

# Azure Analysis Services: why it matters for Power BI users

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 Power BI Gebruikersdag 2018

Motion 10

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THE BI & BIG DATA NETWORK

SUMMAVIEW  
TEAM BUSINESS INTELLIGENCE

Directing Data  
DATADOGS

DataScenarios  
Connecting data to insights

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# Who Am I?

- Chris Webb
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  - Twitter @cwebb\_bi
- UK-based consultant and trainer: [www.crossjoin.co.uk](http://www.crossjoin.co.uk)
- Author/co-author of several books:
  - MDX Solutions
  - Expert Cube Development with SSAS 2008
  - Analysis Services 2012: The BISM Tabular Model
  - Power Query for Power BI and Excel
- Data Platform MVP
- Blogger: <http://blog.crossjoin.co.uk>

# Agenda

- What is Azure AS and why does it matter to me?
- Building models in Azure AS
- The limits of Power BI Pro/Premium – and how Azure AS can help
- Pricing and licensing

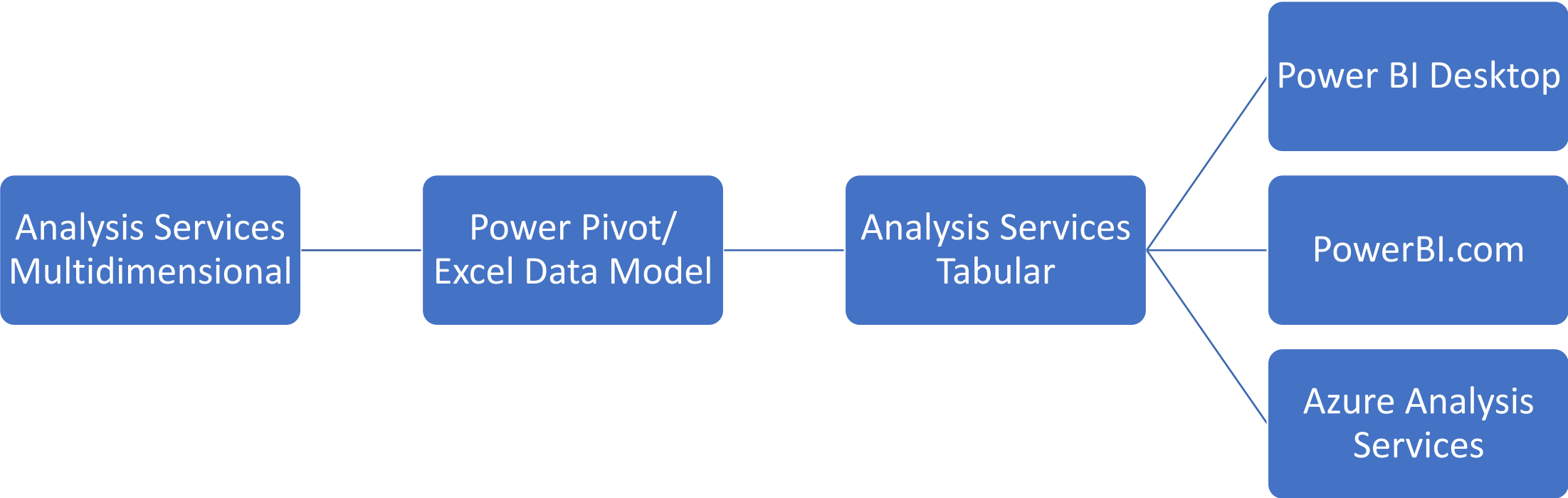
# What is Azure Analysis Services?

- A Platform as a Service version of SQL Server Analysis Services (SSAS)
- Specifically, SSAS Tabular models at 1400 compatibility level
  - That's the same level as SSAS 2017 Tabular
  - 1200 compatibility level (SSAS 2016) also supported
- Both native in-memory and DirectQuery storage supported
- All SSAS Tabular modelling features supported (in Standard tier)
- New features appear regularly

# Why Does This Matter To Me?

- Azure AS is *part* of Microsoft's 'grow up' story for Power BI
- Upgrade when/if you hit Power BI's inherent limitations in:
  - Development
  - Data volumes
  - Query performance
  - Data refresh
  - Security
- The engines are the same – the modelling experience is the same – very few new skills to learn!

