637.00	444531041.00	827,214,362.00
Subtotal: Camcorders		**444531041.00**		
Cameras	Digital Cameras	184103667.00	184103667.00	1,011,318,029.00
Subtotal: Cameras		**184103667.00**		
Office	Organizers	11712495.00	11712495.00	1,023,030,524.00
	Handheld and PDA	18533190.00	30245685.00	1,041,563,714.00
Subtotal: Office		**30245685.00**		
Video	VCR	21688621.00	21688621.00	1,063,252,335.00
	TV	168799539.00	190488160.00	1,232,051,874.00
	DVD	329872045.00	520360205.00	1,561,923,919.00
Subtotal: Video		**520360205.00**		
Total:		**1561923919.00**		

Simple SQL with Sub-Select Should Do the Trick!


```
SELECT d1.PRODUCTTYPE, d1.PRODUCTCATEGORY, d1.REVENUE, SUM(d1.REVENUE)
OVER(PARTITION BY PRODUCTTYPE ORDER BY d1.REVENUE ASC) as running_total

FROM

(SELECT PRODUCTTYPE, PRODUCTCATEGORY, SUM(LINETOTAL) as revenue
    FROM QWQCENT.INVENTORY T1 INNER JOIN QWQCENT.ORDERS T2
    ON T1.PRODUCTNUMBER = T2.PRODUCTNUMBER
    GROUP BY PRODUCTTYPE,PRODUCTCATEGORY
    ORDER BY PRODUCTTYPE,PRODUCTCATEGORY) d1

    ORDER BY PRODUCTTYPE, REVENUE;
```

Final Selection

Sub-Select

Simple SQL with Sub-Select Should Do the Trick!

Test in ACS

COPY the SQL Statement

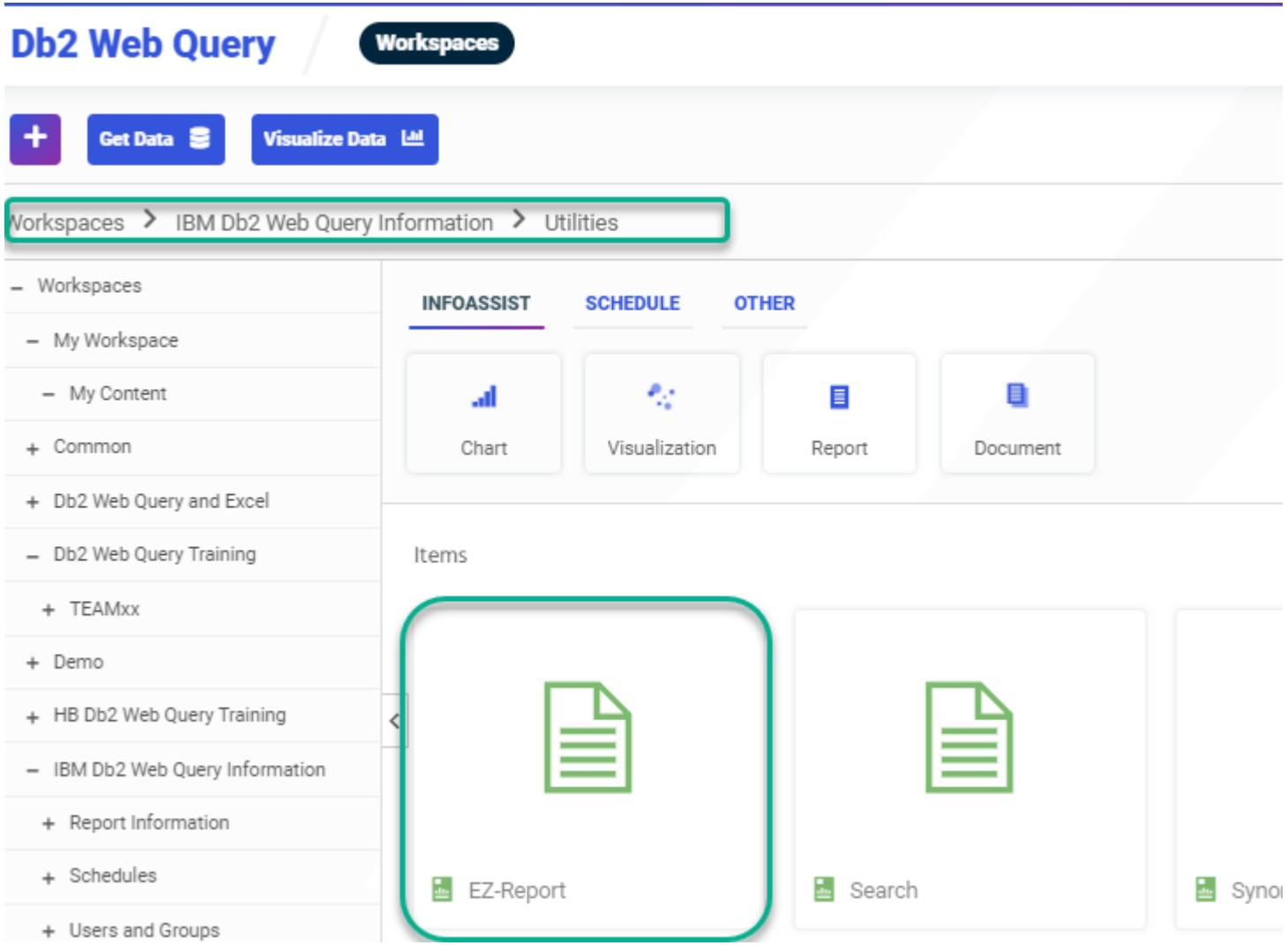
```
1  SELECT dl.deptno, dl.empcount
2    FROM (SELECT workdept as deptno, COUNT(*) as empcount
3                 FROM sampledb.employee GROUP BY workdept) dl;
4
5  SELECT dl.PRODUCTTYPE, dl.PRODUCTCATEGORY, dl.REVENUE, SUM(dl.REVENUE)
6  OVER(PARTITION BY PRODUCTTYPE ORDER BY dl.REVENUE ASC) as running_total
7   FROM (SELECT PRODUCTTYPE, PRODUCTCATEGORY, SUM(LINETOTAL) as revenue
8       FROM QWQCENT.INVENTORY T1 INNER JOIN QWQCENT.ORDERS T2
9       ON T1.PRODUCTNUMBER = T2.PRODUCTNUMBER
10      GROUP BY PRODUCTTYPE,PRODUCTCATEGORY
11      ORDER BY PRODUCTTYPE,PRODUCTCATEGORY) dl
12      ORDER BY PRODUCTTYPE, REVENUE;
13
14
```

Product Type PRODUCTTYPE	Product Category PRODUCTCATEGORY	REVENUE	RUNNING_TOTAL
Audio	Receivers	7113.00	35907113.00
Audio	Amplifiers/PreAm	4428.00	78281541.00
Audio	MP3	43491588.00	121773129.00
Audio	CD Players and Recorders	53447459.00	175620588.00
Audio	Speakers	84717053.00	260337641.00
Audio	Audio Systems	122345680.00	382683321.00
Camcorders	Digital8 Camcorders	13614953.00	13614953.00
Camcorders	MiniDV Camcorders	51539451.00	65154404.00

Note the reset!

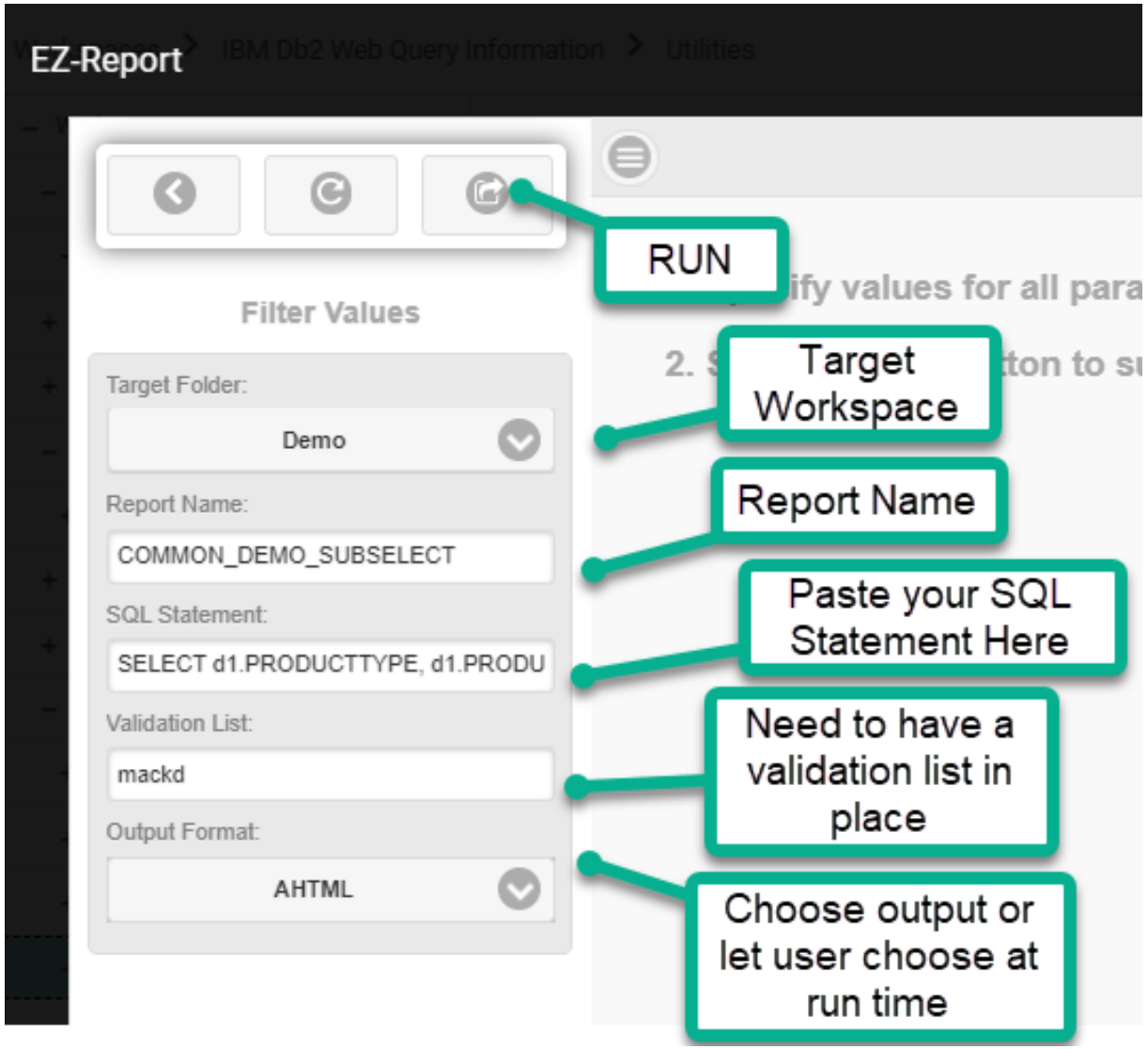
EZ-Report

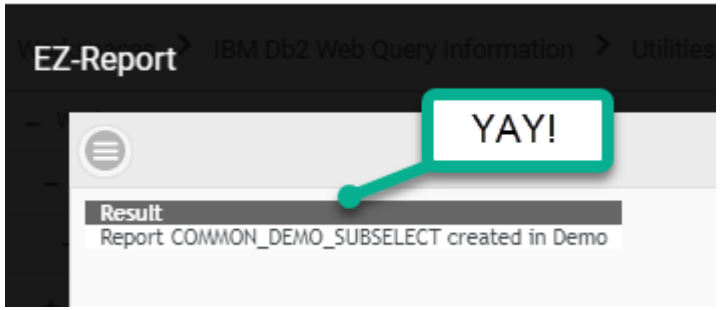
- In Web Query, navigate to IBM Db2 Web Query Information Workspace, Utilities sub-folder
- Double Click on EZ-Report



EZ-Report

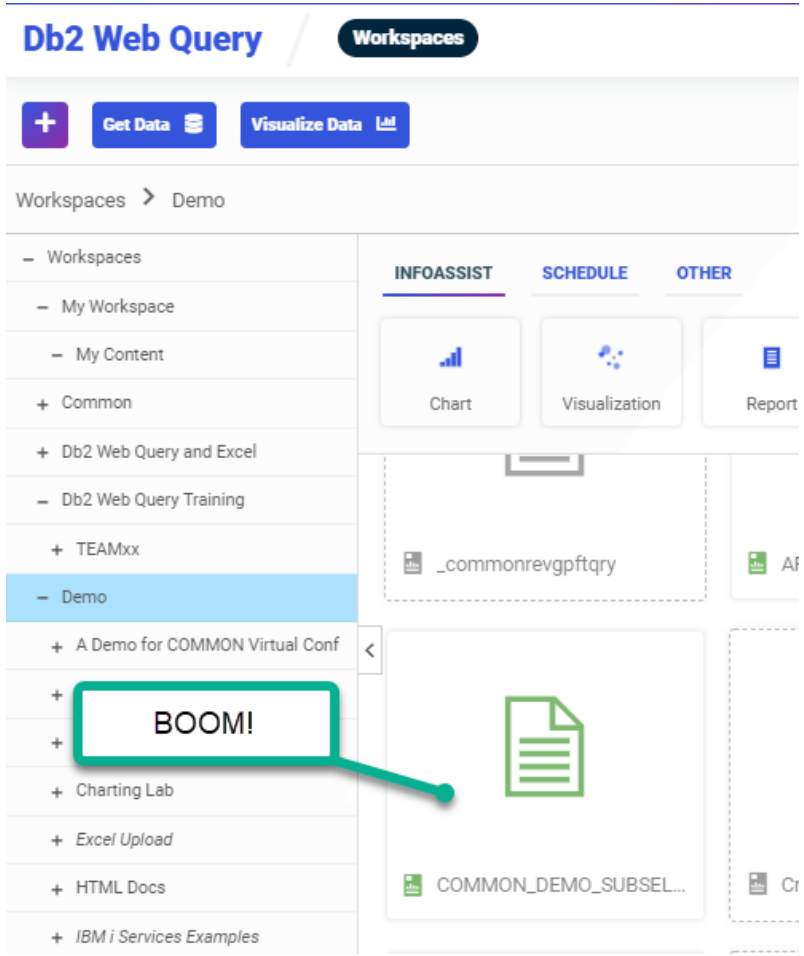
- HINT: Validation List stores an encrypted userid/PW that is required by EZ-Report
- RUN Button will auto generate a Synonym AND a report!





