Microsoft

Should Data Models be Implemented in Azure Synapse Analytics or Power BI Premium?

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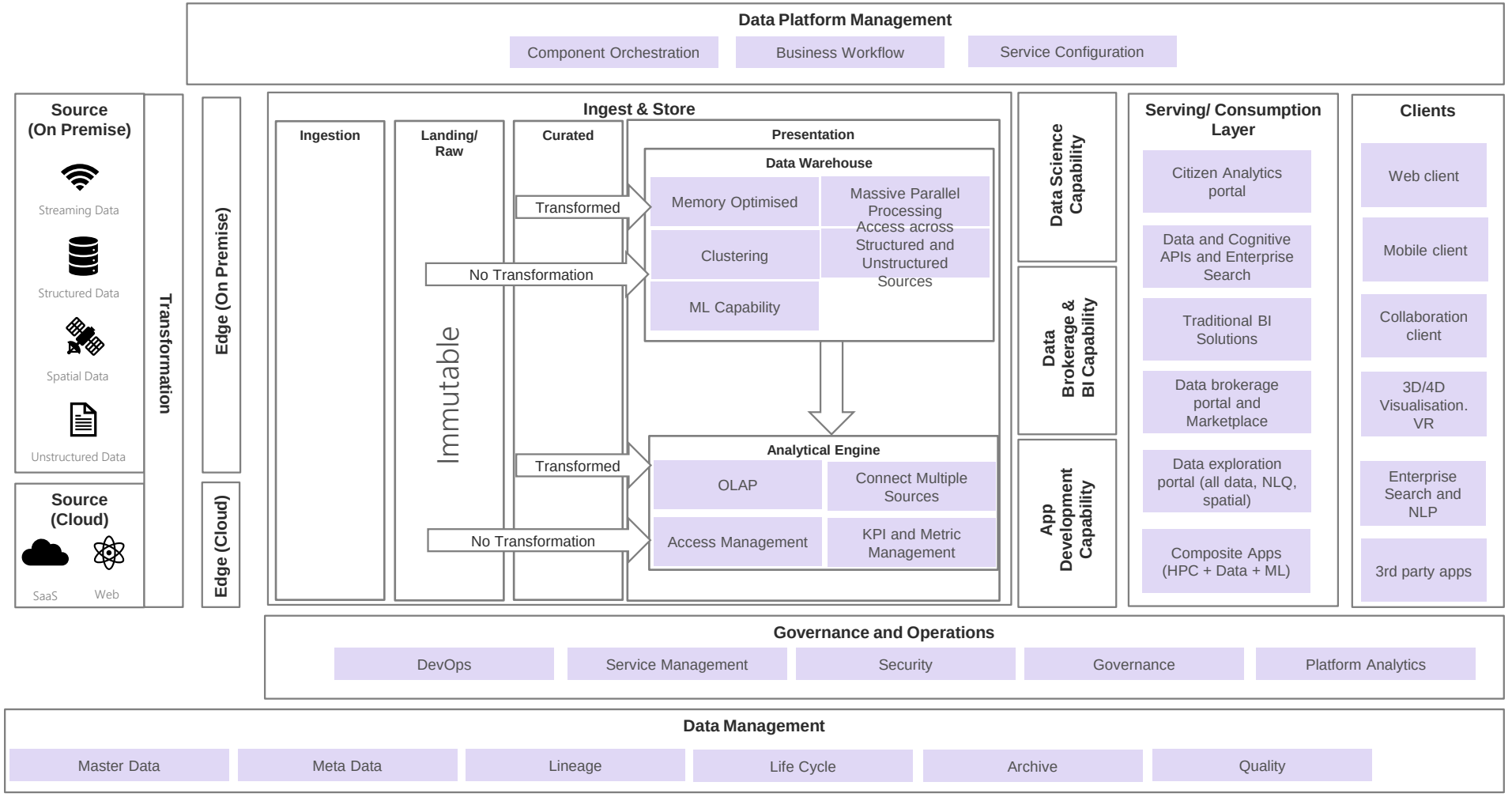
Modern Data Warehouse Generic Pattern