# The Analysis Services Family Tree



# Azure AS vs Power BI Premium

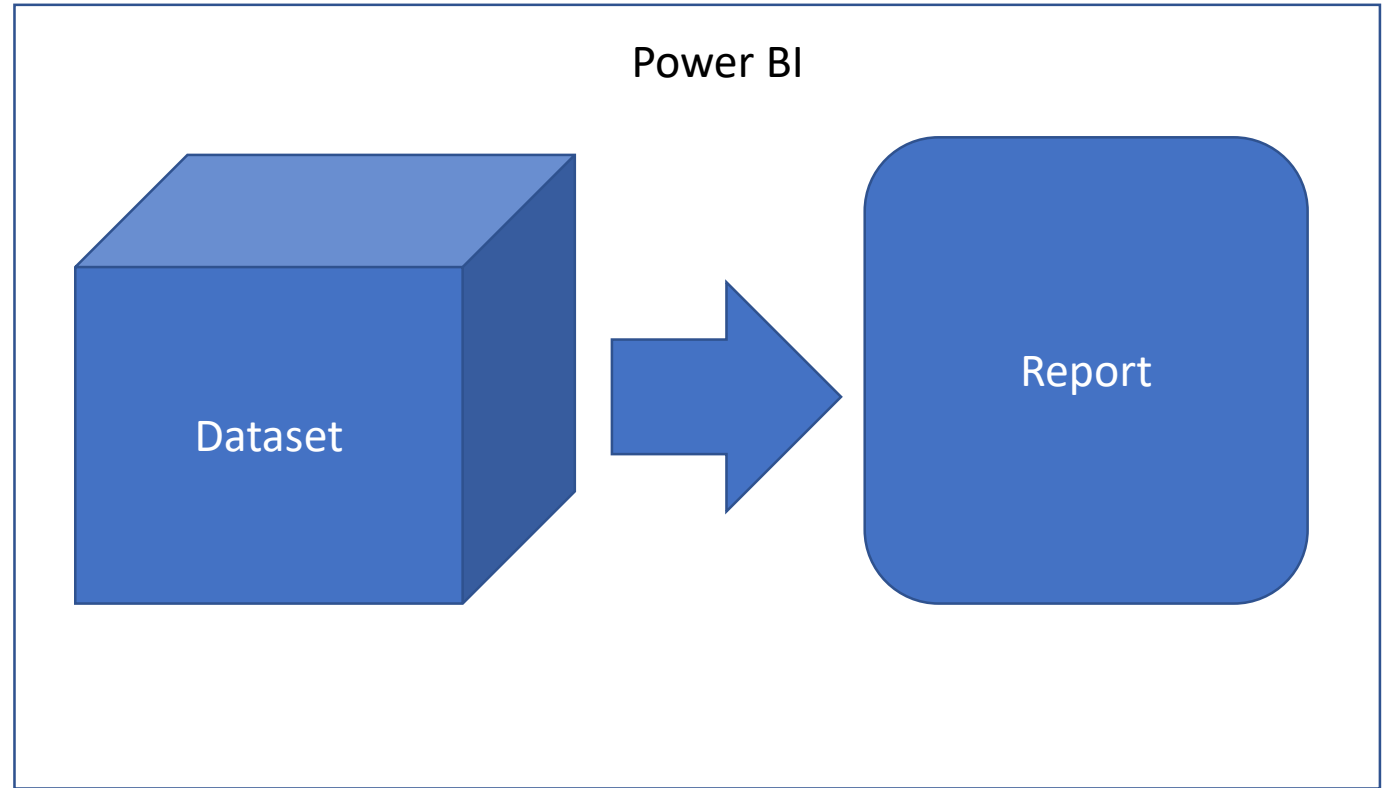
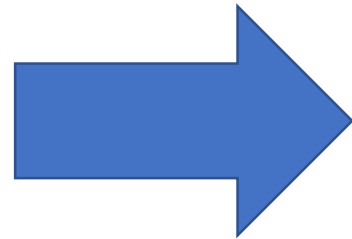
- But isn't Power BI Premium the grow-up story for Power BI?
- Yes, but Azure AS may be a better alternative in some cases
- Generally speaking, MS positioning is:
  - Premium is easier to use and better for decentralised self-service BI
  - Azure AS is more techy, more flexible and better for an IT department-led BI deployment
- Other factors, like cost, also likely to be important in the choice