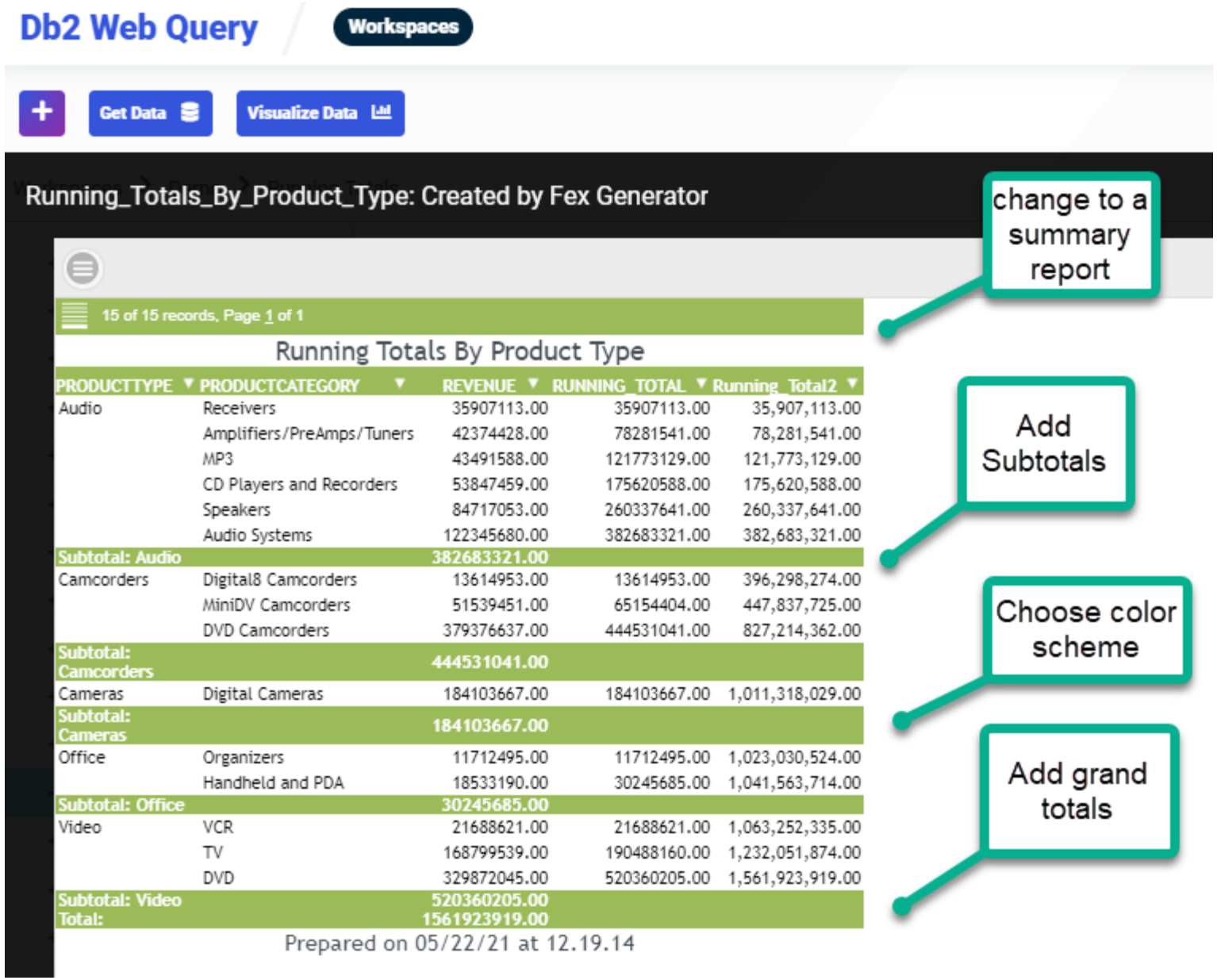
EZ-Report

- Right Click to Edit Report



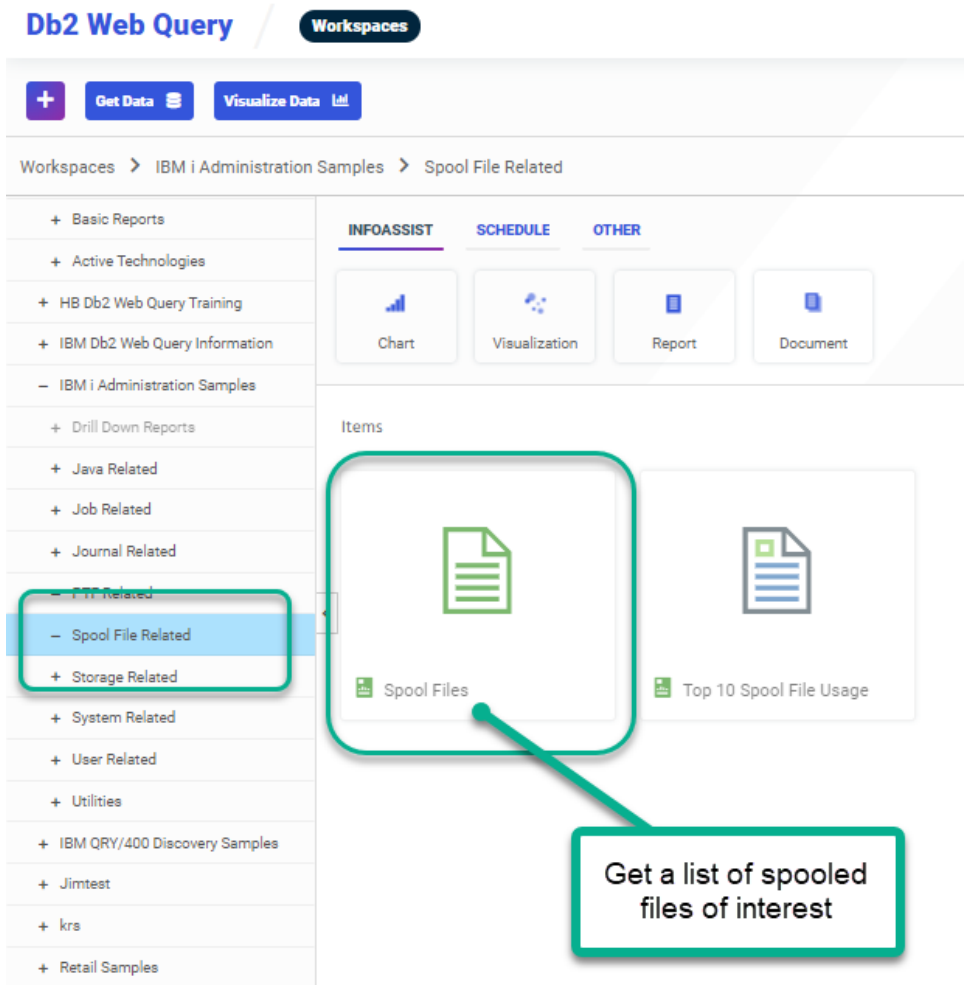
Examples

- You Might Want to
  - Tailor the Header/Footer
  - Change the Color Scheme
  - Add GRAND and SUB TOTALS
  - Create a PROMPT for Product Type selection
  - Schedule the Report to Run on a Regular Basis creating a spreadsheet and sending out via email
  - See EZ-Install InfoAssist TUTORIAL



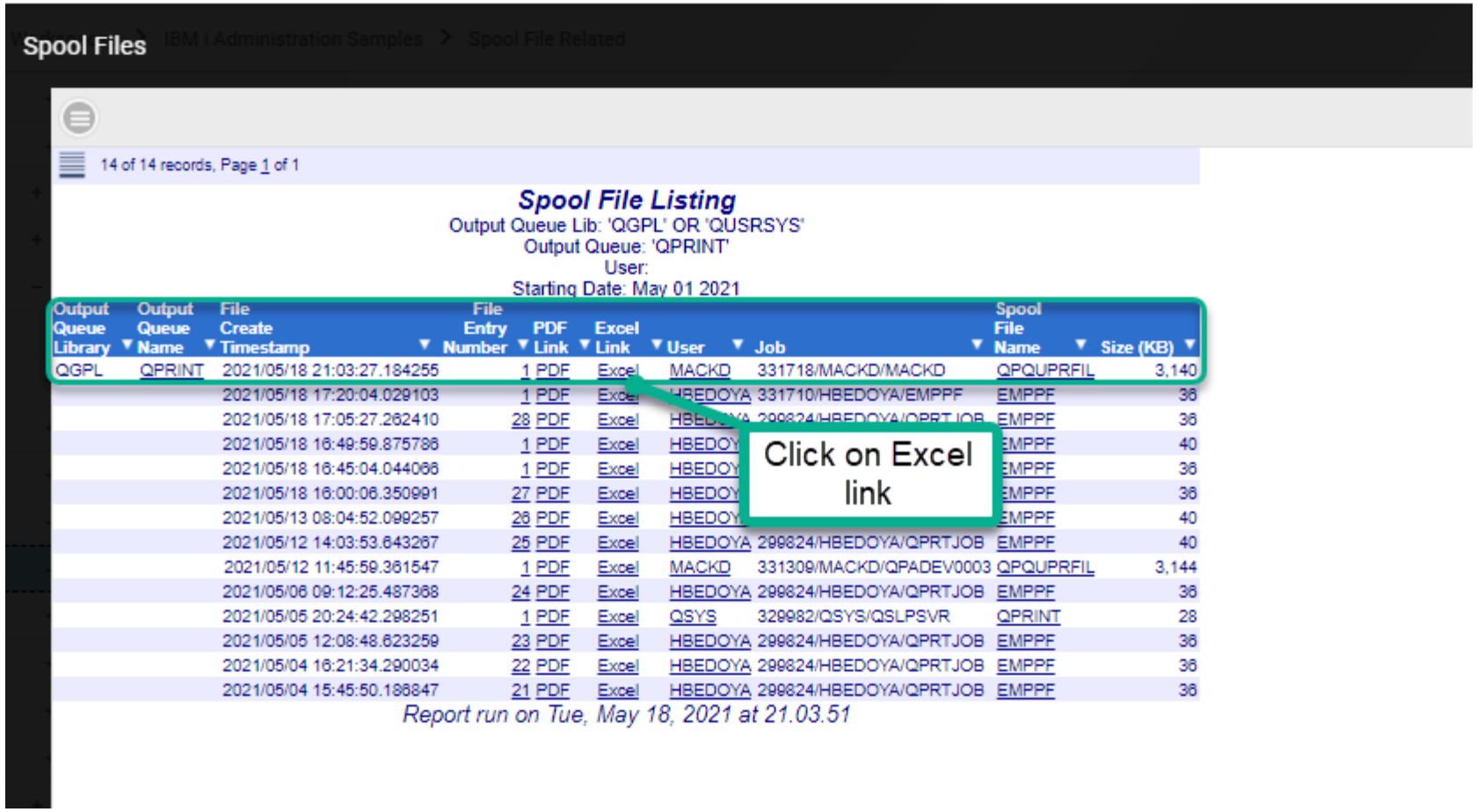
Spool File Related

- Run Spool Files report to generate list of spooled files based on selection criteria



Spool File Related

- Run Spool Files report to generate list of spooled files based on selection criteria



Spool File Related

IBM i Anywhere
IBM i Everywhere

- Run Spool Files report to generate list of spooled files based on selection criteria

	A
1	05/18/21 21:03:27
	PAGE 1
2	Order Order Requested Actual Receive Price
3	Number Date Ship Date Ship Date Date Cost
4	54390 2021-12-29 2022-02-08 2022-04-23 2022-04-28 199.00
	100.00
5	54390 2021-12-29 2022-03-29 2022-03-28 2022-04-13 129.00
	40.00
6	54390 2021-12-29 2022-02-01 2022-02-17 2022-02-27 199.00
	150.00
7	54390 2021-12-29 2022-02-13 2022-02-23 2022-03-24 399.00
	300.00
8	54390 2021-12-29 2022-04-04 2022-04-01 2022-04-27 899.00
	750.00
9	54510 2021-12-29 2022-02-19 2022-05-03 2022-05-30 199.00
	100.00
10	54510 2021-12-29 2022-01-30 2022-04-14 2022-05-02 129.00
	60.00
11	54510 2021-12-29 2022-03-22 2022-03-19 2022-04-06 189.00
	100.00
12	54510 2021-12-29 2022-02-14 2022-02-05 2022-02-25 279.00
	150.00
13	54510 2021-12-29 2022-02-12 2022-03-02 2022-03-08 329.00
	250.00
14	54510 2021-12-29 2022-02-15 2022-02-23 2022-03-19 459.00
	350.00
	54510 2021-12-29 2022-03-21 2022-03-19 2022-03-24 199.00

Display Spool File - Excel

Text to Data to column-ize the data

	A	B	C	D	E	F	G
1	5/18/2021	21:03:27					PAGE 1
2	Order	Order	Requested	Actual	Receive	Price	Cost
3	Number	Date	Ship Date	Ship Date	Date		
4	54390	12/29/2021	2/8/2022	4/23/2022	4/28/2022	199	100
5	54390	12/29/2021	3/29/2022	3/28/2022	4/13/2022	129	40
6	54390	12/29/2021	2/1/2022	2/17/2022	2/27/2022	199	150
7	54390	12/29/2021	2/13/2022	2/23/2022	3/24/2022	399	300
8	54390	12/29/2021	4/4/2022	4/1/2022	4/27/2022	899	750
9	54510	12/29/2021	2/19/2022	5/3/2022	5/30/2022	199	100
10	54510	12/29/2021	1/30/2022	4/14/2022	5/2/2022	129	60
11	54510	12/29/2021	3/22/2022	3/19/2022	4/6/2022	189	100
12	54510	12/29/2021	2/14/2022	2/5/2022	2/25/2022	279	150
13	54510	12/29/2021	2/12/2022	3/2/2022	3/8/2022	329	250
14	54510	12/29/2021	2/15/2022	2/23/2022	3/19/2022	459	350

How Was This Done?

- Services and SYSTOOLS are shipped as VIEWS, Stored Procedures, or User Defined Table Functions
- In Db2 Web Query, you build a report over a “synonym” (meta data object) that represents the data source
- The Data Source can be an SQL View, Stored Procedure, View containing a user defined table function (and of course your files/tables, query/400 definitions, etc.)

Report #1: **Query to get a list of Spooled Files using QSYS.OUTPUT_QUEUE_ENTRIES_BASIC service Shipped as a VIEW**

Spool Services				
QSYS2.OUTPUT_QUEUE_ENTRIES	View	Base	Base	SF99702 Level 9
QSYS2.OUTPUT_QUEUE_ENTRIES_BASIC	View	Base	SF99703 Level 11	SF99702 Level 23
QSYS2.OUTPUT_QUEUE_ENTRIES()	Table function	Base	Base	SF99702 Level 9

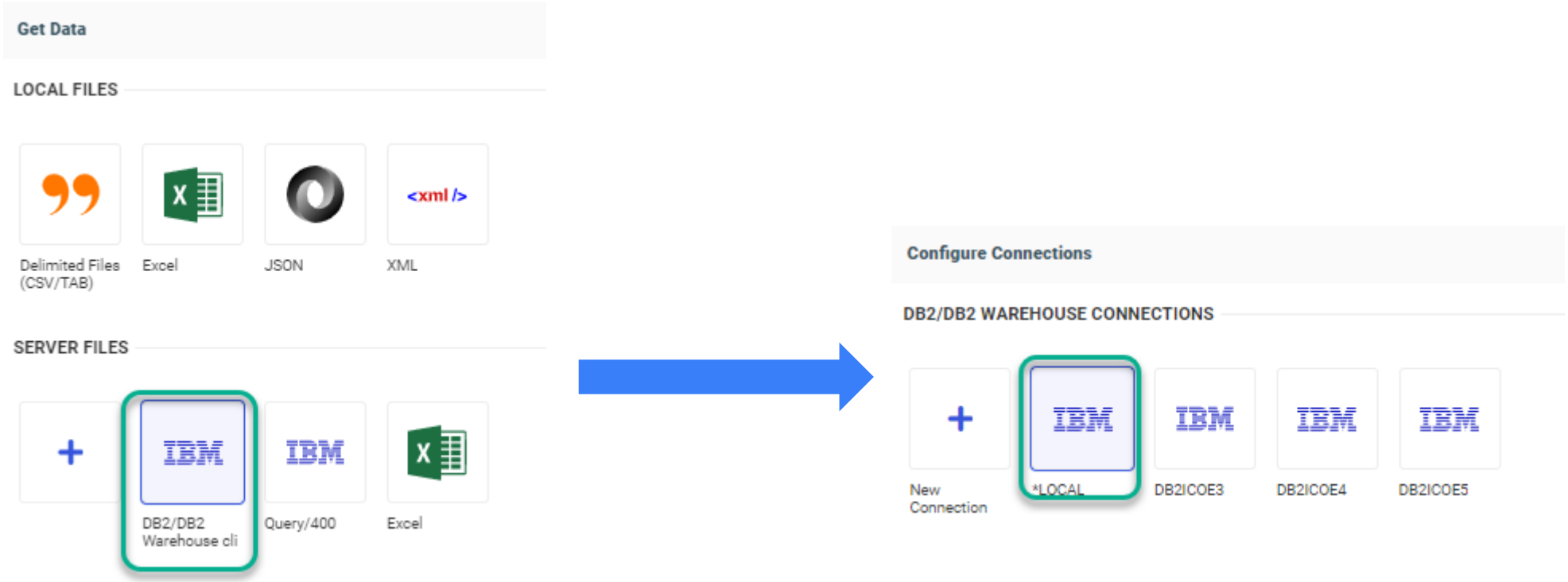
Detailed Information on IBM i Services at https://www.ibm.com/support/pages/node/1119123

How Was This Done?

