Microsoft

Power BI – Under The Covers

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Microsoft Bing

power bi reports

ALL | WORK | IMAGES | VIDEOS | MAPS | NEWS | SHOPPING

Cool Power BI Reports | Power BI Dynamics | KPI in Power Bi | Power BI Report Builder | Power BI in Teams | Power BI Reports in Excel | Beautiful Power BI Reports | Microsoft Power BI Report Builder | Power BI Reports Examples and Ideas | Report Power BI Project Portfolio | Examples of Power Bi Reports | Stunning Power BI Dashboards | Good Power Bi Reports | Power BI Inventory Dashboard | Power BI Dataset Ic

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

Power BI +Project Template

NEW Power BI template for Microsoft Project for the web – Sensei ...

Powerful and FREE: Meet the beautiful features of Power BI - TKI Solutions

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

Power BI Reports | Tips to make Impactful & Interactive Power BI ...

View Reporting Services mobile reports in Power BI - Finance and ...

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

Reports in the Power BI service - Power BI | Microsoft Docs

Power BI Report Exam

View a report - Power BI | Microsoft Docs

Tutorial: Explore a Power BI sample - Power BI | Microsoft Docs

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

Tour the report Filters pane - Power BI | Microsoft Docs

Power BI for Small Business: Project Management Reporting - FluentPro ...

Power BI Updates & Insights: Shared and Certified datasets; Customized ...

Create Your First Microsoft Power BI Report

How to point existing reports to a new dataset in Power BI (even from ...

HR Reporting with Power BI | K Team Solutions GmbH

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

Power BI Reports - Purchase Analysis

Power BI | OnePlan

Create a paginated report for Power BI ...

Tutorial: From Excel workbook to stunning report in Power BI Desktop ...

Power-BI-Report | TatvaSoft

Power BI and Azure as the future of enterprise analytics - TechRepublic

Reporting for Microsoft Planner Using Power BI - FluentPro Blog

Microsoft Business Analytics – Power BI | 365Solutions

Build your own usage report with Power BI - Kasper On BI

Power BI Financial Analysis

Power BI for Office 365 Planner Pack for Microsoft ...

Power BI Reports - Inventory Analysis

Masking confidential data in Power BI reports - DataChant

Power BI for Office 365 Planner - Power BI Reporting Pack for Microsoft ...

Power BI Report Server; Power BI in On-Premises World – RADACAD

Announcing Power BI Reports Pack For FluentPro Financials - FluentPro Blog

Tour the report Filters pane - Power BI | Microsoft Docs

Tutorial: Explore a Power BI sample - Power BI | Microsoft Docs

[Download] # 11 Latest Power BI Templates | Create Power BI Template...

Power BI | OnePlan

How to user Power BI to monitor users activities in Off...

Power BI for Office 365 Pack for Microsoft ...

Inside Power BI in 20ish mins

(Featuring TayTay, Britney, and Sandy & Danny)

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

The Vertipaq Engine

→ Oops I Did It Again

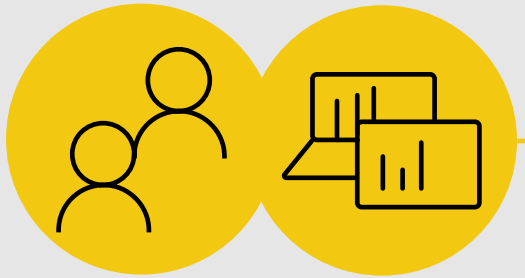
Common Gotchas

→ Tell Me More, Tell Me More

Links and Learning

Disclaimer

- The exact algorithms and implementation of Power BI are proprietary.
  - I love my job, no spoilers tonight
- 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

Formula Engine

DAX/MDX Calculations

Request Processor +Query Plan Executor

Storage Engine

Data Retrieval

Vertipaq

xmlSQL

In-memory columnstore

Refresh

Direct Query

SQL etc

Data Sources

Column vs Row 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
1073

→ Value E

550
963
611
844

10 bits

Super Secret Sauce

Compression – Dictionary Encoding

Product
Cheese
Cheese
Cheese
Cheese
Not-Cheese

→ Hash (Dictionary) Encoding

ID	Product
0	Cheese
1	Not-Cheese

Product
0
0
0
0
1

Compression

Product
Cheese
Cheese
Cheese
Cheese
Not-Cheese

→ Run Length Encoding

Prod	nt
	1

Super Secret Sauce

Compression

Product
Cheese
Cheese
Cheese
Cheese
Not-Cheese

68 Bytes

Vertipaq Storage

Dictionary

ID	Product
0	Cheese
1	Not-Cheese

Data

Product	Count
0	4
1	1

37 Bytes

Other Secret Sauce

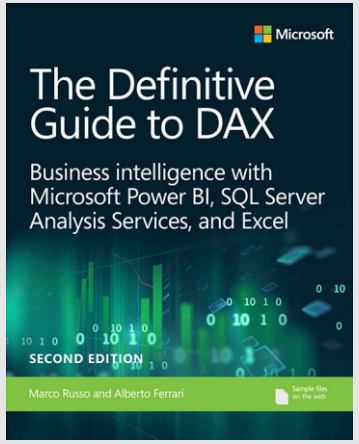
- → Hierarchies – MDX - Excel
- → Relationships
  - → “Mapping” between FK values and primary table row index
- → Segments and Partitions
  - → Data is processed blocks of 1M rows, one thread per segment
- → Materialisation
  - → SE to FE results materialized in-memory, uncompressed
- → Aggregations

Exploring Vertipaq – A Demo!

Oops I Did It Again - Gotchas

- Trying to Store Everything
  - Strings
- Types
  - Precision
- Calculated Cols
  - Optimising Boolean filters
- Column Splits
  - Date and Time
  - Transaction IDs, Invoice Numbers
- Over-partitioning
- Attribute Hierarchies
  - isAvailableInMDX
- Auto DateTime
- Believing DMVs

Tell Me More, Tell Me More



The Definitive Guide to DAX – 2nd Edition

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)

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/

Microsoft

Thank You