# Azure AS Vs On-Premises SSAS

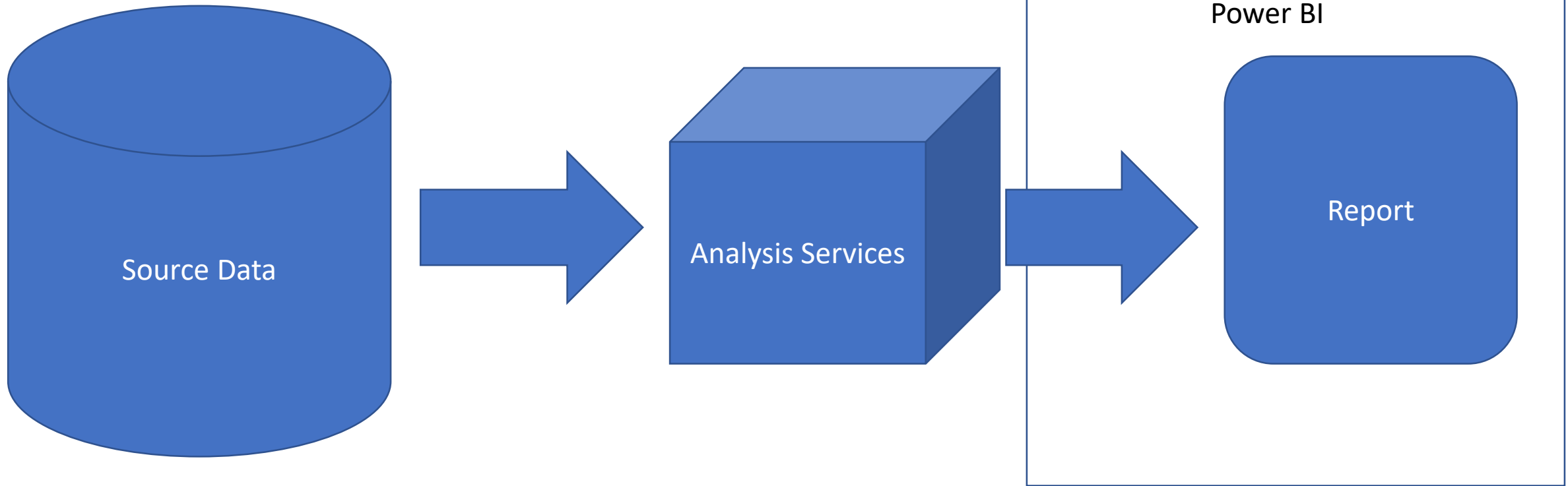
- Benefits of using Azure AS over on-premises SSAS:
  - No upfront hardware/licensing costs
  - No cost for ongoing maintenance
  - Spin up a server in minutes
  - Easy scale up/out
  - Gets new features/upgrades automatically
  - If your data is already in the cloud, it should stay there
- Is it cheaper...?
- No SSAS Multidimensional support... yet 😞