1. Create a Synonym over the VIEW

Within Web Query Home Page, select GET DATA button and Db2/Db2 Warehouse Adapter

Choose *LOCAL to run the service on the same system Db2 Web Query is installed on
(note you could also choose a remote server/connection adapter and get the list of spooled files from another partition)!



How Was This Done?

1. Create a Synonym over the VIEW

Set Library to QSYS2

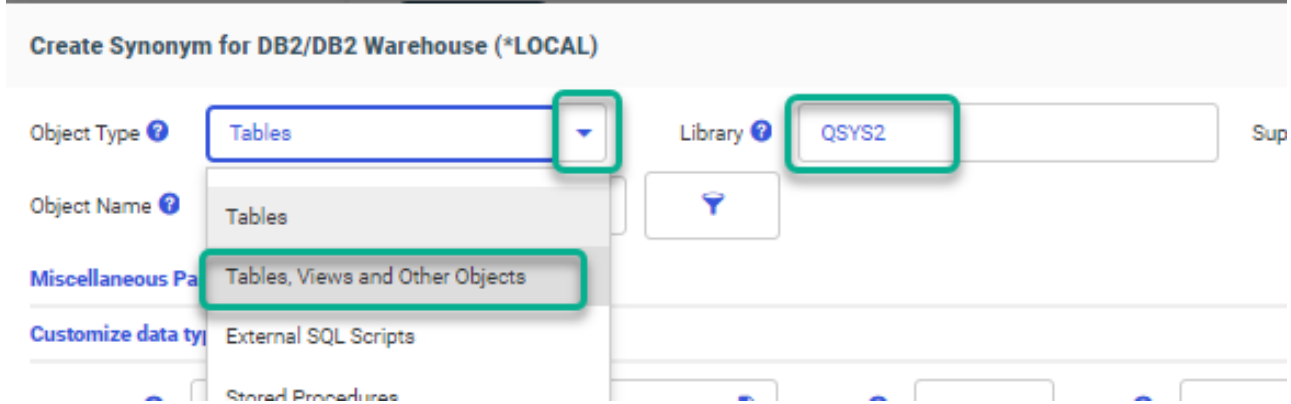
Hit the drop-down button for Object Type and select “Tables, Views, and other Objects”

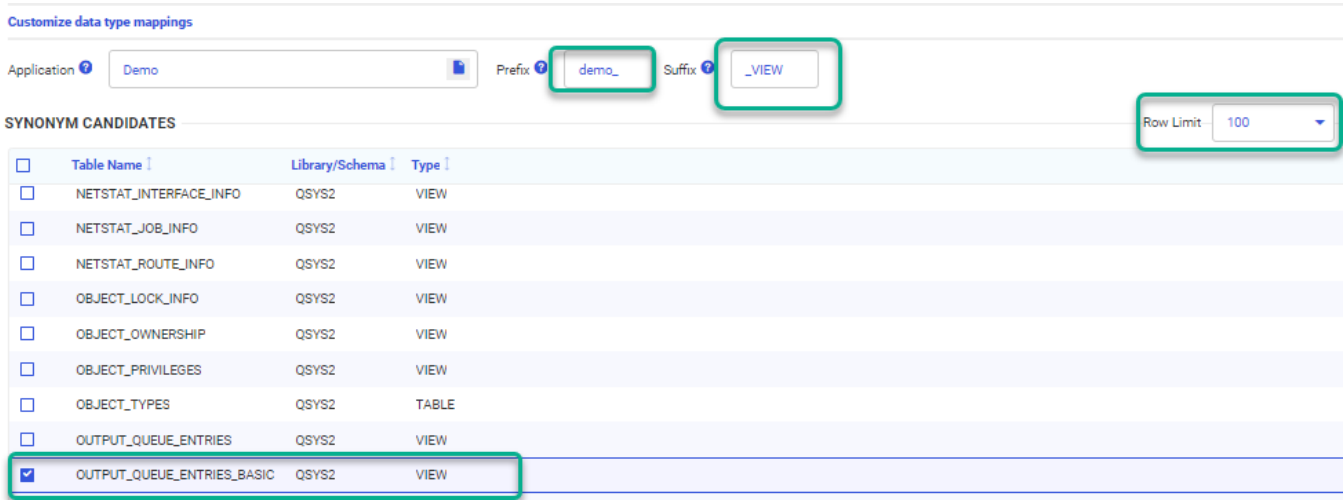
Select the filter (search) icon to see the list of objects in QSYS2

You may need to set Row Limit to 100

Choose the Output_queue_entries_basic VIEW

Hint: Provide a prefex and suffix to your synonym name to recognize it later and identify it as a VIEW synonym



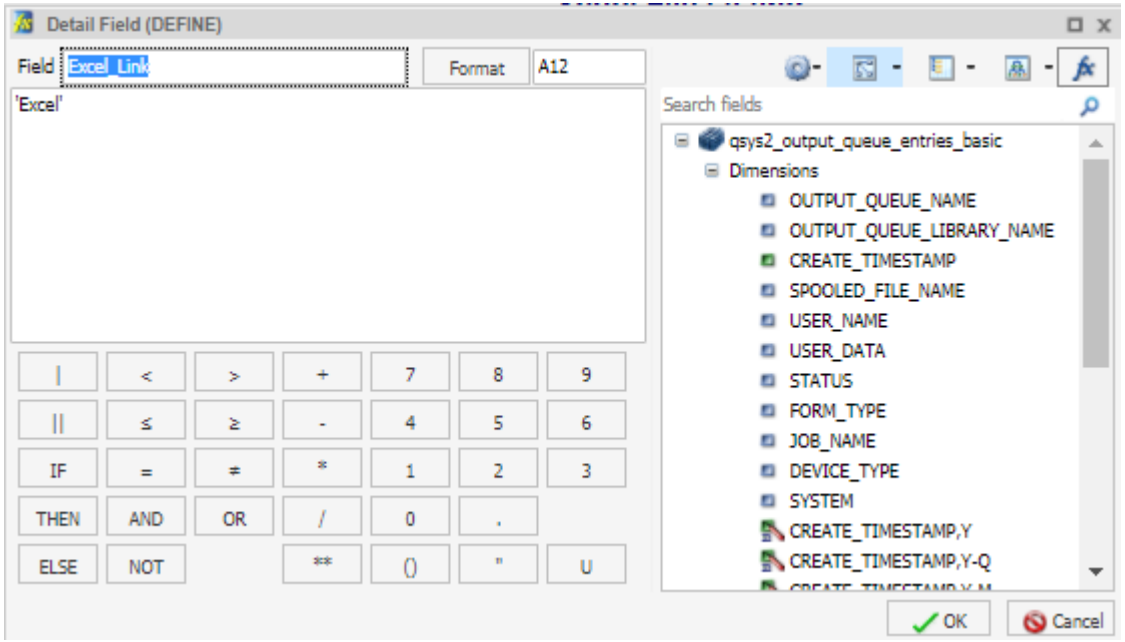


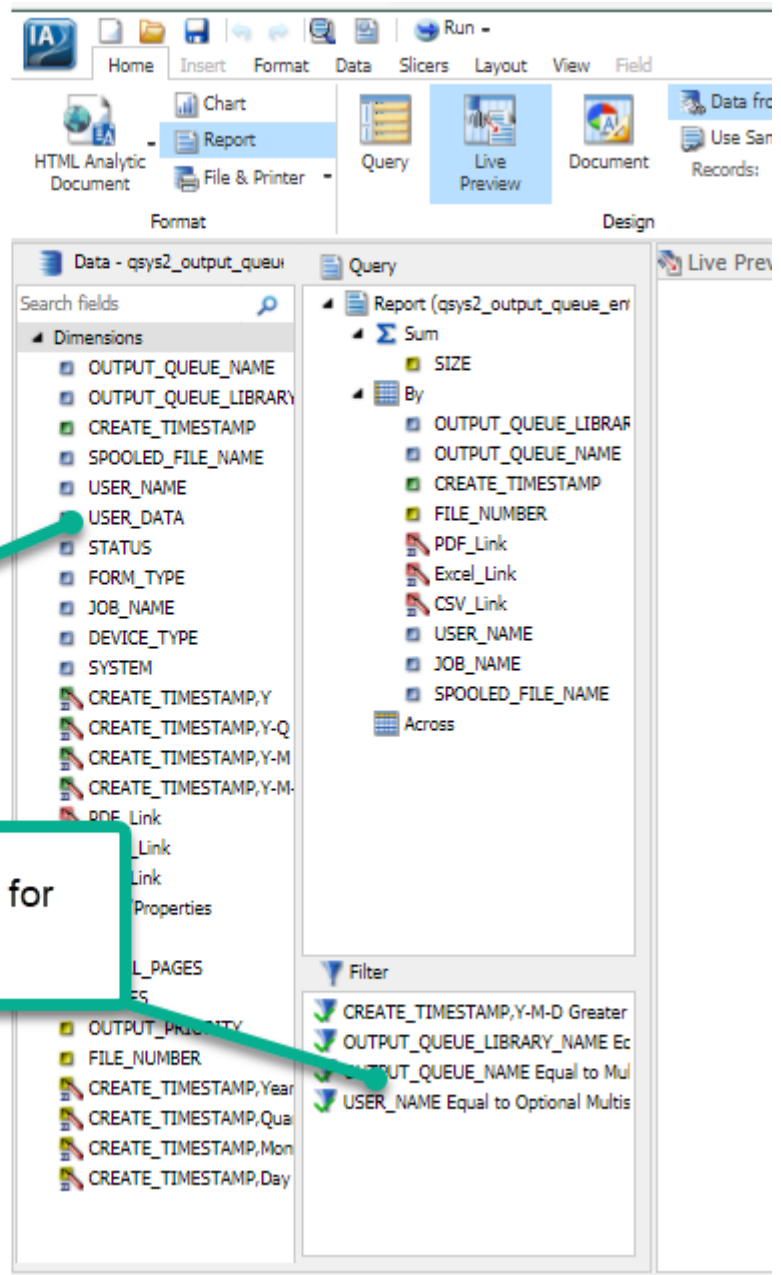
Note: You could also have reversed engineer the select statement using ACS Run SQL Scripts, then copy pasted the view’s SELECT statement into our EZ-Report auto generation utility to auto generate the synonym (and a report)!

How Was This Done?

2. Create your report over the synonym!

- Add a dummy “define” field with a value of “Excel” for creating a hyper link (will we do this later)
  - You could create the link on the spooled_file_name field too as an alternative

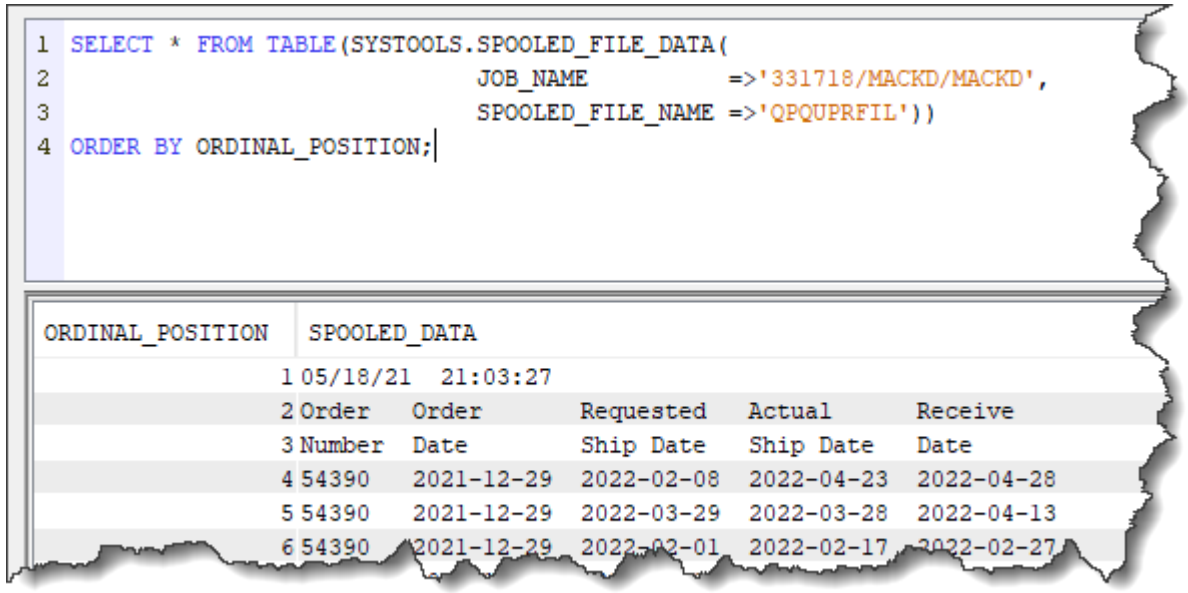




How Was This Done?

