SQL Day

14 edycja konferencji SQLDay

9-11 maja 2022, WROCŁAW + ONLINE

Data Community

partner złoty

Future Processing

Infinite DATA

KPMG

partner srebrny

Objectivity

summ-it

UBS

dbWatch DATABASE CONTROL

partner brązowy

elitmind think bright

Bartek Graczyk, Paweł Potasiński

Agile but secure analytics architecture in Azure

SPEAKERS

Bartek

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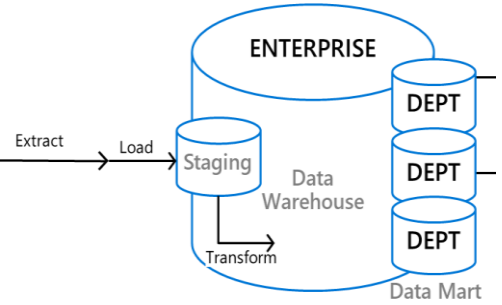
The Promise of the Data-Driven Enterprise

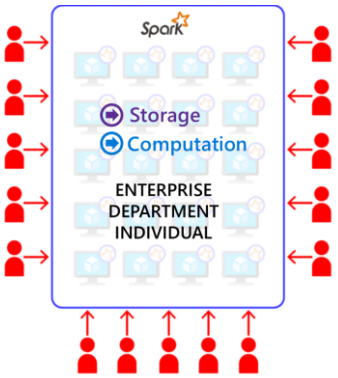
- Speed to insights
- Fluid Agility
- Governance & right use of data
- Influence value chain

The Evolution of Data Architecture

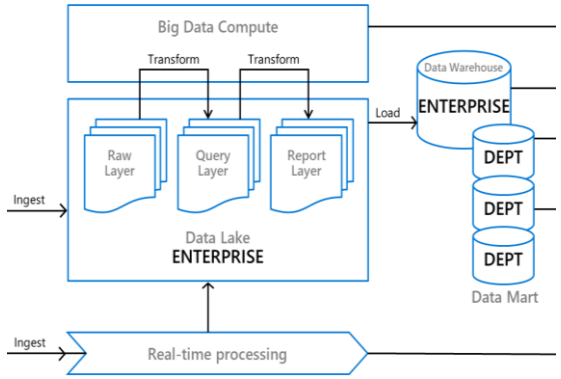
Late 1980s
Data Warehouse



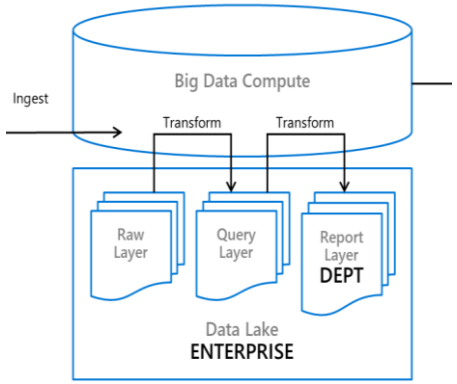
Late 2000s
Data Lake



Mid 2010s
Cloud Data Platform



2020
Data Lakehouse



Emerging

Data Fabric?
Data Mesh?

