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Power BI – Under The Covers

Liesel Hughes (they/them)

Cloud Solution Architect Data & AI
Microsoft Perth, Western Australia

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SafeSearch: Moderate - Filter

Power BI Inventory Dashboard

Power BI Sample Reports Template

Power BI Report Templates Free

Power BI Employee Dashboard

Dynamic Power BI Dashboard

Amazing Power BI Dashboards

Power BI HR Dashboard Examples

Examples of Good Power BI Reports

Power BI Platform

Power BI Report Themes



Power BI Reports: A Beginner's Guide to BI Reporting | LaptrinhX



How to display a full-width Power BI report in SharePoint - HANDS ON SharePoint



Guide: Power BI Reports Overview - Helpshift Knowledge Base Helpshift Knowledge Base



Create Your First Microsoft Power BI Report



Power BI Report Designs: How to Get Inspiration Through Enterprise DNA



How to point existing reports to a new dataset in Power BI (even from AAS) - Kasper On BI



Power BI Report Server: Power BI in On-Premises World | RADACAD



Report page layout



Sixten



Guide: Power BI Reports Overview - Helpshift Knowledge Base Helpshift Knowledge Base



Portfolio Dashboard



Display Microsoft Power BI Reports On Screens In Your Office - VuePilot



Creating Unique Power BI Report Template Designs | Enterprise DNA



Cash Flow Forecasting in Power BI - CSG Pro



Project Operations: Advanced reporting with Power BI | proMX



Power BI Profit and Loss



Power BI Report Design - 5 tips! - GAC Business Solutions



Power BI-Report | TatvaSoft



Dashboards and Data: How Power BI connectors help SMBs round out a BI and reporting strategy...



Power BI Reports: A Beginner's Guide to BI Reporting | LaptrinhX



Purchase by Month



Resource Assignments



P&L / COMMISSIONS REPORT



Power BI Financial Analysis



Financial Dashboard for Nonprofit Organizations - Example, Uses



Power BI Part 1 - My Continuous Learning Blog



The Power BI Course - Excel Campus



Power BI Reports - Purchase Analysis



NEW Power BI template for Microsoft Project for the web - Sensei Project Solutions



Construction Business Profit Report Ideas



Power BI Financial Analysis



Financial Dashboard for Nonprofit Organizations - Example, Uses



Power BI Part 1 - My Continuous Learning Blog



The Power BI Course - Excel Campus



Section 1:

Nice to meet you, Where you been?
I could show you incredible things



The Vertipaq Engine

Section 2:



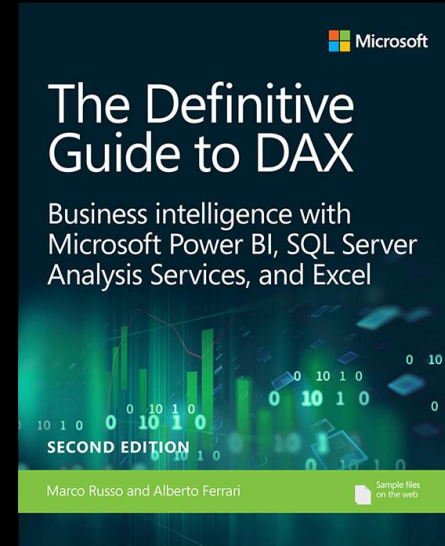
Oops I Did It Again



Common Gotchas

Section 3:

Gotta Make You Understand



Learning More



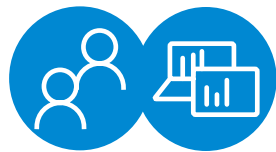
Disclaimer

The exact **algorithms** and **implementation** of Fabric & Power BI are **proprietary**.

I love my job, no spoilers today

The various **generic algorithms** employed are **well-known** and describe, to a **useful level**, how the internals operate allowing us to **build better models**.





MDX / DAX Queries

Request Processor + Query Plan Executor

Formula Engine
DAX/MDX Calculations

Storage Engine
Data Retrieval

Vertipaq



xmlSQL



In-memory columnstore



Refresh



Data Store

Direct Query



SQL etc

Data Sources



Row vs Column Store

ID	Invoice	Product	Cost
1	10123	Cheese	\$17.23
2	10673	Cheese	\$21.37
3	11086	Cheese	\$19.88
4	10734	Cheese	\$18.76
5	10967	Not-Cheese	\$9.50

ID	Invoice	Product	Cost
1	10123	Cheese	\$17.23
2	10673	Cheese	\$21.37
3	11086	Cheese	\$19.88
4	10734	Cheese	\$18.76
5	10967	Not-Cheese	\$9.50



Compression – Value Encoding

Invoice

10123

10673

11086

10731

Value

Super Secret Sauce

550

963

611

844

10 bits



Compression – Dictionary Encoding

Product
Cheese
Cheese
Cheese
Cheese
Not

Hash (Product) →

Product
Cheese
Cheese

Product
0
0
0
0
1

Super Secret Sauce



Compression - RLE

ID	Product
0	Cheese
1	Not-Cheese

Product
0
0
0
0
1

Super Secret Sauce

Product	Count
0	4
1	1



All Together

Product
Cheese
Cheese
Cheese
Cheese
Not-Cheese

68 Bytes

Vertipaq Storage			
Dictionary		Data	
ID	Product	Product	Count
0	Cheese	0	4
1	Not-Cheese	1	1

37 Bytes



Direct Lake – Vertipaq Native Delta Storage



Exploring Vertipaq – A Demo!



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Oops I Did It Again - Gotchas

Trying to Store Everything

Types / Precision

Auto DateTime

Believing DMVs

Column Splits

Date and Time

Transaction IDs, Invoice Numbers etc

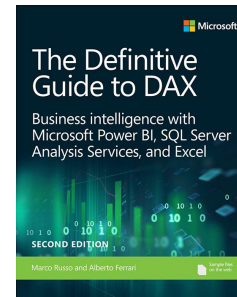


Gotta Make You Understand - Learning

[The Definitive Guide to DAX – 2nd Edition](#)

DAX Studio <https://daxstudio.org/>

Bravo <https://bravo.bi/>



[Performance Tuning of Tabular Models in SQL Server 2012 Analysis Services | Microsoft Docs](#)

[https://docs.microsoft.com/en-us/previous-versions/sql/sql-server-2012/dn393915\(v=msdn.10\)](https://docs.microsoft.com/en-us/previous-versions/sql/sql-server-2012/dn393915(v=msdn.10))

[Data reduction techniques for Import modeling - Power BI | Microsoft Docs](#)

<https://docs.microsoft.com/en-us/power-bi/guidance/import-modeling-data-reduction>

[Best practice rules to improve your model's performance | Microsoft Power BI Blog](#)

<https://powerbi.microsoft.com/en-us/blog/best-practice-rules-to-improve-your-models-performance/>

[Delta Lake table optimization and V-Order - Microsoft Fabric | Microsoft Learn](#)

<https://learn.microsoft.com/en-us/fabric/data-engineering/delta-optimization-and-v-order>





Questions?



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