3. Report #2 (to drill down to): Find the Service to Return the data from Spooled File: **QSYSTOOL.SPOOLED_FILE_DATA** and note that it is shipped as a table function

4. Because this SQL function requires parameters to be passed to a table function, we're going to need to create a Stored Procedure containing the SELECT FROM TABLE function
   - First, use ACS Run SQL Scripts to test the SQL with the table function

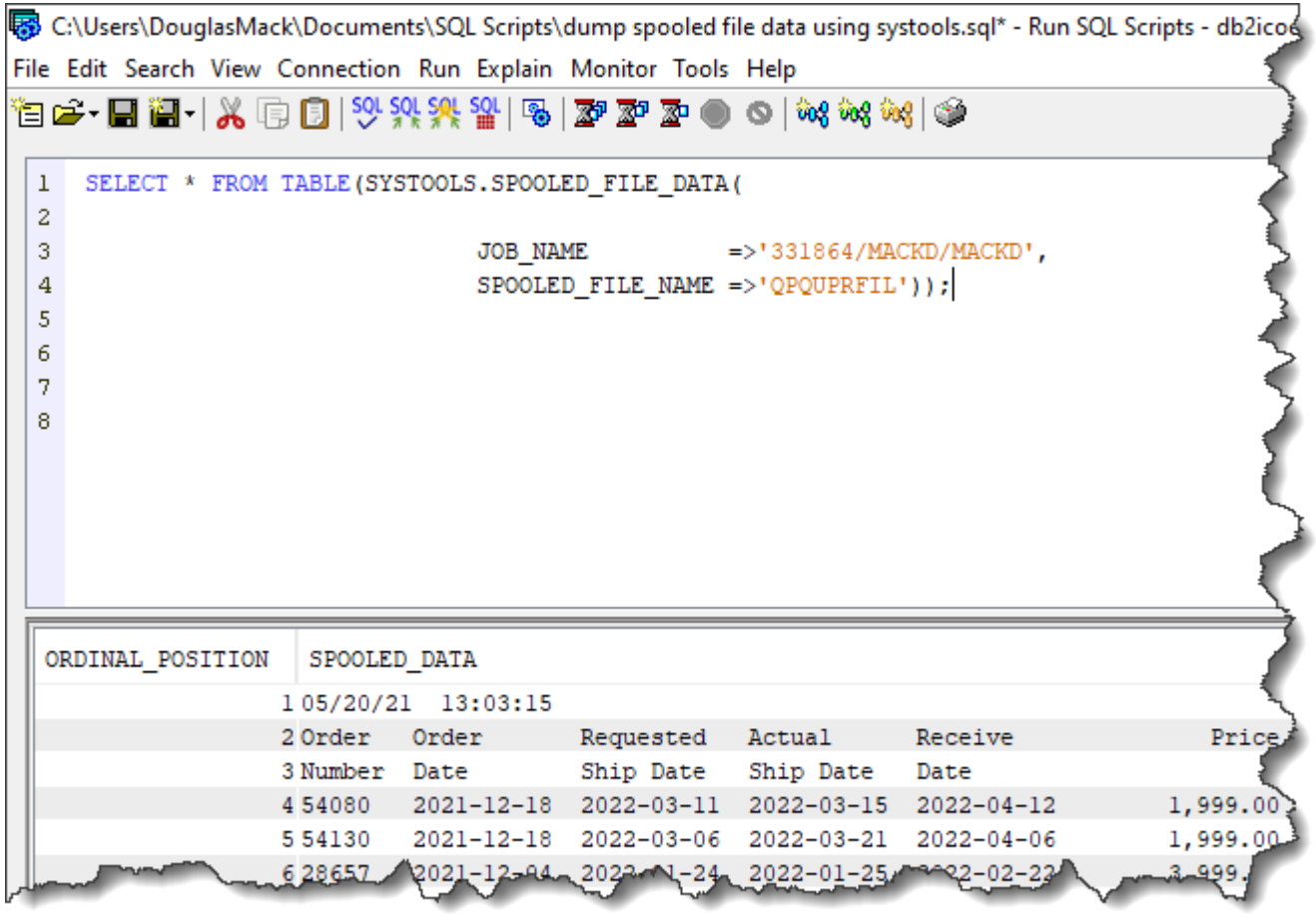


```
1 SELECT * FROM TABLE(SYSTOOLS.SPOOLED_FILE_DATA(
2                             JOB_NAME          =>'331718/MACKD/MACKD',
3                             SPOOLED_FILE_NAME =>'QPQUPRFIL'))
4 ORDER BY ORDINAL_POSITION;
```

ORDINAL_POSITION	SPOOLED_DATA				
1	05/18/21 21:03:27				
2	Order	Order	Requested	Actual	Receive
3	Number	Date	Ship Date	Ship Date	Date
4	54390	2021-12-29	2022-02-08	2022-04-23	2022-04-28
5	54390	2021-12-29	2022-03-29	2022-03-28	2022-04-13
6	54390	2021-12-29	2022-02-01	2022-02-17	2022-02-27

How Was This Done?

4. Because this SQL function requires parameters to be passed to a table function, we're going to need to create a Stored Procedure containing the SELECT FROM TABLE function
   - First, use ACS Run SQL Scripts to test the SQL with the table function



How Was This Done?

5. Create your Stored Procedure (Remember, this already provided in the QWQREPOS library)

```
 6 SET PATH "QSYS","QSYS2","SYSPROC","SYSIBMADM","MACKD" ;
 7
 8 CREATE OR REPLACE PROCEDURE MACKD.SPOOLED_FILE_DETAIL (
 9     IN JOB_NAME VARCHAR(28) ,
10     IN SPOOLED_FILE_NAME VARCHAR(10) DEFAULT  'QPJOBLOG' ,
11     IN FILE_NUMBER VARCHAR(6) DEFAULT  '*LAST'  )
12     DYNAMIC RESULT SETS 1
13     LANGUAGE SQL
14     SPECIFIC MACKD.SPLFDETAIL
15     NOT DETERMINISTIC
16     MODIFIES SQL DATA
17     CALLED ON NULL INPUT
18     PROGRAM TYPE SUB
19     SET OPTION  ALWBLK = *ALLREAD ,
20     ALWCPYDTA = *OPTIMIZE ,
21     COMMIT = *NONE ,
22     DECRESULT = (31, 31, 00) ,
23     DFTRDBCOL = MACKD ,
24     DYNDFTCOL = *NO ,
25     DYNUSRPRF = *USER ,
26     SRTSEQ = *HEX,
27     [illegible] V7R3M0
```

```
28     BEGIN
29 DECLARE ERROR_OCCURRED INT ;
30
31 DECLARE C1 CURSOR FOR SELECT *
32   FROM TABLE(SYSTOOLS.SPOOLED_FILE_DATA(JOB_NAME, SPOOLED_FILE_NAME))
33   ORDER BY ORDINAL_POSITION;
34
35 DECLARE CONTINUE HANDLER FOR SQLEXCEPTION SET ERROR_OCCURRED = 1 ;
36
37 OPEN C1 ;
38 END  ;
39
```

```
53
54 CALL MACKD.SPOOLED_FILE_DETAIL ('331864/MACKD/MACKD','QPQUPRFIL');
55
56
57
```

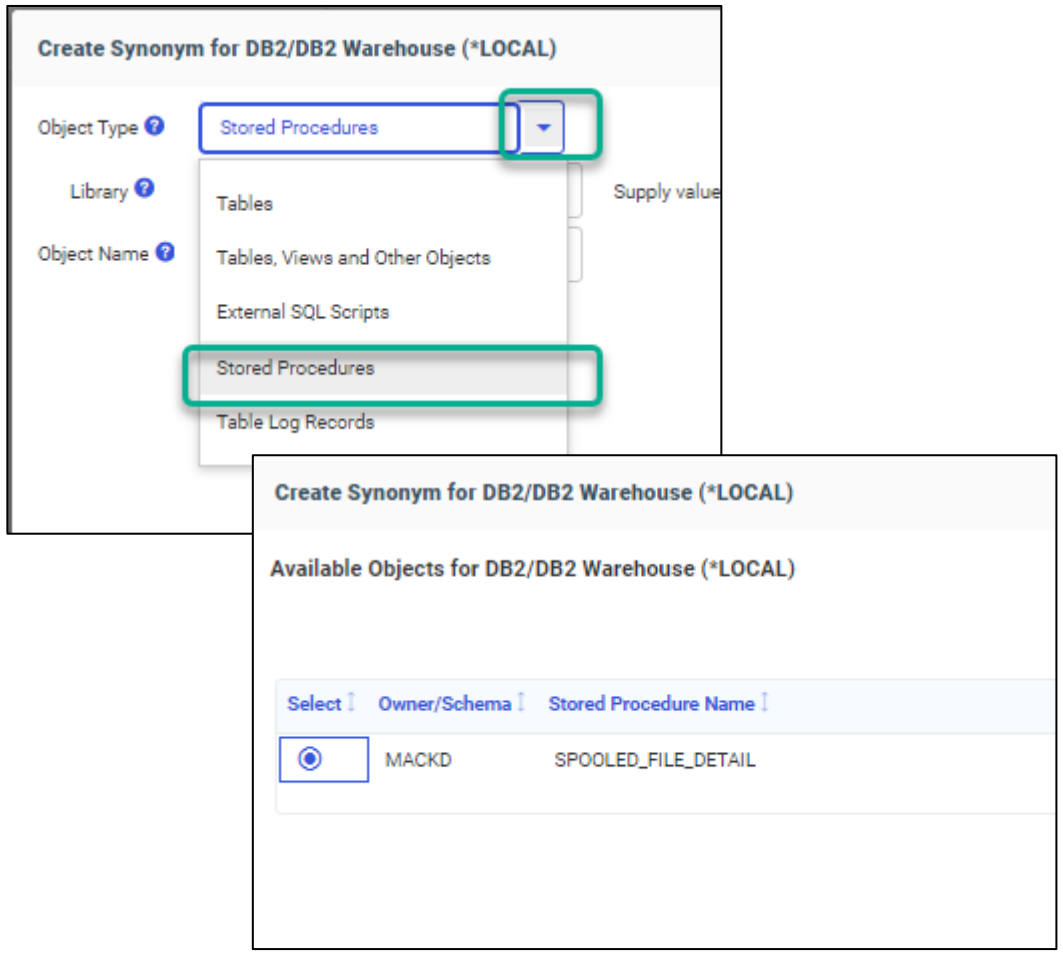
ORDINAL_POSITION	SPOOLED_DATA						
1	05/20/21 13:03:15					PAGE 1	
2	Order	Order	Requested	Actual	Receive	Price	Cost
3	Number	Date	Ship Date	Ship Date	Date		
4	54080	2021-12-18	2022-03-11	2022-03-15	2022-04-12	1,999.00	1,500.00
5	54130	2021-12-18	2022-03-06	2022-03-21	2022-04-06	1,999.00	1,500.00
6	28657	2021-12-04	2022-01-24	2022-01-25	2022-02-22	3,999.00	3,700.00
7	28251	2021-11-28	2022-02-13	2022-02-12	2022-03-12	3,999.00	3,700.00
8	28390	2021-11-28	2022-01-05	2022-01-06	2022-01-10	4,599.00	4,000.00
9	28519	2021-11-28	2022-03-01	2022-03-07	2022-03-14	3,999.00	3,700.00
10	28015	2021-10-17	2021-11-18	2021-11-19	2021-12-25	2,999.00	2,000.00
11	28045	2021-10-17	2021-12-04	2021-12-01	2021-12-27	3,999.00	3,700.00
12	37984	2021-10-02	2021-12-30	2022-03-05	2022-03-09	3,999.00	3,700.00
13	96654	2021-09-28	2021-11-26	2021-12-10	2021-12-22	3,199.00	2,500.00
14	96731	2021-09-16	2021-11-05	2021-11-12	2021-11-24	3,199.00	2,500.00
15	96061	2021-09-06	2021-10-08	2021-10-25	2021-11-24	3,999.00	3,700.00
16	96175	2021-09-06	2021-10-10	2021-10-09	2021-10-12	1,999.00	1,500.00
17	48580	2021-08-29	2021-10-11	2021-10-20	2021-11-11	3,999.00	3,700.00

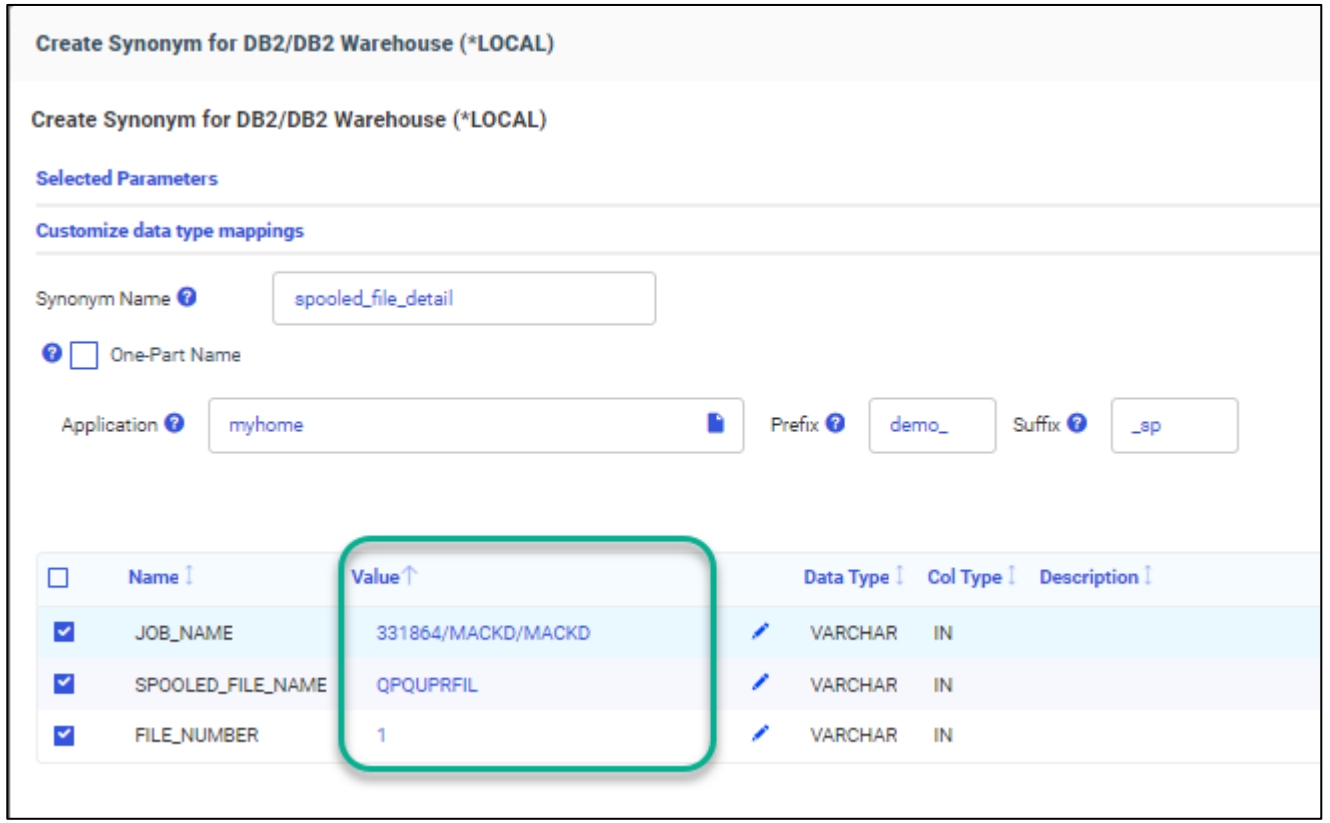
Done: 70 rows retrieved

- Test by calling it with parameters within ACS

How Was This Done?