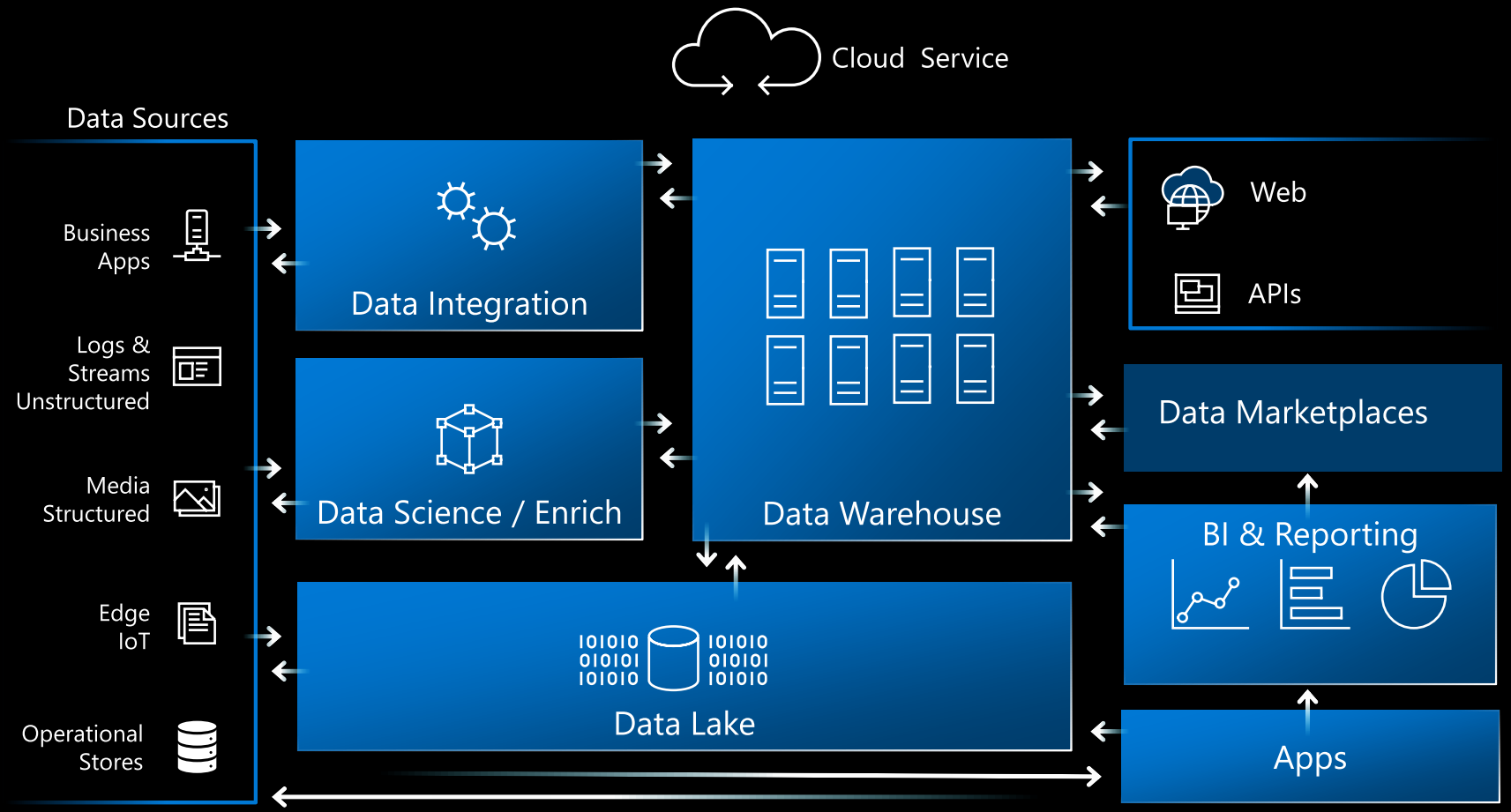
Centralization

V2.01.01

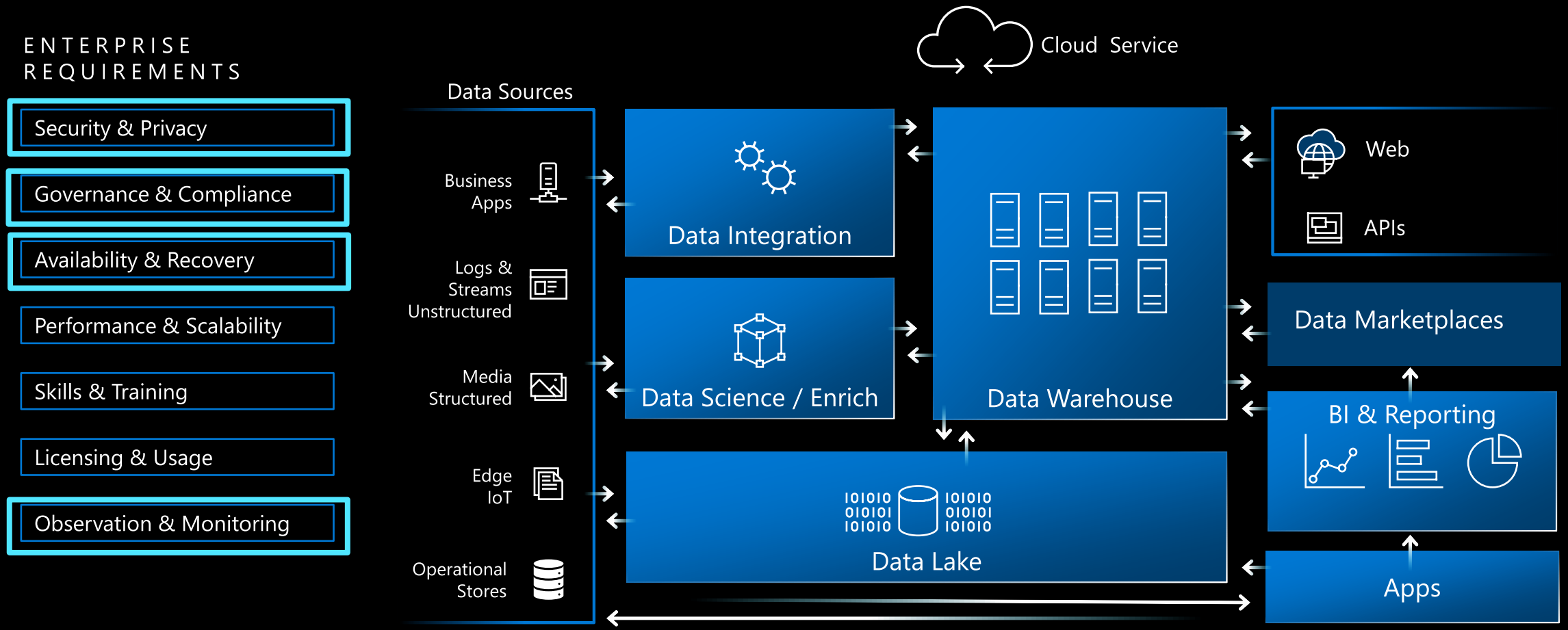
The Burden of Data Architecture