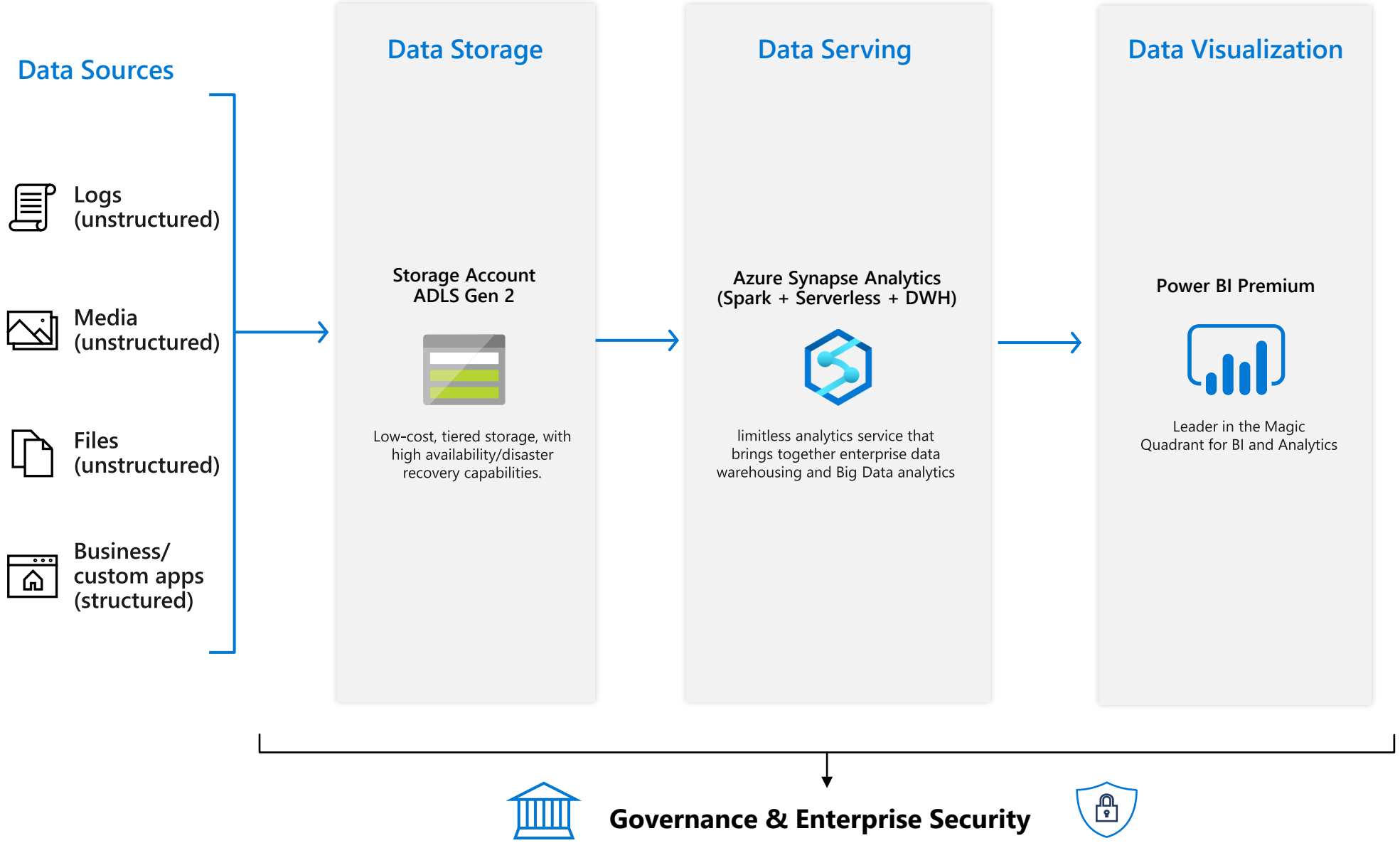
Credit: © Wagdy Issac, *Data Adoption Framework (2019)*

Microsoft Azure is the only cloud provider to unify AI, BI, and Analytics creating accelerated time-to-insight