# Importing Data



# Live Connections



# Moving from Import to Live connections

- Using Azure AS with Power BI means you'll use Live connections rather than importing data
- This means that development work is split between:
  - Azure AS development of dataset in Visual Studio SSDT
  - Report development (as normal) in Power BI Desktop
- Azure AS development can be done by IT – although any experienced Power BI developer will be able to do it too
- IT will need to be involved in many maintenance and configuration tasks though to get the most out of Azure AS
- You can switch existing reports to use Azure AS using the rebind API

# Configuring Azure Analysis Services

- You will need:
  - A credit card
  - An Azure subscription
  - A Resource Group
  - Azure Active Directory
  - A user in Azure AD that you can set as an Azure AS Administrator
  - The Azure AS version of the On-Premises Gateway installed if you want to load data from on-premises data sources
- Then go to the Azure Portal and follow the instructions...

# Azure Analysis Services Tiers

- Azure Analysis Services servers come in three tiers
- Multiple performance levels in each tier
- Developer tier is intended for dev use but licence allows for use in production
  - Runs on shared hardware so no performance guarantees
  - Has all features and functionality
- Basic tier lacks some features: perspectives, partitioning, DirectQuery
- Standard tier has all features

# Developing With Azure AS in SSDT

- Create a 1400 compatibility level SSAS Tabular project in SSDT
- Connect to your data sources – use Service Account for data source impersonation mode
- Build your model in SSDT
- Enter your Azure AS server name in the Deployment Server property
- Deploy (sign in as an administrator when the Azure AD popup appears, if necessary)
- Process as normal
- Build reports in Power BI and Excel as normal

# Azure AS Web Designer

- As an alternative to Visual Studio SSDT, you can use the Azure AS web designer for development to:
  - Edit existing models
  - Create new models from Azure SQL Database or Azure SQL DW
  - Upload Power BI Desktop files and convert to Azure AS
  - Download Visual Studio projects
- To browse models it allows you to:
  - Browse in a basic web-based experience
  - Download Excel or Power BI Desktop files

# Power BI Limits: Development

- All development – data loading, modelling, reports – is combined into the .pbix file by default
- Makes multi-user development and using source control difficult
- You can download a .pbix file for a published report, but which .pbix file is the master copy?
- Need to make a conscious effort to have multiple reports connecting to a single data model



# Azure AS: Development

- Development in Visual Studio is very similar to development in Excel Power Pivot (and to a lesser extent Power BI Desktop)
- Splitting the data model from everything else means separate teams can build the data model and the reports
- Integration with Visual Studio gives automatic integration with most source control solutions
- BISM Normalizer (<http://bism-normalizer.com/>) is a free, open-source tool that gives you partial deployment, database compare and more
- Everything is scriptable

# Power BI Limits: Data Volumes

- Power BI Desktop can work with as much data as you can fit into memory on your development PC
- Limits on model size after publishing to the Power BI Service with Pro subscription:
  - 1GB for models created in Power BI Desktop
  - 250MB for models created in Power Pivot/Excel Data Model
- Size limits for all storage on Power BI Service with Pro subscription:
  - 1GB/user for free subscriptions
  - 10GB/user for Power BI Pro subscriptions
  - 10GB per workspace – though total usage cannot exceed 10GB/user overall

# Power BI Premium : Data Volumes

- Currently model size is limited to 10GB
- Main benefit of Premium is increased storage capacity for all models:
  - P1 25GB
  - P2 50GB
  - P3 100GB
  - Larger P4/P5 available in some regions

# Azure AS: Data Volumes

- Storage in Azure AS is limited by server
- You can have multiple databases per server
- One Power BI model = one Azure AS database
- Current storage (equivalent to total size of all models) by Azure AS tier:
  - Developer 3GB
  - Basic 10GB to 20GB
  - Standard 10GB to 640GB

# What About DirectQuery?

- DirectQuery is another way of dealing with data volume problems
- Azure AS also supports DirectQuery
- But:
  - Not all data sources support DirectQuery
  - Not all Power BI features are available in DirectQuery
  - Query performance can be a **big** problem, especially with complex measures