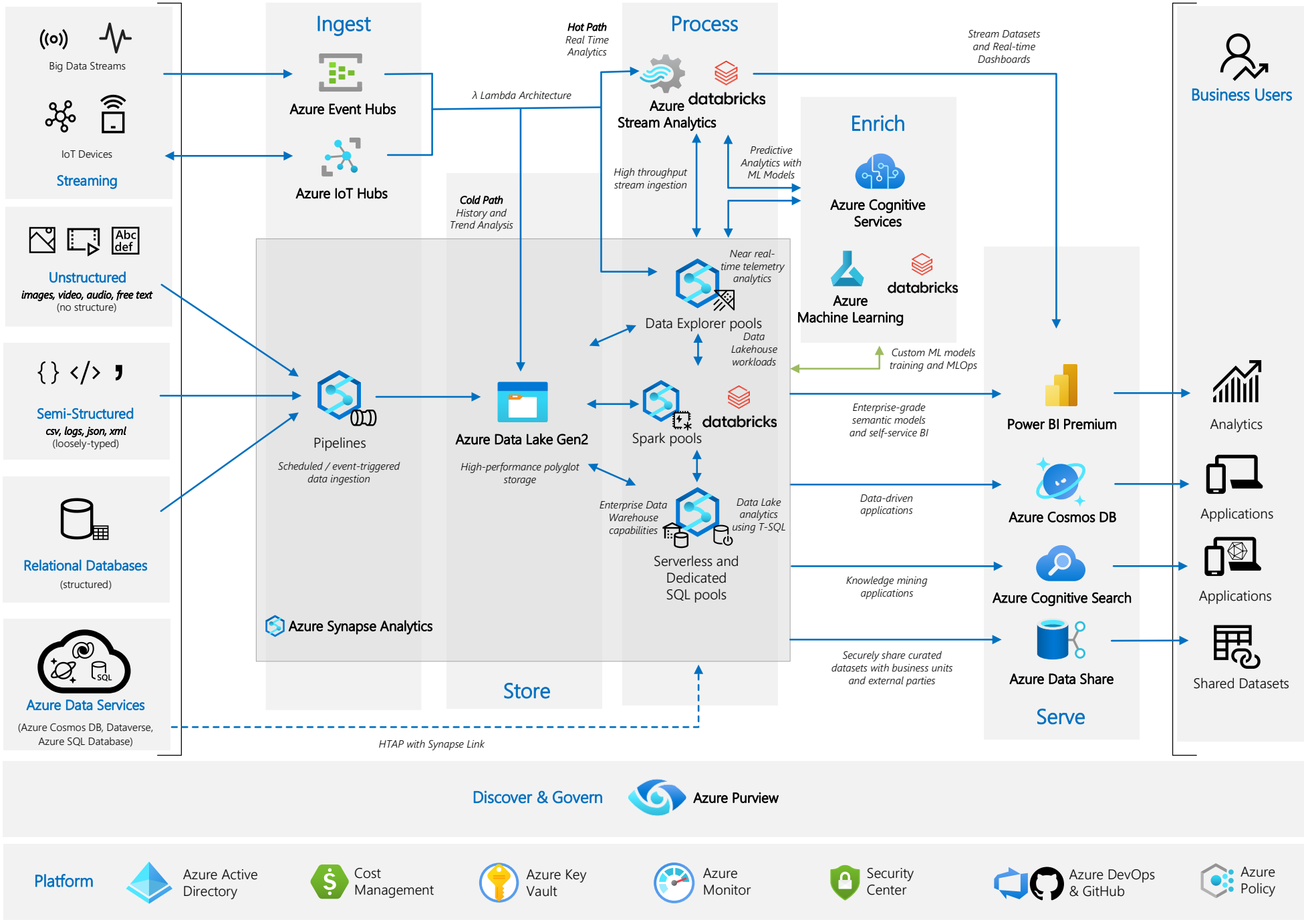
ENTERPRISE REQUIREMENTS

- Security & Privacy
- Governance & Compliance
- Availability & Recovery
- Performance & Scalability
- Skills & Training
- Licensing & Usage
- Observation & Monitoring