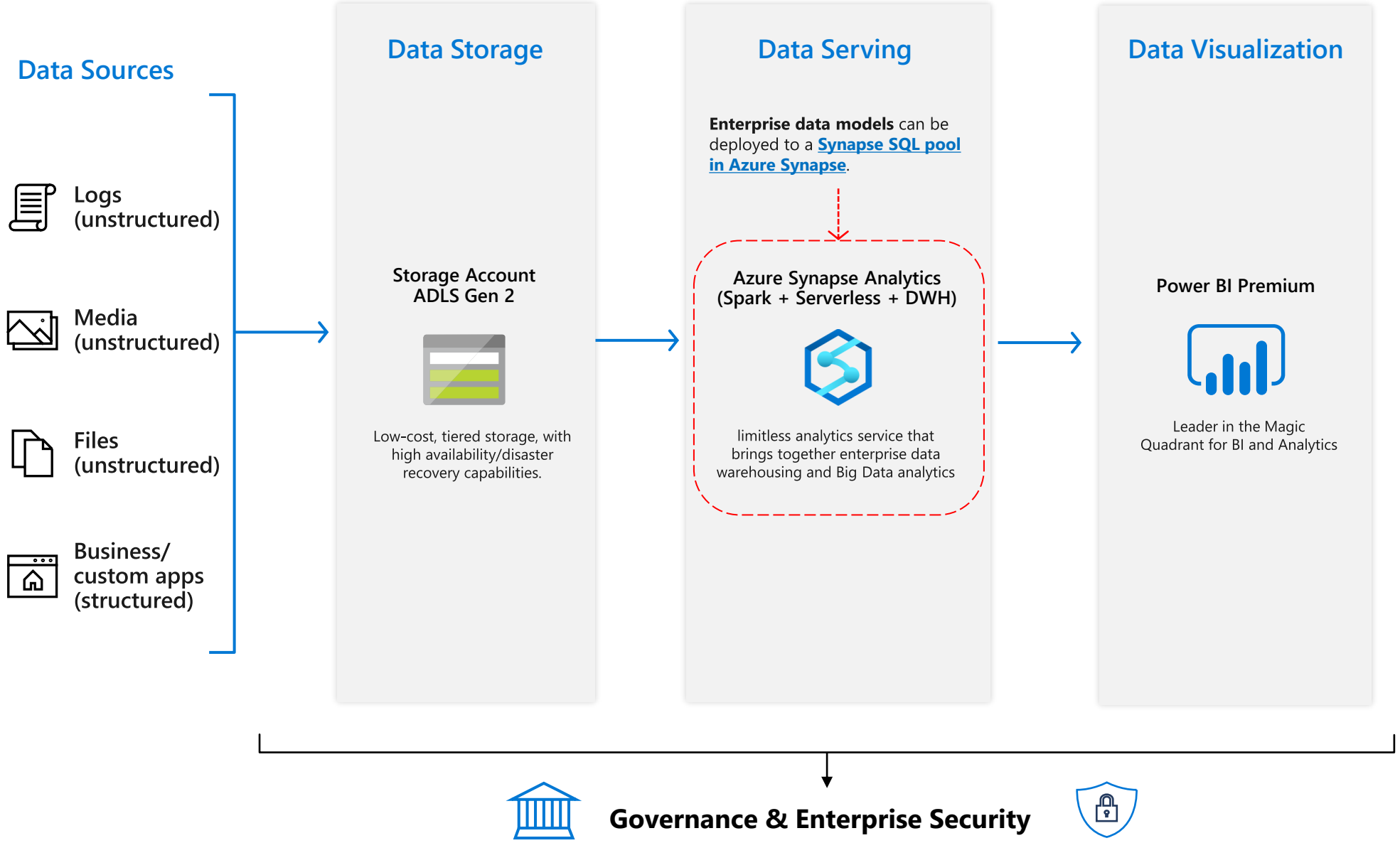
BI Solution Pattern I

Data Models in Azure Synapse Analytics

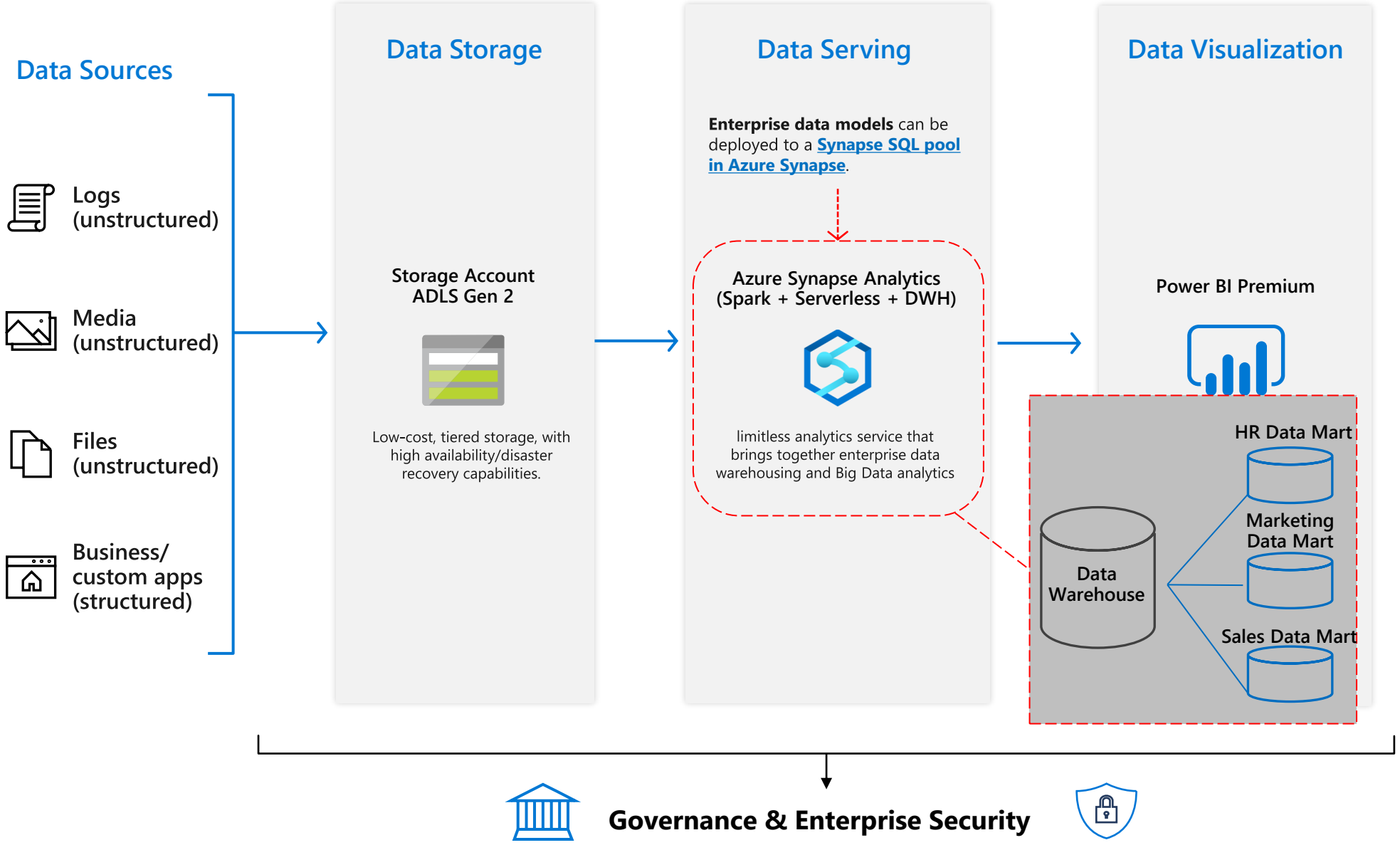
Reference Architecture



Reference Architecture

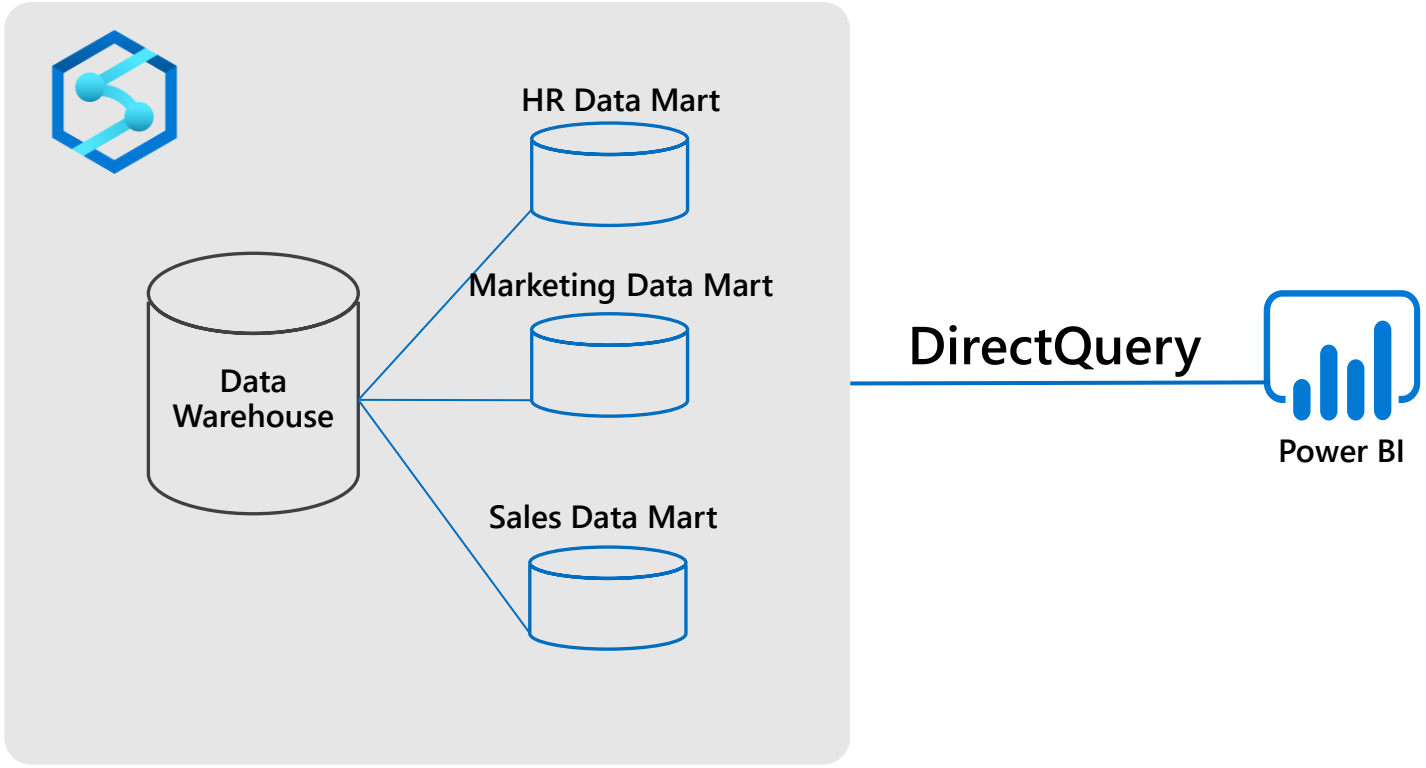


Reference Architecture



Connection Mode

Use Power BI as visualization layer where the data are hosted in Azure Synapse Analytics



Advantages

- Enable analytics on large data with **massive parallel processing (MPP)**
- Store in relational tables with **columnar storage** & **columnar ordering**
- Use all or subset of the data in **materialized views** can get faster performance
- Tune the performance with result set caching (so recomputation is not needed.)
- Come with more complete security.
  - Row-level security (RLS)
  - Column-level security
  - Dynamic Data Masking
- Get most up-to-date data from source → Single source of truth
- It may no need Power BI Premium to handle large dataset
- Possible for no data movement (serverless pool)