6. Create a Synonym over your Stored Procedure

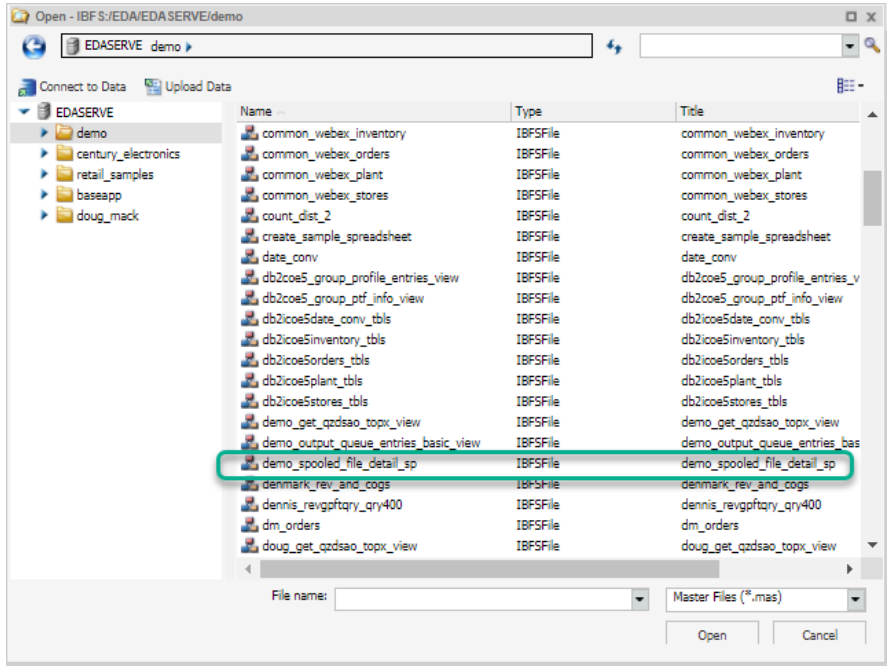


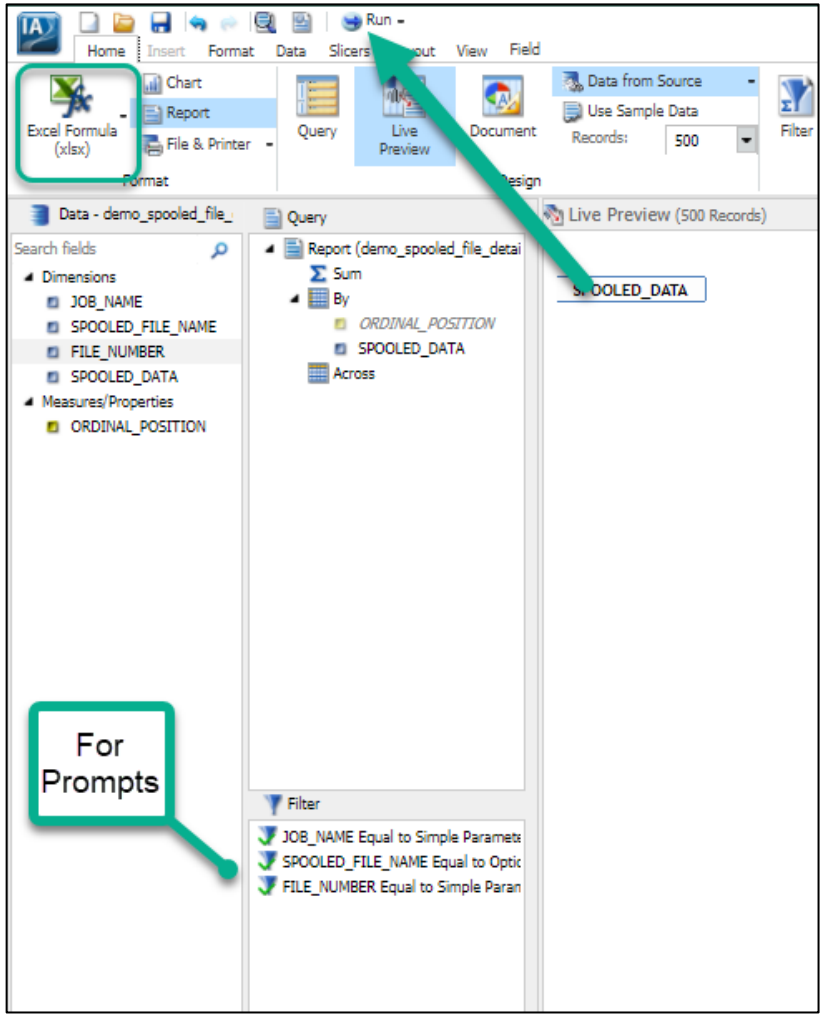


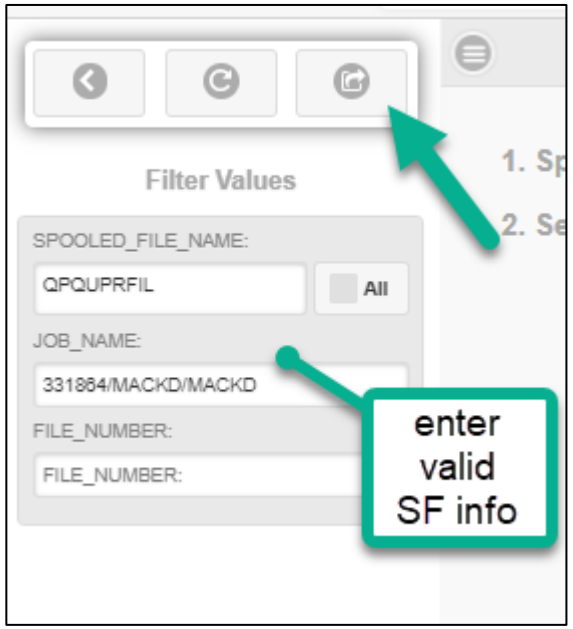
You're prompted for the input fields the SP is expecting and you need to provide VALID values

How Was This Done?

6. Create a Report over your new Synonym – specify OUTPUT as .xlsx or .csv



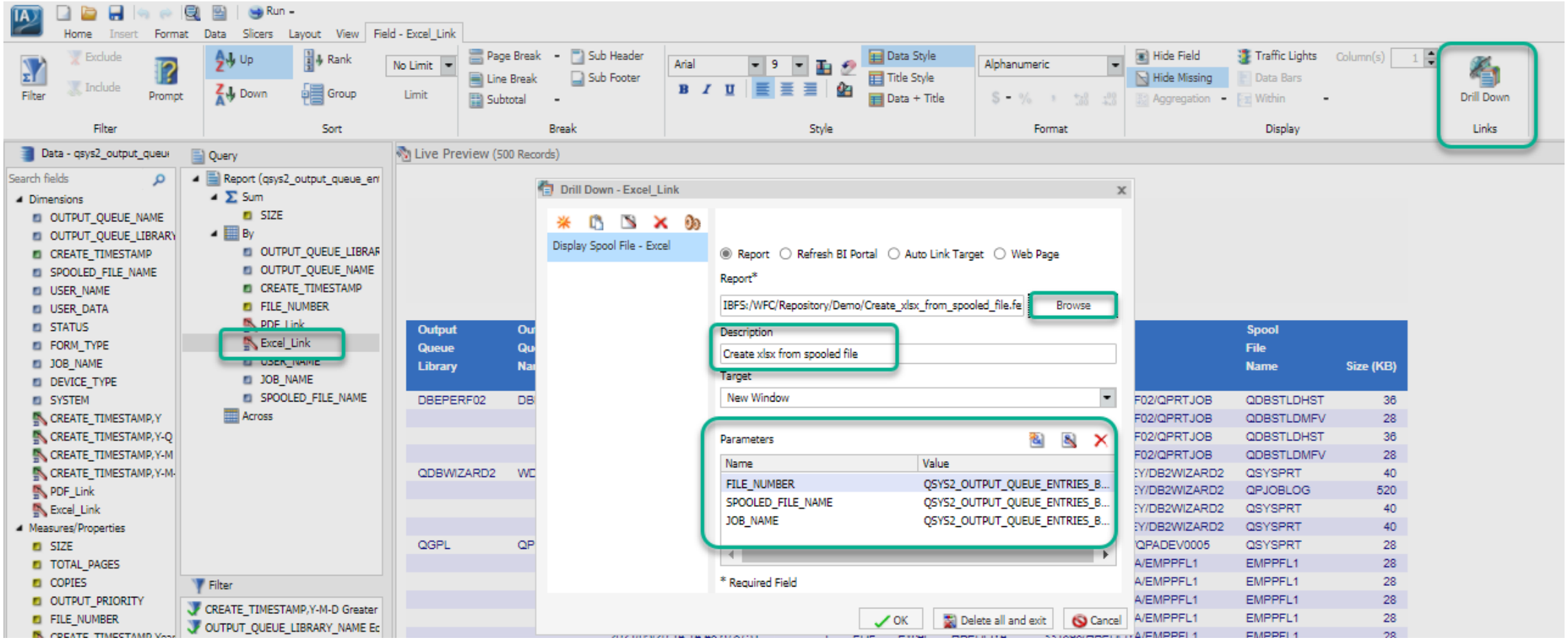




- Add filters for inputting spooled file name/job name
- Test with the RUN button
- Save your Report

Almost Done!

7. Link the Parent report to the Spooled File Detail report we just created



- Open Parent Report. Click on Excel_Link then Drill Down Tool
- Browse for the Create xlsx from Spooled File report
- Add the fields to be used to pass the Spooled File information to it, click OK and SAVE!

Whoo Hoo!

Db2 Web Query | **Workspaces**

Get Data | Visualize Data

Spool Files

Starting Date: May 19 2021

Output Queue Library	Output Queue Name	File Create Timestamp	File Entry Number	PDF Link	Excel Link	User	Job	Spool File Name	Size (KB)
QGPL	QPRINT	2021/05/20 17:07:07.614748	1	PDF	Excel	TAFORD	331903/TAFORD/QPADEV0005	QSYSPRT	28
		2021/05/20 14:29:33.428149	1	PDF	Excel	HBEDOYA	331905/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 14:26:37.646023	1	PDF	Excel	HBEDOYA	331904/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 14:19:04.369891	1	PDF	Excel	HBEDOYA	331900/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 14:18:32.886295	1	PDF	Excel	HBEDOYA	331899/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 14:14:48.678751	1	PDF	Excel	HBEDOYA	331898/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 14:13:50.115814	1	PDF	Excel	HBEDOYA	331897/HBEDOYA/EMPPF	EMPPF	36
		2021/05/20 14:08:22.214465	1	PDF	Excel	HBEDOYA	331896/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 13:58:30.773874	1	PDF	Excel	HBEDOYA	331895/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 13:46:47.662146	1	PDF	Excel	HBEDOYA	331888/HBEDOYA/EMPPFL1	EMPPFL1	28
		2021/05/20 13:43:57.827127	30	PDF	Excel	HBEDOYA	299824/HBEDOYA/QPRTJOB	EMPPF	36
		2021/05/20 13:03:15.283010	1	PDF	Excel	MACKD	331864/MACKD/MACKD	QPQUPRFIL	36
		2021/05/20 12:59:07.800530	3	PDF	Excel	MACKD	331822/MACKD/QPADEV0004	QPQUPRFIL	36
		2021/05/20 12:56:17.613774	1	PDF	Excel	MACKD	331863/MACKD/MACKD	QPQUPRFIL	36
		2021/05/20 12:41:44.614265	2	PDF	Excel	MACKD		XPRTF	28
		2021/05/20 12:41:44.593934	1	PDF	Excel	MACKD		XPRTF	36
		2021/05/20 12:34:20.629726	2	PDF	Excel	MACKD		XPRTF	60
		2021/05/20 12:34:20.581143	1	PDF	Excel	MACKD		XPRTF	124
		2021/05/20 11:53:08.565362	1	PDF	Excel	MACKD	331847/MACKD/MACKD	QPQUPRFIL	28
		2021/05/20 11:51:05.152252	2	PDF	Excel	MACKD	331822/MACKD/QPADEV0004	QPQUPRFIL	1,348
		2021/05/20 11:48:29.304746	1	PDF	Excel	MACKD	331844/MACKD/MACKD	QPQUPRFIL	292
		2021/05/20 11:32:17.563524	1	PDF	Excel	HBEDOYA	331843/HBEDOYA/EMPPF	EMPPF	36
		2021/05/20 11:18:55.392363	1	PDF	Excel	MACKD	331834/MACKD/MACKD	QPQUPRFIL	292
		2021/05/20 11:18:18.626792	1	PDF	Excel	MACKD	331833/MACKD/MACKD	QPQUPRFIL	28
		2021/05/20 11:18:02.490037	29	PDF	Excel	HBEDOYA	299824/HBEDOYA/QPRTJOB	EMPPF	36

Click on Excel Link

File Home Insert Draw Page Layout Formulas Data Review

Paste | TREBUCHET MS | 9 | Wrap Text | Merge & Cen

Clipboard | Font | Alignment

A1 | SPOOLED_DATA

	A						
1	SPOOLED_DATA						
2	05/20/21 13:03:15				PAGE 1		
3	Order Number	Order Date	Requested Ship Date	Actual Ship Date	Receive Date	Price	Cost
5	54080	2021-12-18	2022-03-11	2022-03-15	2022-04-12	1,999.00	1,500.00
6	54130	2021-12-18	2022-03-06	2022-03-21	2022-04-06	1,999.00	1,500.00
7	28657	2021-12-04	2022-01-24	2022-01-25	2022-02-22	3,999.00	3,700.00
8	28251	2021-11-28	2022-02-13	2022-02-12	2022-03-12	3,999.00	3,700.00
9	28390	2021-11-28	2022-01-05	2022-01-06	2022-01-10	4,599.00	4,000.00
10	28519	2021-11-28	2022-03-01	2022-03-07	2022-03-14	3,999.00	3,700.00
11	28015	2021-10-17	2021-11-18	2021-11-19	2021-12-25	2,999.00	2,000.00
12	28045	2021-10-17	2021-12-04	2021-12-01	2021-12-27	3,999.00	3,700.00
13	37984	2021-10-02	2021-12-30	2022-03-05	2022-03-09	3,999.00	3,700.00
14	96654	2021-09-28	2021-11-26	2021-12-10	2021-12-22	3,199.00	2,500.00
15	96731	2021-09-16	2021-11-05	2021-11-12	2021-11-24	3,199.00	2,500.00
16	96061	2021-09-06	2021-10-08	2021-10-25	2021-11-24	3,999.00	3,700.00
17	96175	2021-09-06	2021-10-10	2021-10-09	2021-10-12	1,999.00	1,500.00
18	48580	2021-08-29	2021-10-11	2021-10-20	2021-11-11	3,999.00	3,700.00
19	38696	2021-08-06	2021-10-10	2021-09-29	2021-10-06	2,599.00	2,300.00
20	39307	2021-07-31	2021-10-24	2021-11-06	2021-11-25	3,999.00	3,700.00
21	37891	2021-06-17	2021-08-08	2021-08-23	2021-08-28	3,999.00	3,700.00
22	37894	2021-06-17	2021-08-04	2021-08-05	2021-08-08	1,999.00	1,500.00
23	36819	2021-05-23	2021-07-08	2021-07-09	2021-07-14	3,599.00	3,300.00