The Burden of Data Architecture



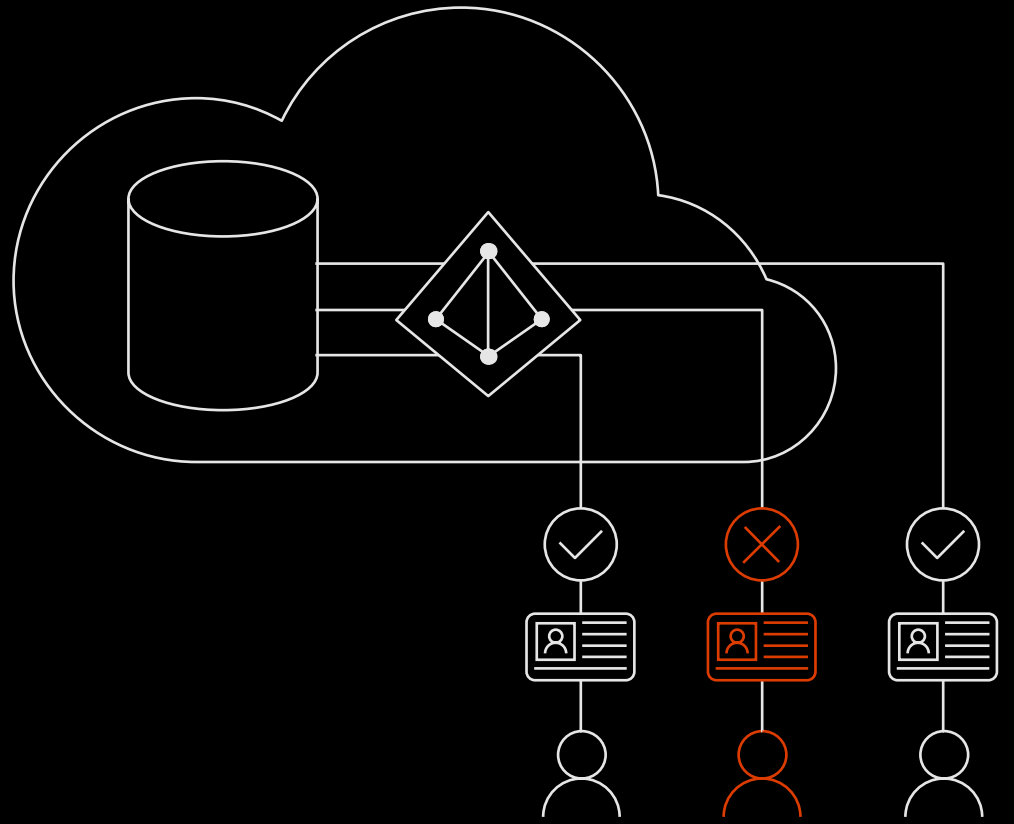

Big Data Streams
IoT Devices
Streaming
Unstructured
images, video, audio, free text
(no structure)
Semi-Structured
csv, logs, json, xml
(loosely-typed)
Relational Databases
(structured)
Azure Data Services
(Azure Cosmos DB, Dataverse, Azure SQL Database)
Ingest
Azure Event Hubs
Azure IoT Hubs
Hot Path
Real Time Analytics
λ Lambda Architecture
Cold Path
History and Trend Analysis
Process
Azure Stream Analytics
databricks
High throughput stream ingestion
Predictive Analytics with ML Models
Enrich
Azure Cognitive Services
Azure Machine Learning
databricks
Stream Datasets and Real-time Dashboards
Business Users
Near real-time telemetry analytics
Data Explorer pools
Data Lakehouse workloads
Custom ML models training and MLOps
Pipelines
Scheduled / event-triggered data ingestion
Azure Data Lake Gen2
High-performance polyglot storage
Spark pools
databricks
Enterprise Data Warehouse capabilities
Data Lake analytics using T-SQL
Serverless and Dedicated SQL pools
Azure Synapse Analytics
Store
Enterprise-grade semantic models and self-service BI
Power BI Premium
Analytics
Data-driven applications
Azure Cosmos DB
Applications
Knowledge mining applications
Azure Cognitive Search
Applications
Securely share curated datasets with business units and external parties
Azure Data Share
Shared Datasets
Serve
HTAP with Synapse Link
Discover & Govern
Azure Purview
Platform
Azure Active Directory
Cost Management
Azure Key Vault
Azure Monitor
Security Center
Azure DevOps & GitHub
Azure Policy

Microsoft Azure

Step 1:
Introduce yourself….– few words about identification, authentication & authorization