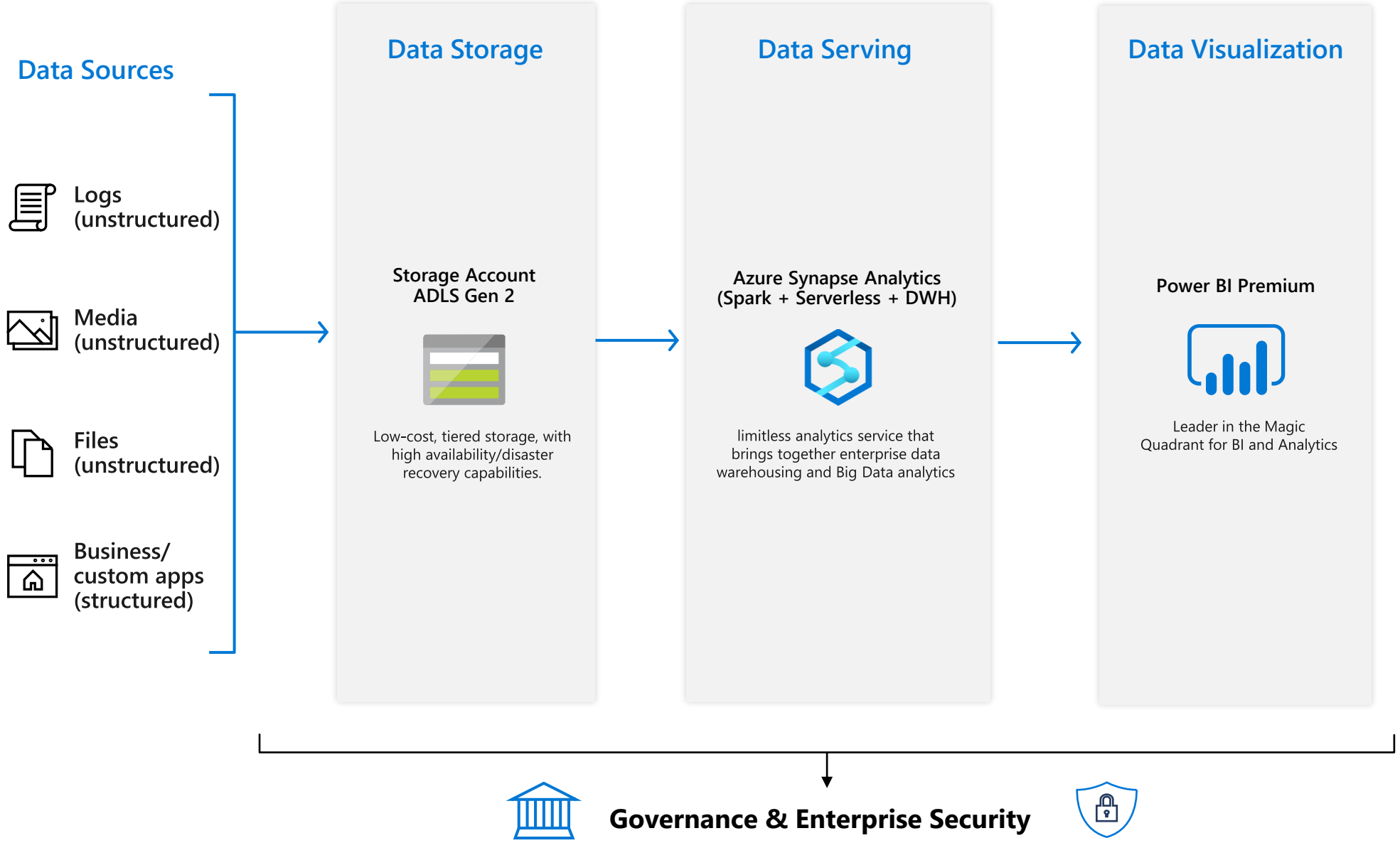
Disadvantages

- There is a limit of **128 max concurrent queries** in SQL DW and 1,024 max open concurrent connections. When the concurrency limit is exceeded, the request goes into an internal queue where it waits to be processed. When the connection limit is exceeded, connections will be refused with an error.
- Slower **dashboard performance** & **DirectQuery performance**.
- **Cannot add new columns** or create calculated column within Power BI
- **Cannot** leverage **DAX** functionality due to some limitations
- **Query load** depends on Synapse only
- **Auto date/time** is unavailable
- Synapse can only connect to a single Power BI workspace now