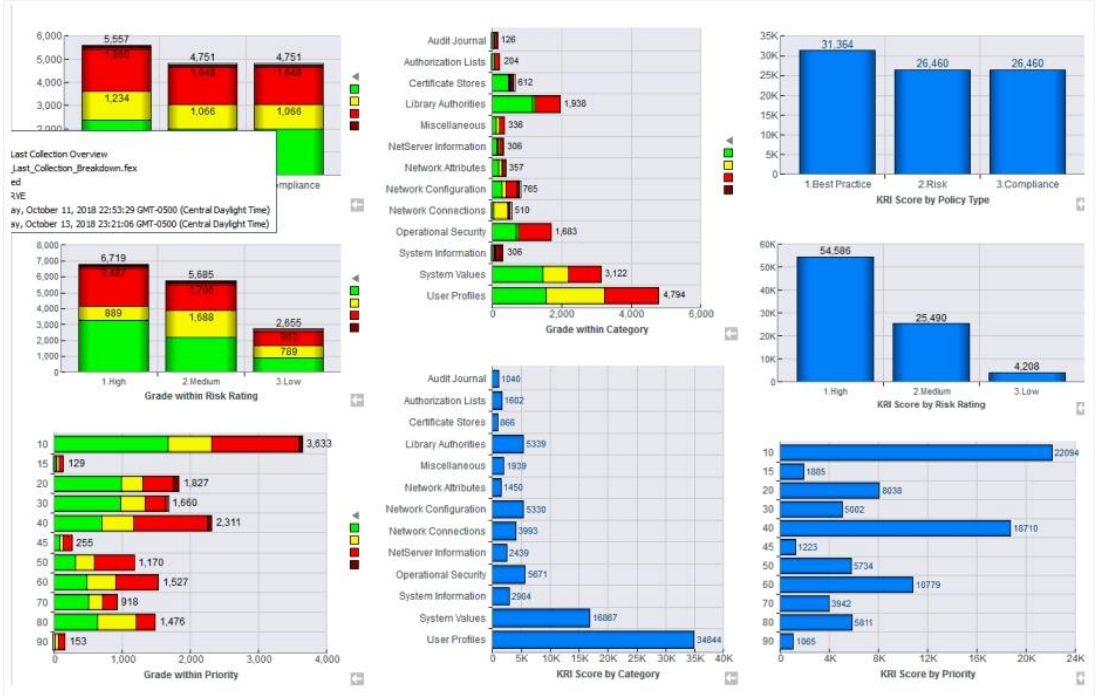
Create xlsx from spooled file

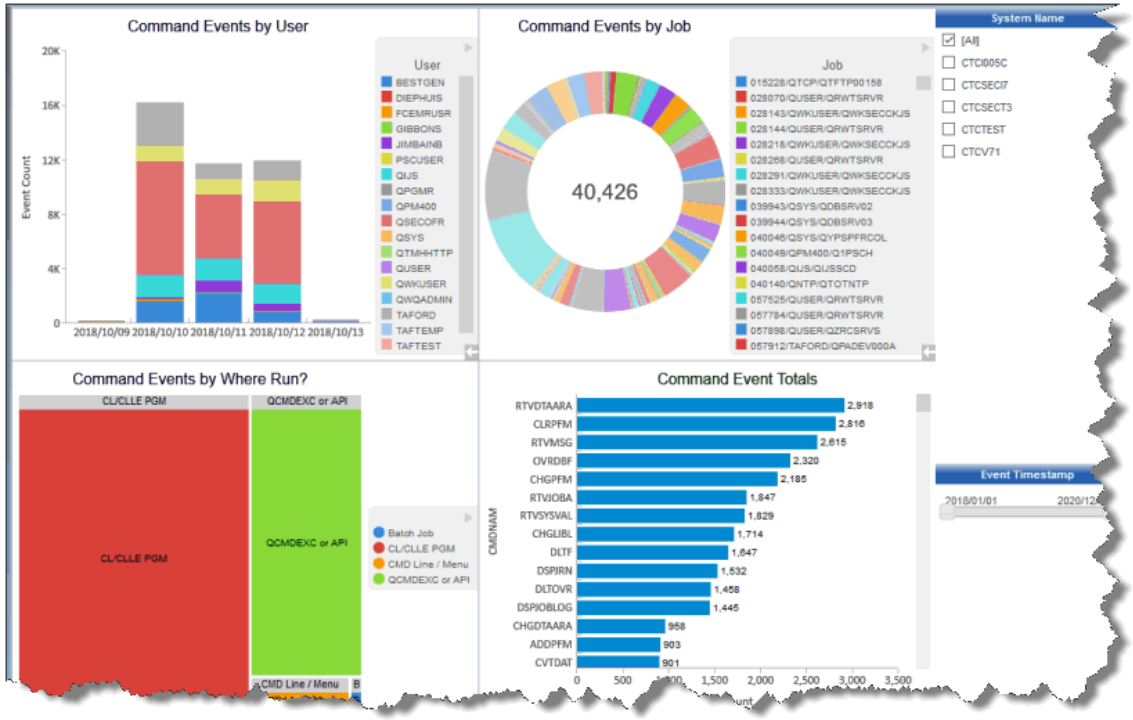
IBM Has Done Some of the Work For You

IBM i Anywhere
IBM i Everywhere

- Sample set of reports and dashboards using IBM i “Services” built into the product
  - Documentation on how these were built

- Out of the box Security Centric but also contains many systems/object type monitoring reports
  - Compliance Automation and Reporting Solution Enterprise Edition (multiple systems/LPARs)
    - Sold as a Lab Services solution
    - Single Server Express Edition coming soon
    - https://www.ibm.com/support/pages/ibm-i-security#cart





What is Machine Learning (ML)?

- Training a computer to make intelligent predictions…
  - …about things humans **are good at**:
    - Language Translation
    - Text-to-Speech Generation
    - Playing Games
  - …about things humans **are bad at**:
    - What factors indicate failure of components?
    - Identify the factors of high-risk credit accounts
    - Doing complex stock market analysis

Training and Inferencing

- **Training:**
  - Taking data and building a mathematical **model** to draw some conclusions about relationships in that data
  - Data is usually labeled, with **known outcomes**
  - Typically done by Data Scientist
- **Inferencing:**
  - Feeding new data into your model to make informed **predictions**
  - Data may or may not be labeled, with **unknown outcomes**
  - Often done by Data Scientist, but doesn’t have to be

Db2 Web Query Version 2.3.0

- **Significant** upgrades in ease of use and navigation
- **New Home Page** simplifies organization of content
  - Complements legacy BI Portal
- Powerful **New Designer** for creating content
  - Complements legacy InfoAssist authoring tool
- Data Preparation facilities to **“work with data”** for building of extracts or “wrangling” data to use for visualizations
- **New “Insights”** brings packaged AI/ML models to Web Query to auto generate additional data relationship charts and information

Auto Generate Insights

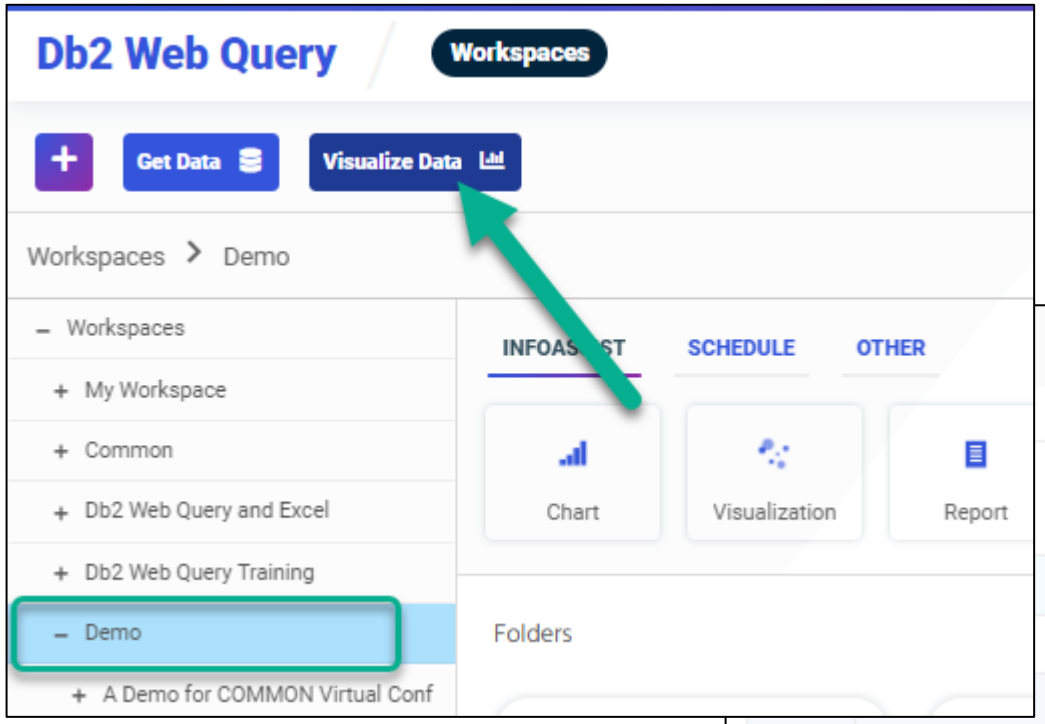
Increase productivity and gain insights through automatic generation of analytics

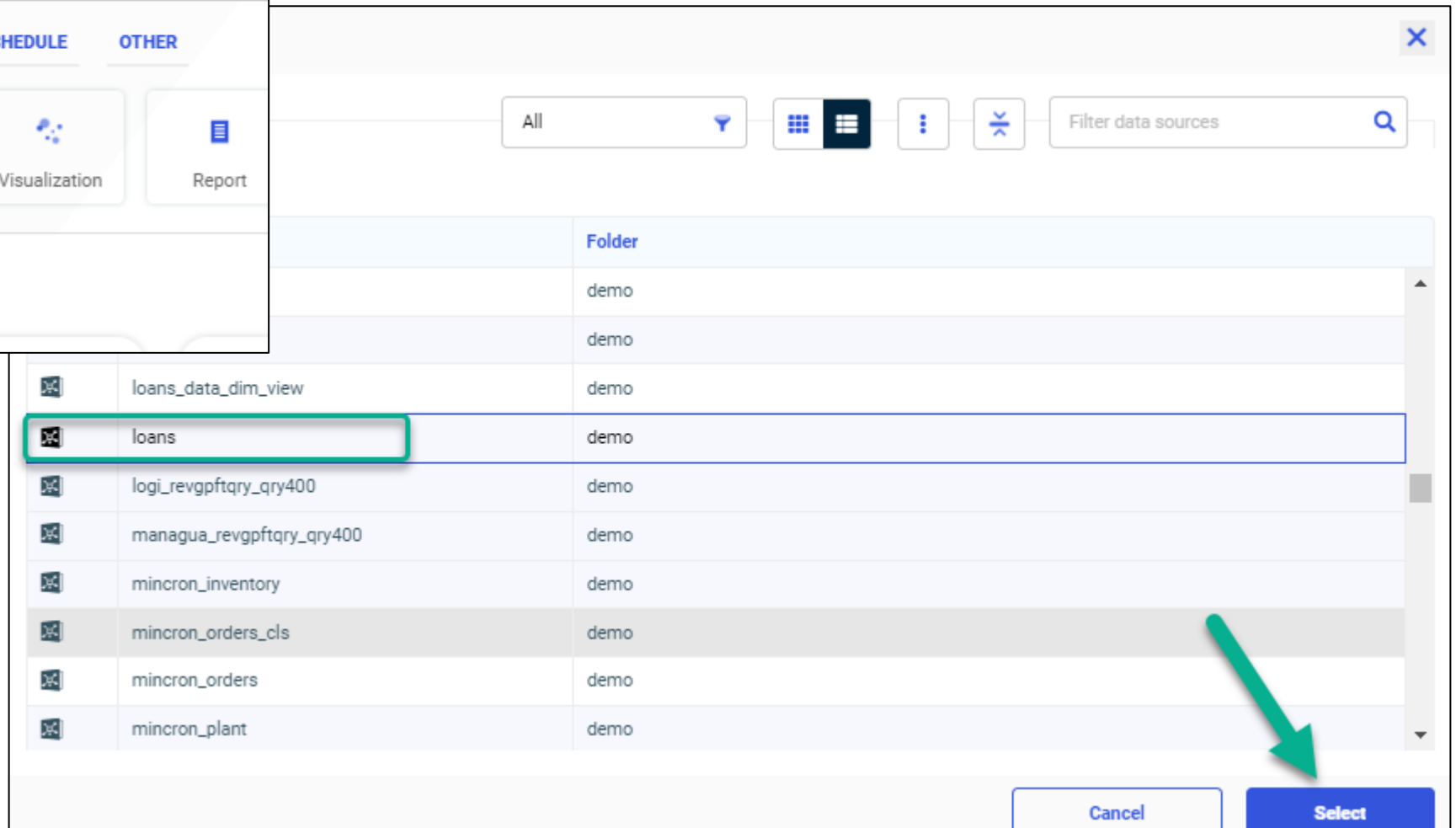
- Automatically analyze data sets via pre-built ML (machine learning) models to find correlations and outliers
- User can cobble the data set together through synonyms, or new Data Flows
- **Initially shipped as a limited use cloud-based approach for Phase 1**

Chart Category	Description	Statistical Model Used
Correlations	Detects cases where multiple measures show a similar trend or pattern.	Pearson Correlation
Outliers	Identifies unusual patterns in categorical data.	Entropy Analysis
Time-based	Analyzes business data over time to identify consistent and inconsistent patterns in noisy data.	Time-based outlier: Isolation Forest
		Time-based seasonality: STL Decomposition
		Time-based trend: Piecewise Linear Regression

Note: Insights ships with a default of being disabled

Example: Loan Data

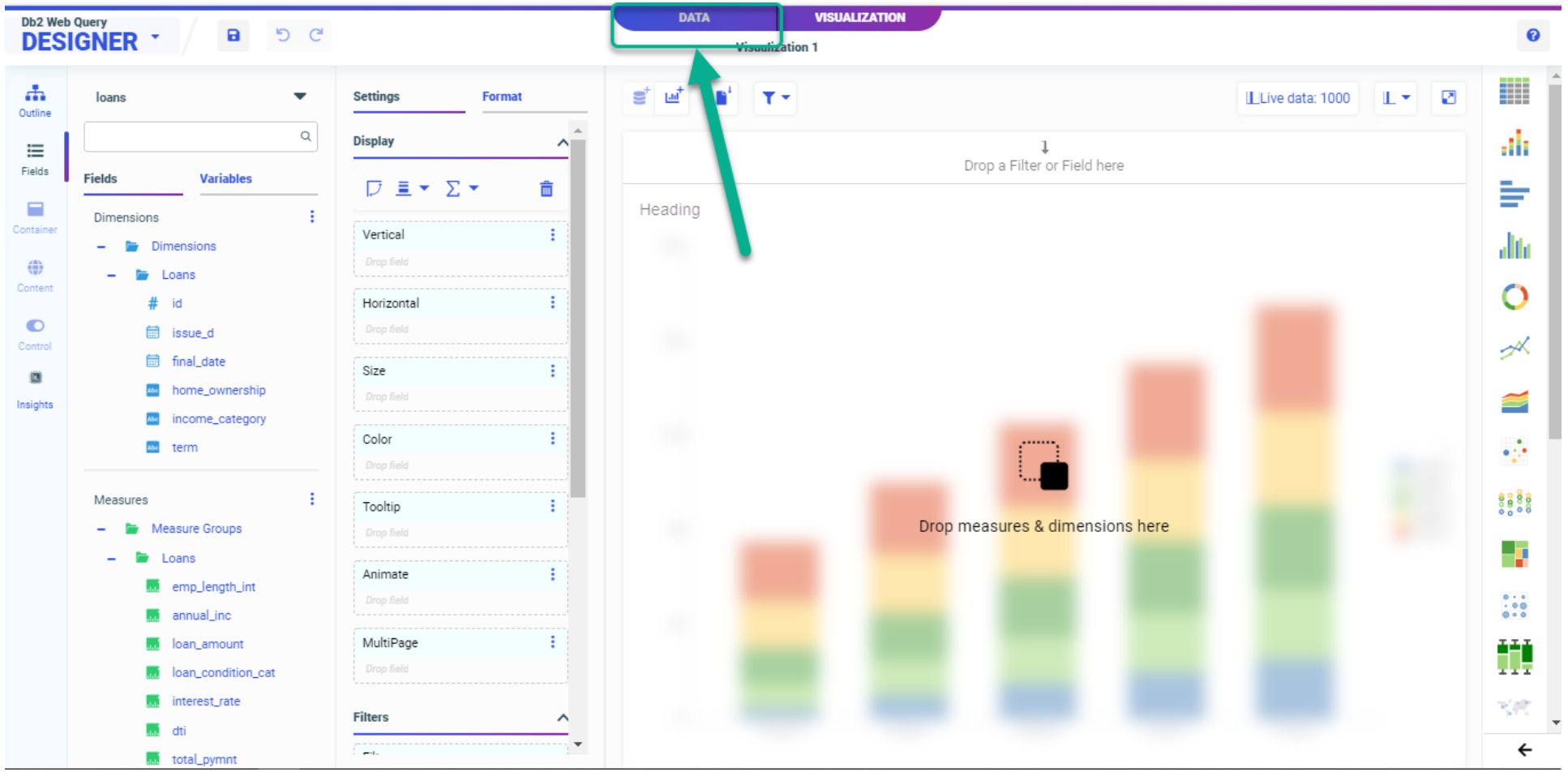




- Navigate to your workspace
- Click on Visualize Data
- Select the LOANS Synonym