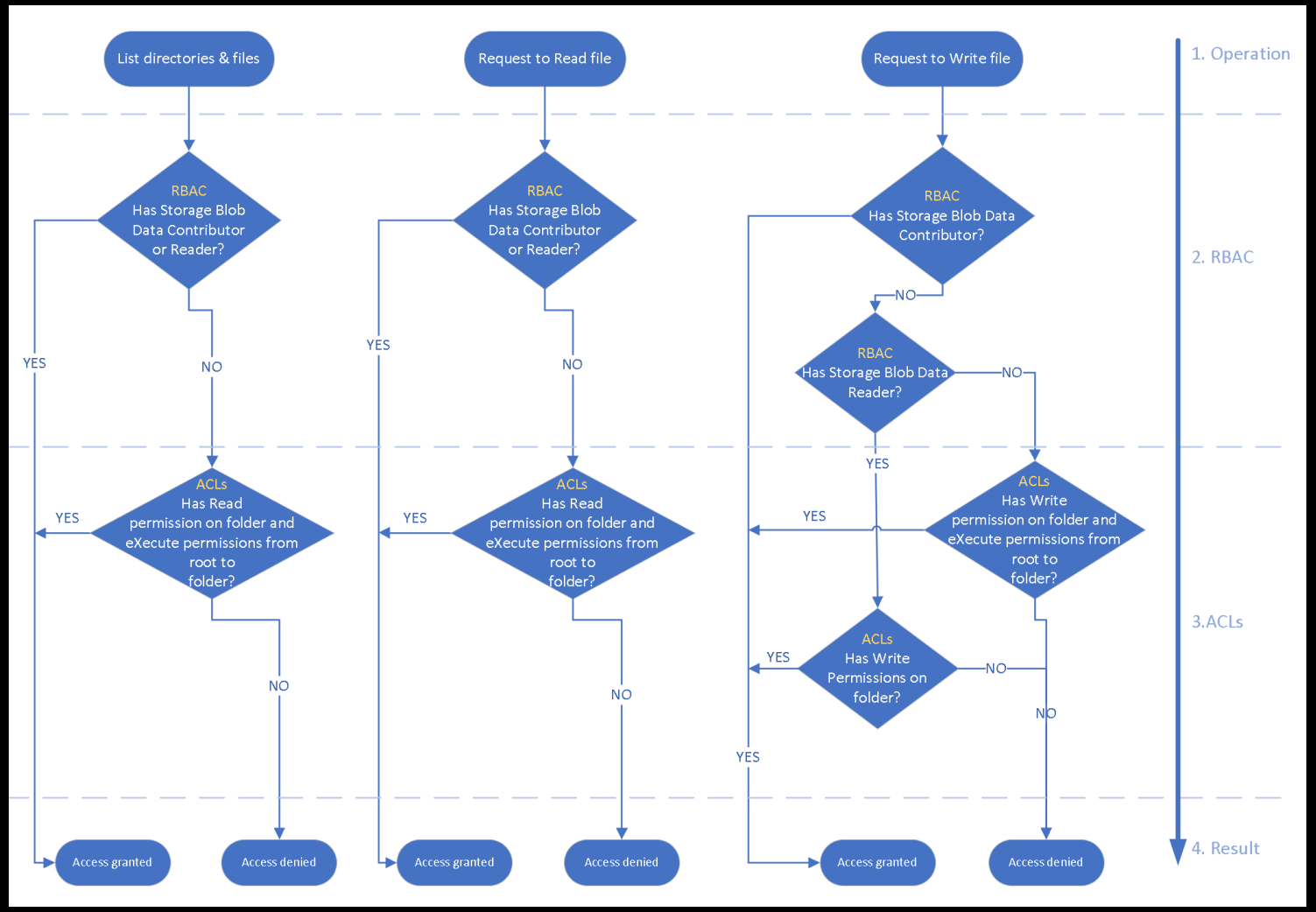
Introduce yourself…– few words about identification, authentication & authorization

- Overview
  - Manage user identities in one location
  - Enable access to data services with Azure Active Directory user identities and groups
- Benefits
  - Alternative to database level authentication
  - Limits proliferation of user identities across databases
  - Allows password rotation in a single place
  - Enables management of database permissions by using external Azure Active Directory groups
  - Eliminates the need to store passwords



Introduce yourself…– few words about identification, authentication & authorization | Azure Data Lake Storage

[Access control and data lake configurations in Azure Data Lake Storage Gen2 - Cloud Adoption Framework | Microsoft Docs]