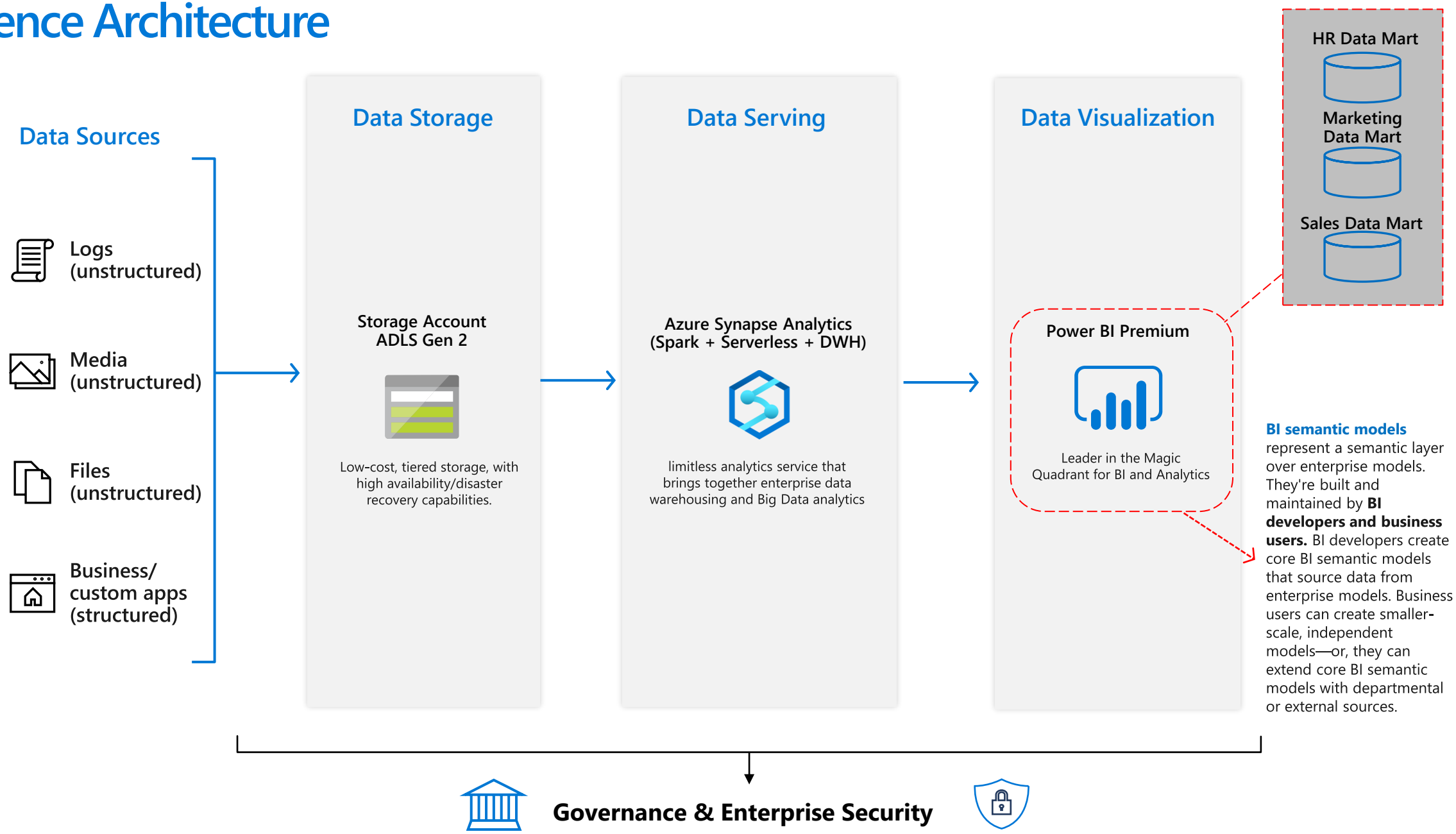
BI Solution Pattern II

Data Models in Power BI Premium

Reference Architecture

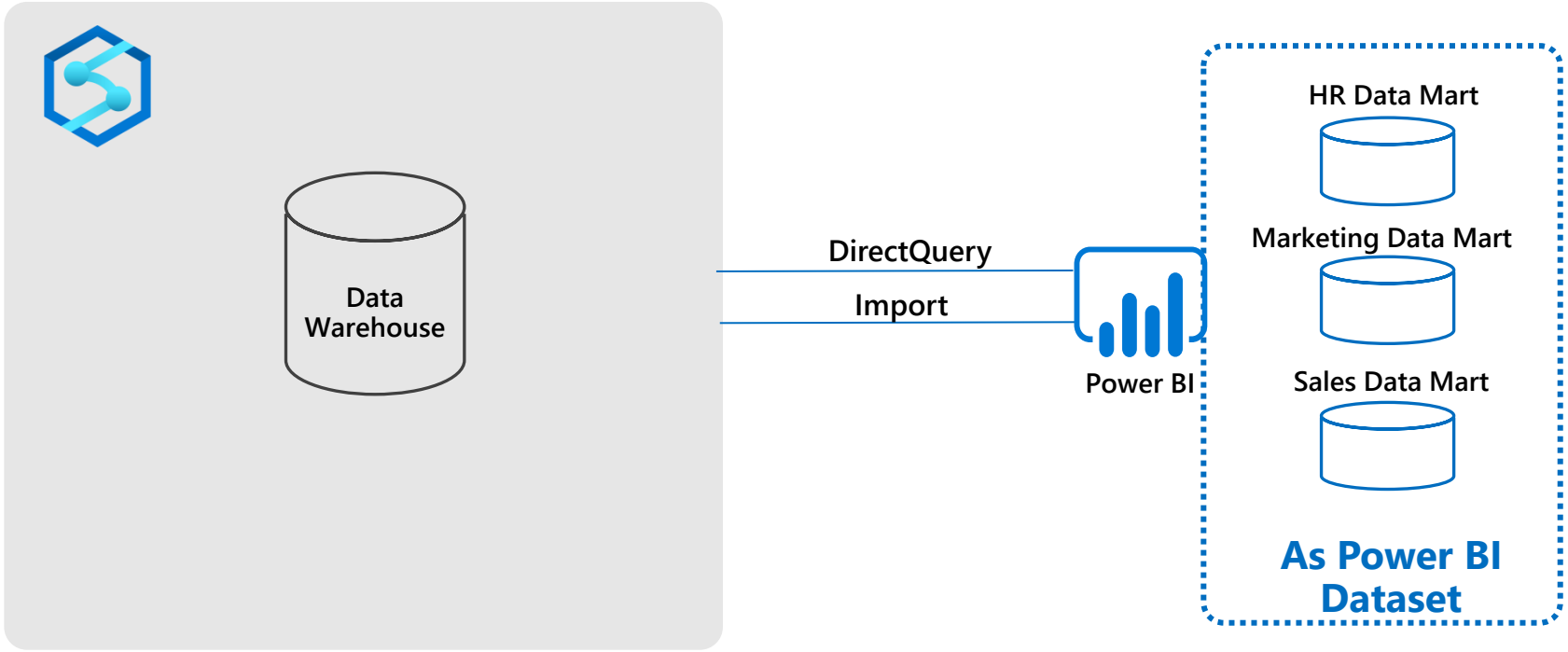


Reference Architecture



Connection Mode

Create Sematic Model (Dataset) in Power BI, by leveraging Composite model use aggregation table with **Import** model and detail or adhoc query with **DirectQuery** mode to Azure Synapse analytics



Advantages

- Allow for **faster query performance**
- Leverage **DAX functionality**
- More flexible to combine with other dataset/ data sources
- Time intelligence capabilities
- As source still resides in Synapse, these functionality can be used (on the Synapse side though):
  - Materialized views
  - Result-set cache
  - Security
    - Row-level security (RLS)
    - Column-level security
    - Dynamic Data Masking

Disadvantages

- Lack some part of the security, particularly **column-level security**
- No Perspectives feature yet. **Perspectives**, in tabular models, define viewable subsets of a model that provide focused, business-specific, or application-specific viewpoints of the model
- Need schedule to refresh data to keep data current - it may bottleneck if we have so many schedule at the same time