Loan Data

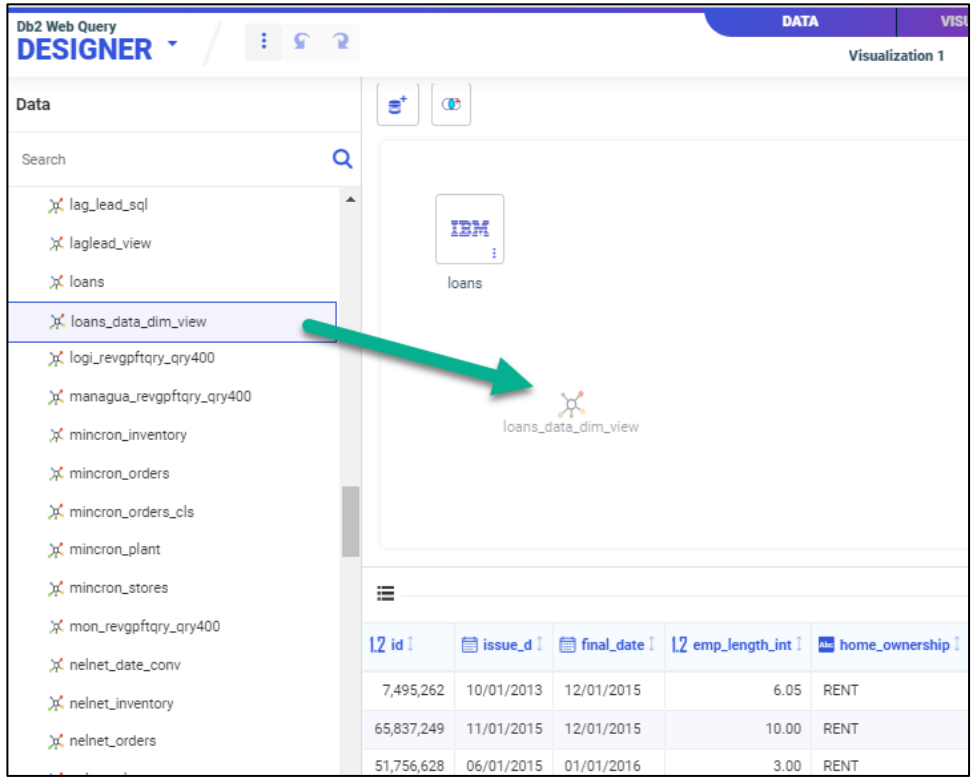
- New Db2 Web Query “Designer” Opens
- Let’s cobble some data together first. Click on DATA Tab

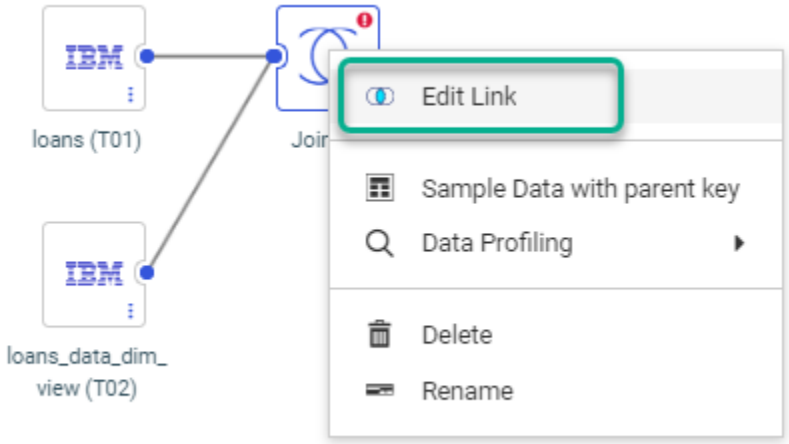


Loan Data

- Suppose you had a Packed 8 Decimal field for date
  - Let's fix that – web query ships with a utility to create a date dimension table (and view)

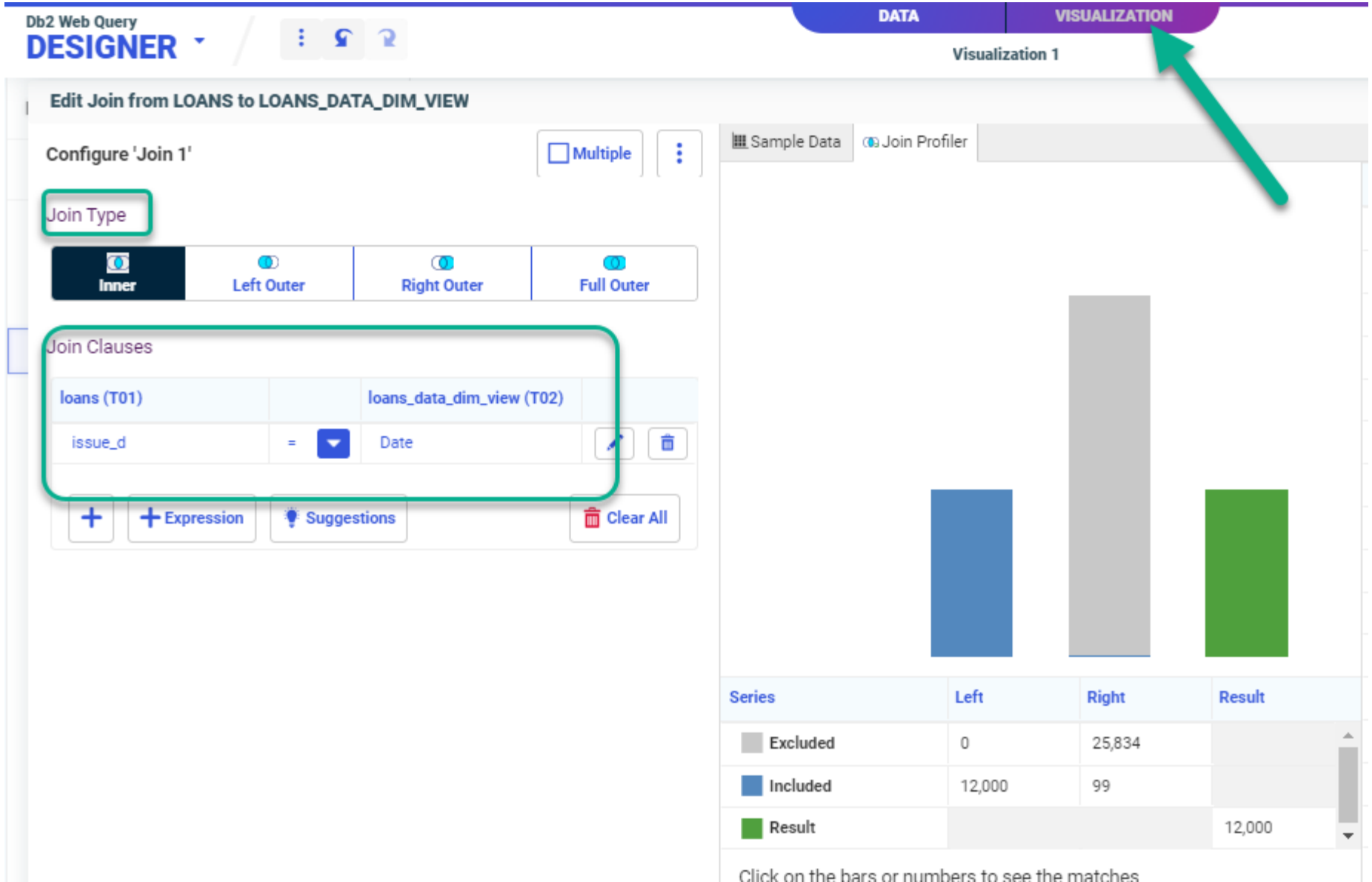
- Joining the LOAN synonym to the date dimension view will add all kinds of date attributes including a true date set of fields that Python Libraries will understand (they won't know a P8 decimal is a date)!





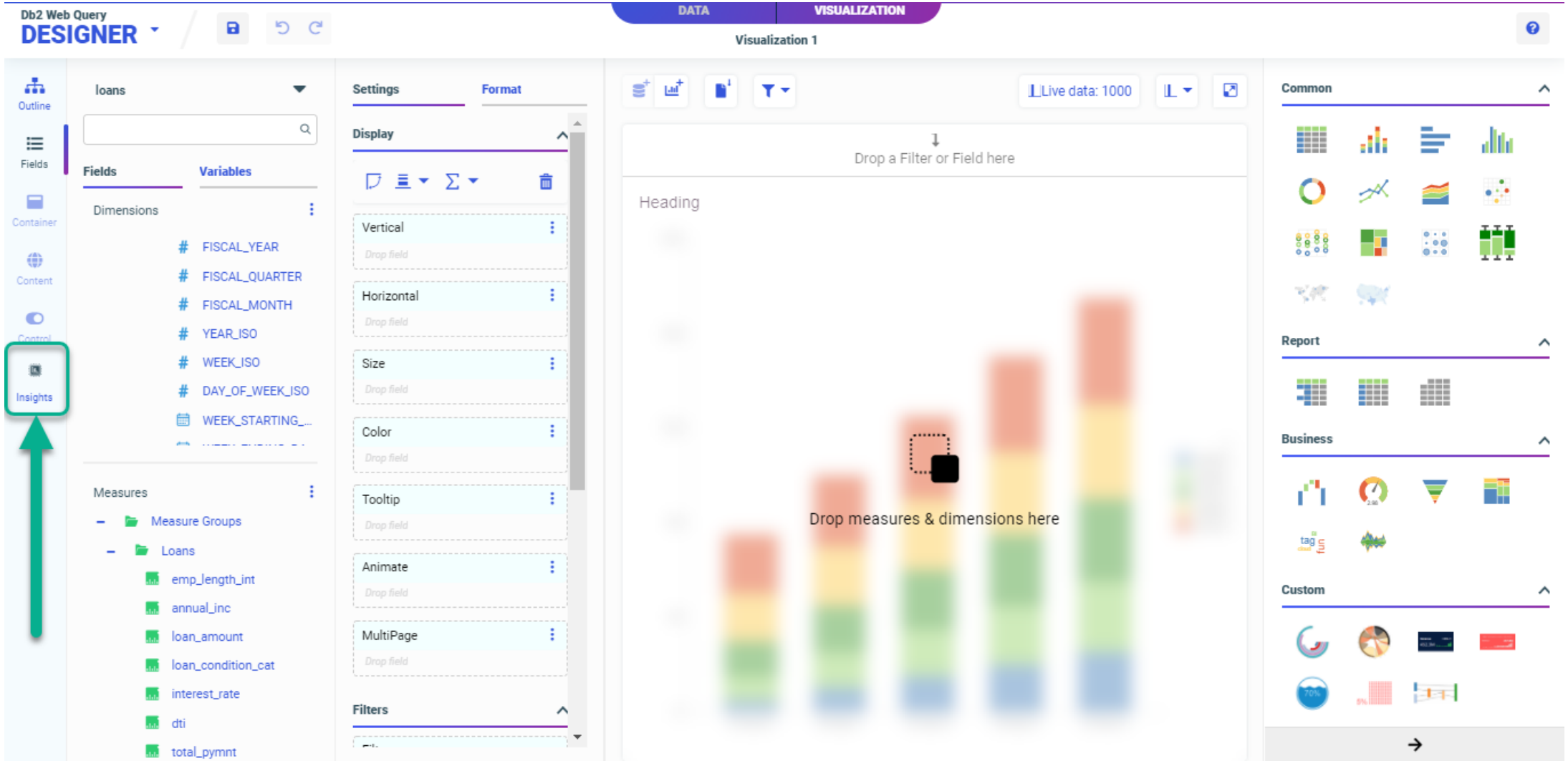
Loan Data

- Satisfied with JOIN definition? Click on Visualization tab



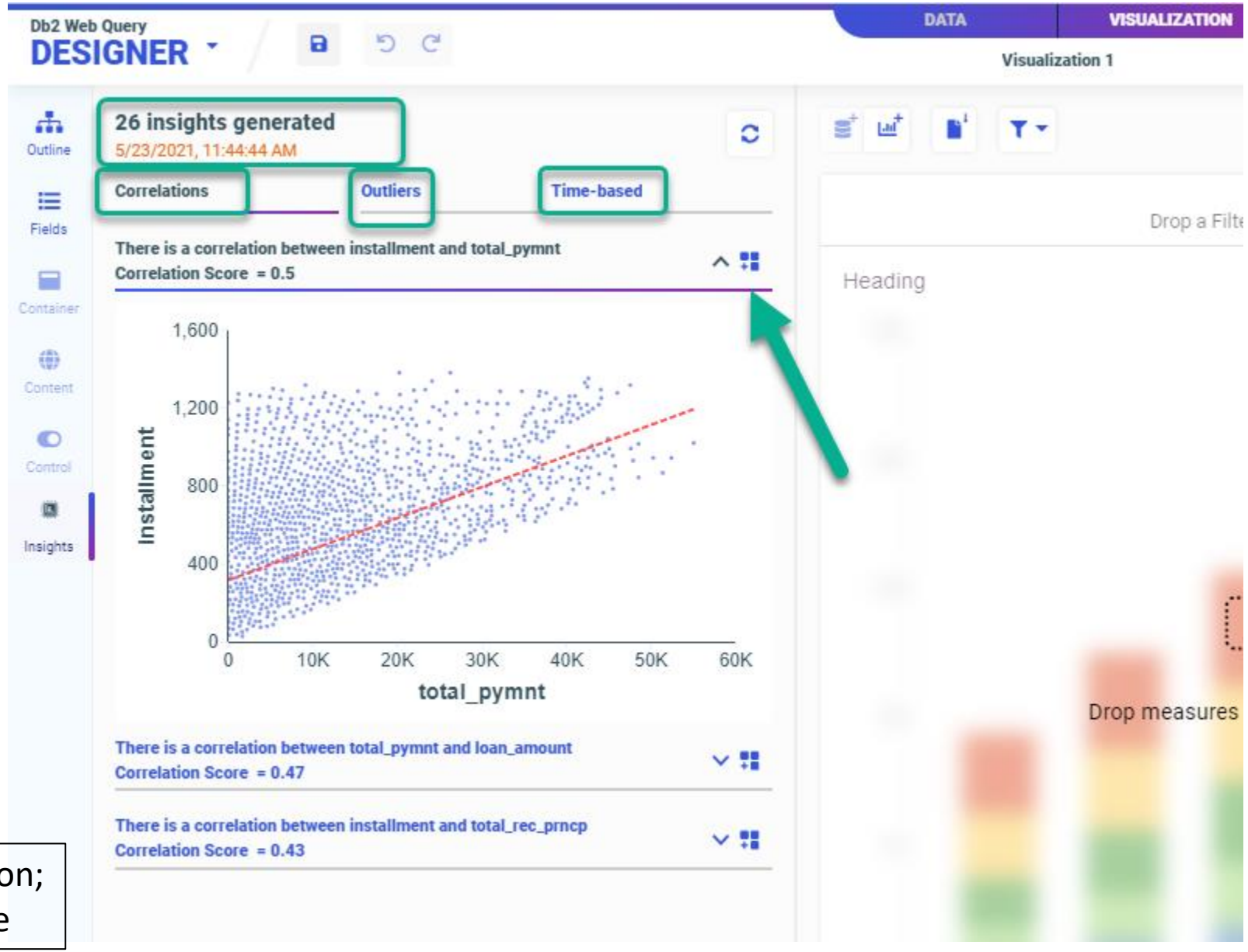
Load Data Supplemented Now with Date Attributes

- Within Designer you could start building a dashboard with your data set, then turn it into a “page”
  - A page can contain many different charts/graphs/report in single windowpane
  - For NOW, let’s get some insights from some pre-built ML Models; **Click on INSIGHTS**



Loan Data Supplemented Now with Date Attributes

- Data Sent to Cloud* Service
- 26 “insights” in the form of charts and text description returned from ML Models in 3 categories
  - Correlations
  - Outliers
  - Time-Based
- You can peruse each insight and decide to add to your “Page” (dashboard) using buttons in upper right-hand side.