# Power BI Limits: Performance

- Power BI Pro makes no guarantees about query performance
- Nothing much you can do if you have:
  - A large model
  - Complex calculations in DAX measures
  - Many users querying at the same time  
...and your queries are slow
- Other factors inside the Power BI service may also impact query performance
- MS throttles performance to stop one user hogging resources

# Power BI Premium: Performance

- Power BI Premium capacity is dedicated to you alone so you won't suffer from the 'noisy neighbour' problem
- Performance is measured in virtual cores, divided into
  - Front-end cores, for report rendering, APIs, web service
  - Back-end cores, for data refresh, querying
- Virtual cores by SKU:
  - P1 4 front-end/4 back-end
  - P2 8 front-end/8 back-end
  - P3 16 front-end/32 back-end

# Azure SSAS: Performance

- An Azure AS server is also dedicated to you
- Performance is measured in QPUs (Query Processing Units)
- 100 QPUs is roughly equal to 5 pretty fast cores
- A server with 200 QPUs will be 2x faster than one with 100 QPUs
- Current spec by Azure AS tier:
  - Developer 20 QPUs
  - Basic 40 QPUs to 80 QPUs
  - Standard 40 QPUs to 640 QPUs
- Remember – only equivalent to Premium back-end cores



# Power BI Limits: Data Refresh

- Performance of data refresh in Power BI subject to same limitations regarding resources as query performance
- Several other significant limitations in Power BI Pro:
  - Tables must always be completely reloaded, or never reloaded at all
  - No supported way to add just new data to a table
  - Can only schedule refresh up to 8 times per day
  - No exact control over when refresh takes place
  - No (easy) way to start refresh when other operations finish

# Power BI Premium: Data Refresh

- Performance of data refresh in a Premium capacity experiences same benefits as with query performance
- Datasets can be refreshed up to 48 times a day
- Other Pro restrictions still in place, but coming soon:
  - Incremental refresh
  - Dedicated data refresh nodes will allow for processing to take place without affecting query performance
  - Basically the same features that are already available in Azure AS

# Azure AS: Data Refresh

- Partitioning tables allows you to refresh only the partitions where data has changed
- Partitions are processed in parallel, so overall refresh performance can be much faster
- Individual tables can be refreshed
- No restrictions on how often you refresh
- You can schedule or invoke data refresh operations
- Setting up all of this is relatively complex right now though

# Security

- Power BI and Azure AS have the same security features
  - Allow/deny access to all data
  - Row-level security
- Azure AS also has object-level security on:
  - Tables
  - Columns on tables
- Power BI security is the responsibility of the report developer – will rules be applied consistently across all reports?
- Applying security in Azure AS means all reports that connect to a database always have the same security applied

# Pricing And Licensing

- Power BI Pro subscription is currently €8.40 per user per month
- Power BI Premium P series starts at €4200 per month
- Azure SSAS pricing (per month):
  - Developer €81.27
  - Basic €264.73 to €529.43
  - Standard €498.65 to €12780.05
- Easy to scale up/down and scale out on demand
- A paused Azure AS server costs you nothing
- So you probably won't pay the monthly costs shown above

# The Future

- Premium will get lots of new features like:
  - Incremental refresh
  - Better monitoring capabilities
  - More options for subscriptions
  - Integration of SSRS in the cloud
  - The ability to connect from Excel and other SSAS client tools
- Will these features make Premium more attractive?

# Summary

- Azure AS is a natural progression from Power BI
- All your existing Power BI modelling/DAX skills are transferable
  - Your Power Query/M skills will be soon too
- Centralising model development makes sense in many cases
- Azure AS gives you more control over development, performance and data refresh
- Azure AS is more cost effective than Power BI Premium if all you want is larger models and better query performance

# Bedankt!

Vergeet niet de evaluatie in te vullen!  
Scan de QR code.



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Laat MS Office voor ú werken



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Challenge accepted.



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Connecting data to insights