- There's a dataset size limit (400GB)
    - Large datasets can be enabled for all Premium P SKUs and Embedded A SKUs. **The large dataset size limit in Premium is comparable to Azure Analysis Services**, in terms of data model size limitations.

Decision Flow

Azure Synapse Analytics

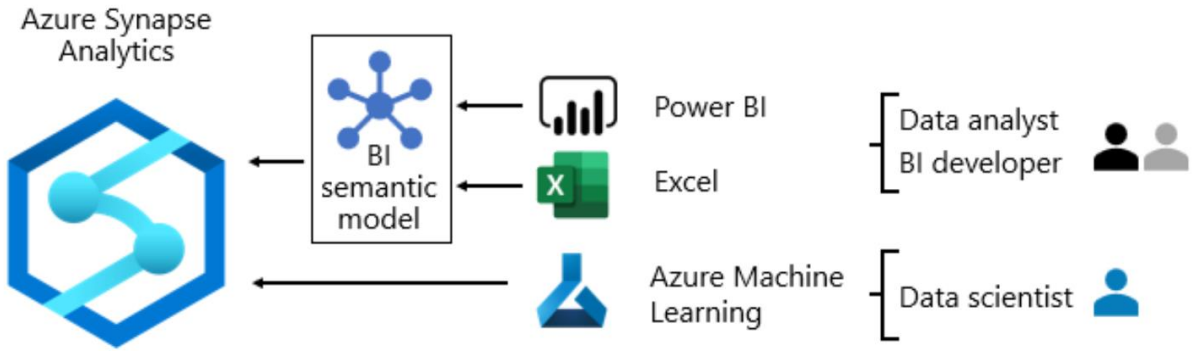
Where will Data Mart be resided?

Power BI Premium

No	Your organization allow to extract data to 3rd party?	YES
YES	Are you certain that queries will hit Result-set cache?	No
YES	Do you have complex ETL/aggregations?	No
No	Do you want to leverage DAX functionality ?	YES
YES	Do you need near real-time data (DirectQuery)?	No

Reference Architecture

- BI solution architecture in the Center of Excellence - Power BI | Microsoft Docs
- Enterprise business intelligence - Azure Reference Architectures | Microsoft Docs
- mspnp/azure-sqldw-enterprise-bi (github.com)
- What is dedicated SQL pool (formerly SQL DW)? - Azure Synapse Analytics | Microsoft Docs
- Azure Synapse Analytics & Power BI concurrency | James Serra's Blog
- Large datasets in Power BI Premium - Power BI | Microsoft Docs
- Azure SQL Data Warehouse with DirectQuery - Power BI | Microsoft Docs



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Thank you