* We are working on an On-Premise option; 500,000 row limit in current cloud service

Loan Data Supplemented with Date Attributes

IBM i Anywhere
IBM i Everywhere

Db2 Web Query
DESIGNER

DATA | VISUALIZATION

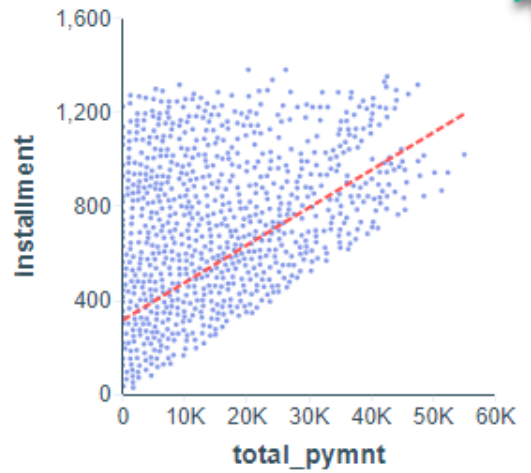
Visualization 1

Outline | Fields | Container | Content | Control | Insights

26 insights generated
5/23/2021, 11:44:44 AM

Correlations | Outliers | Time-based

There is a correlation between installment and total_pymnt
Correlation Score = 0.5



There is a correlation between total_pymnt and loan_amount
Correlation Score = 0.47

There is a correlation between installment and total_rec_prncp
Correlation Score = 0.43

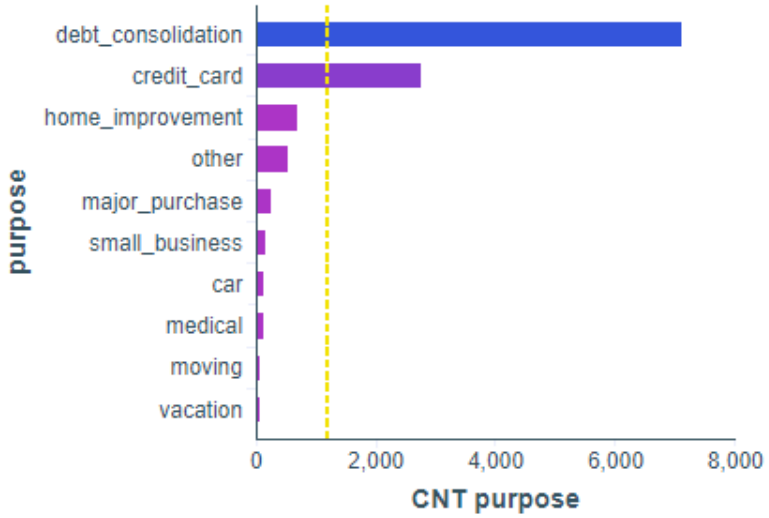
Live data: All

Page Heading

Drop a Filter or Field here

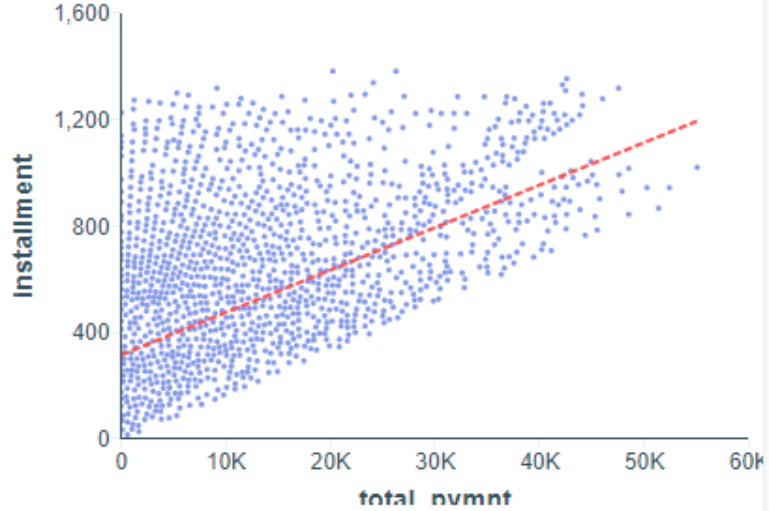
Container 1

Count of purpose is noticeably different per purpose



Container 2

There is a correlation between installment and total_pymnt
Correlation Score = 0.5



Now What?

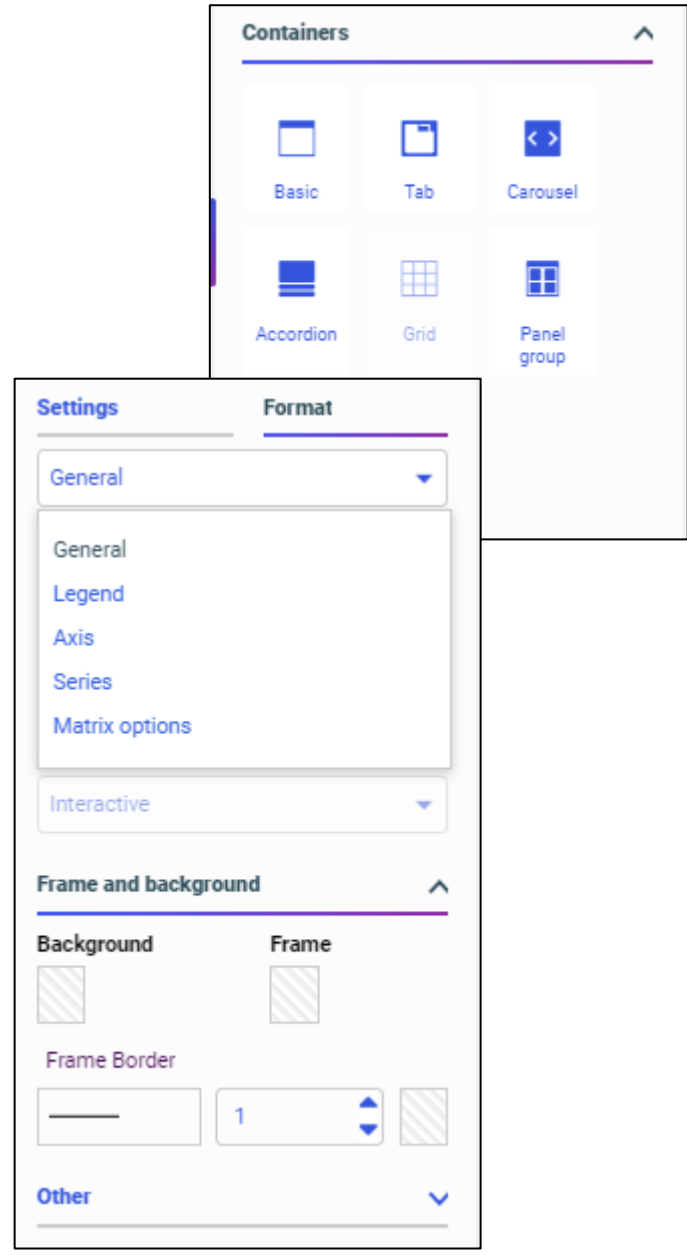
- You can add your own containers to the page with the data set you're working with
  - Multiple options for containers to contain more than one visualization/report
    - Tab, Carousel, Accordian, etc.

- Customize the page (formatting options)

- Add a dynamic Filter

- Save the page, allow others to run it
  - Post auto generation, you are feeding more/new data **into the charts** but not going back to the cloud ML Models (i.e., you trained the model, no need to do so except you may want to down the road at some point)

- You can create a DATA FLOW as a permanent object (similar to creating a permanent Synonym)



Loan and Date Time

Loan and Date Time Analysi

issue_d Y-Q
All

issue_d Y-Q
All

Clear | Custom

Previous month and current

Previous quarter and current

Previous year and current

YTD

Last 5 quarters

Last 13 months

Last 9 quarters

Last 25 months

Prior YTD

Last 7 days

Reason for Loan

Count of purpose

debt_conso
cred
home_impro
major_pu
small_bu

purpose

4,000 5,000 6,000 7,000 8,000

purpose

Install ment and Total Payment Correlation

There is a correlation between installment and total_pymnt
Correlation Score = 0.5

Installment

1,600
1,200
800
400
0

0 10K 20K 30K 40K 50K 60K

total_pymnt

Loan Amount an

loan_amount

60M
50M
40M
30M
20M
10M
0

Autumn Spring Summer Winter

Northern Season

purpose

car credit_card debt_consolidation educational
home_improvement house major_purchase medical
moving other renewable_energy small_business
vacation wedding

Financials by Purpose of Loan

120M
100M
80M
60M
40M
20M
0

car credit_card debt_conso... educational home_impr... house major_purc... medical moving other renewable_... small_busi... vacation wedding

purpose

interest_rate loan_amount

What Have You Learned Today?

- The BEST way to get started or evaluation or “play with” Db2 Web Query is EZ-Install
  - Request by sending an email to QU2@us.ibm.com with your name, company name, serial number and OS level and we’ll send you the installation info and package
  - Take the TEST DRIVE and InfoAssist Tutorials once you’ve installed

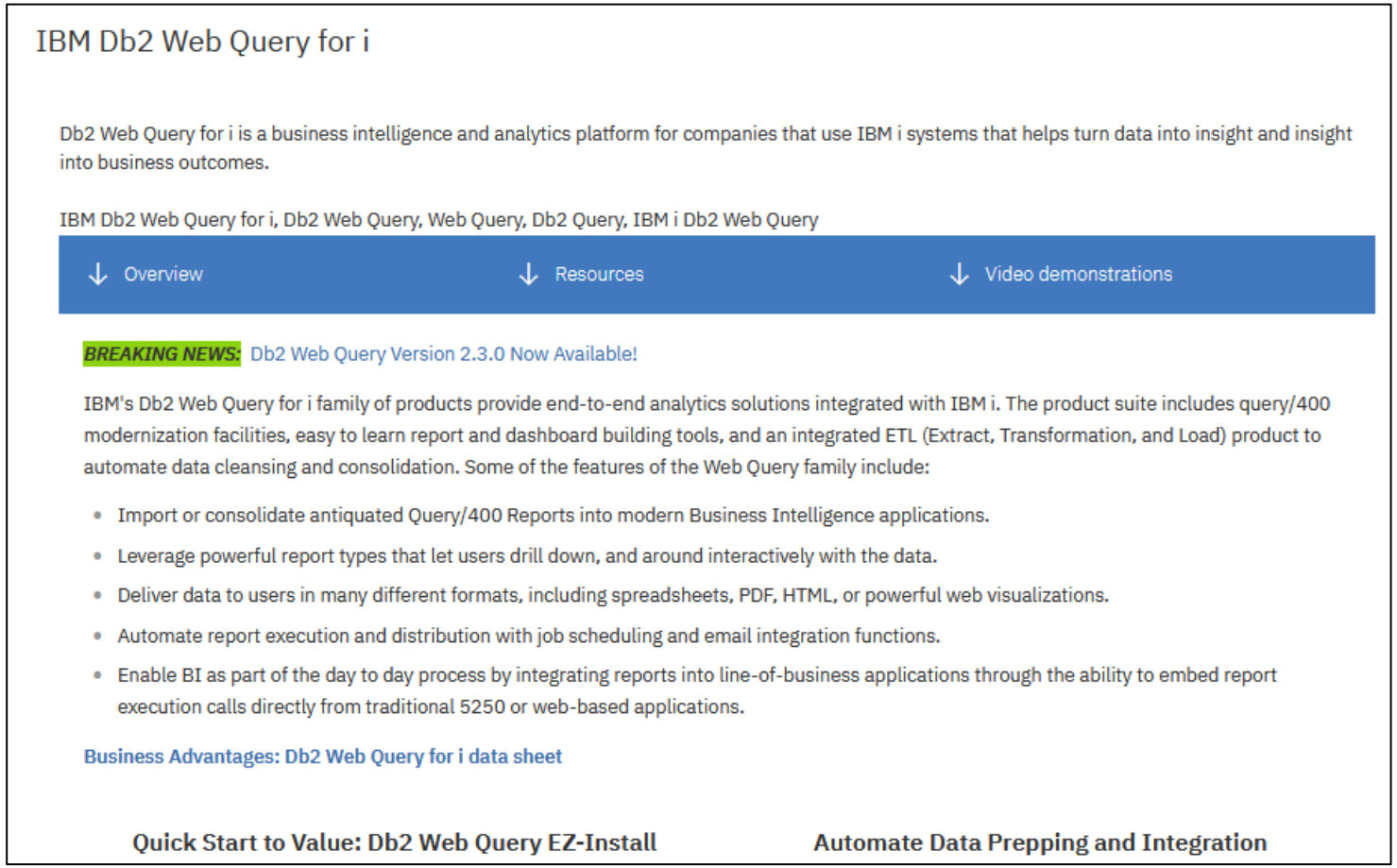
- You don’t need to be an SQL Programmer to use Db2 Web Query, but with even some basic knowledge of SQL you can leverage it to eliminate multi-pass workfile approaches, improve performance and build reports/dashboards over IBM i Services

- Synonyms are a GOOD THING. They simplify the data for report authors, and create a “single version of the truth” so people trust the data
  - Auto generation of synonyms can improve productivity and get ‘er done FAST

- Automated Insights is interesting and new – WE WANT YOUR FEEDBACK (QU2@us.ibm.com)!!!

Where to Go For MORE Information on 2.3.0

- Db2 Web Query for i main website
  - http://ibm.biz/db2webqueryi
- New Features Guide available on the Db2 Web Query WIKI
  - http://ibm.biz/db2wqwiki take the DOCUMENTATION link
- Product Manual also on the wiki
  - http://ibm.biz/db2wqwiki take the DOCUMENTATION link
- Doug Mack blog posts
  - Db2webqueryi.blogspot.com
- EZ-Install Test Drive and InfoAssist Tutorials
  - Included in the EZ-Install package
- EZ-Report
  - http://ibm.biz/db2wq-ezreport



THANK YOU!