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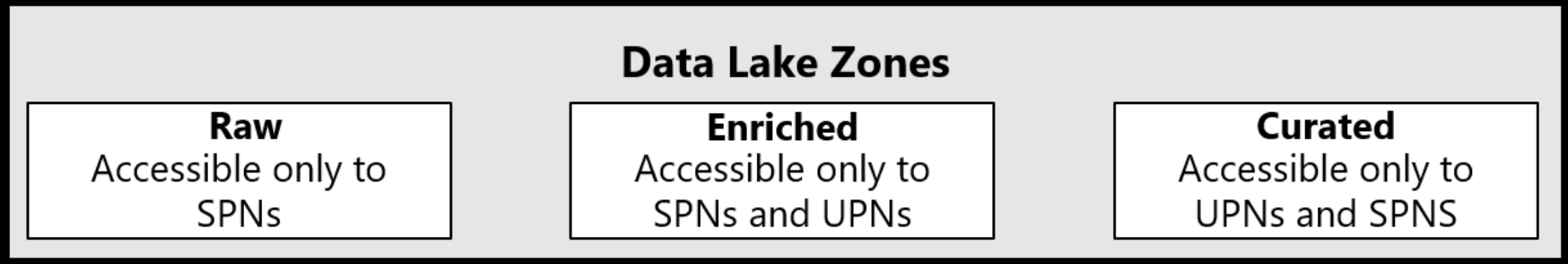
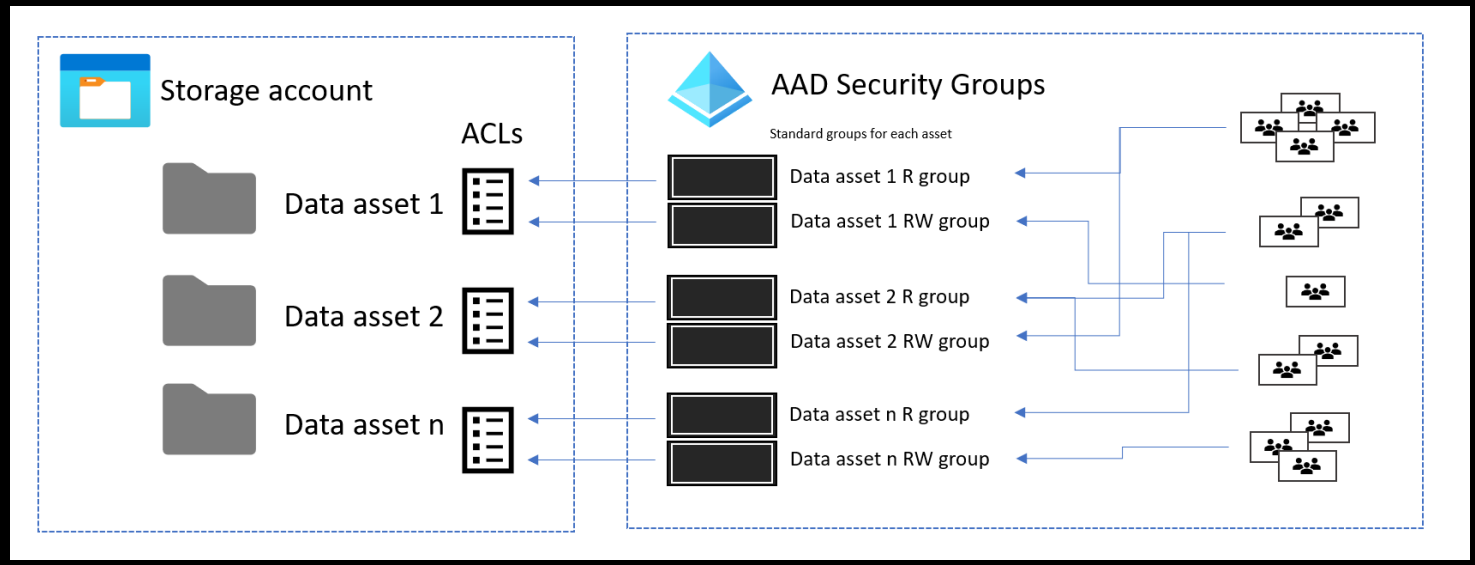
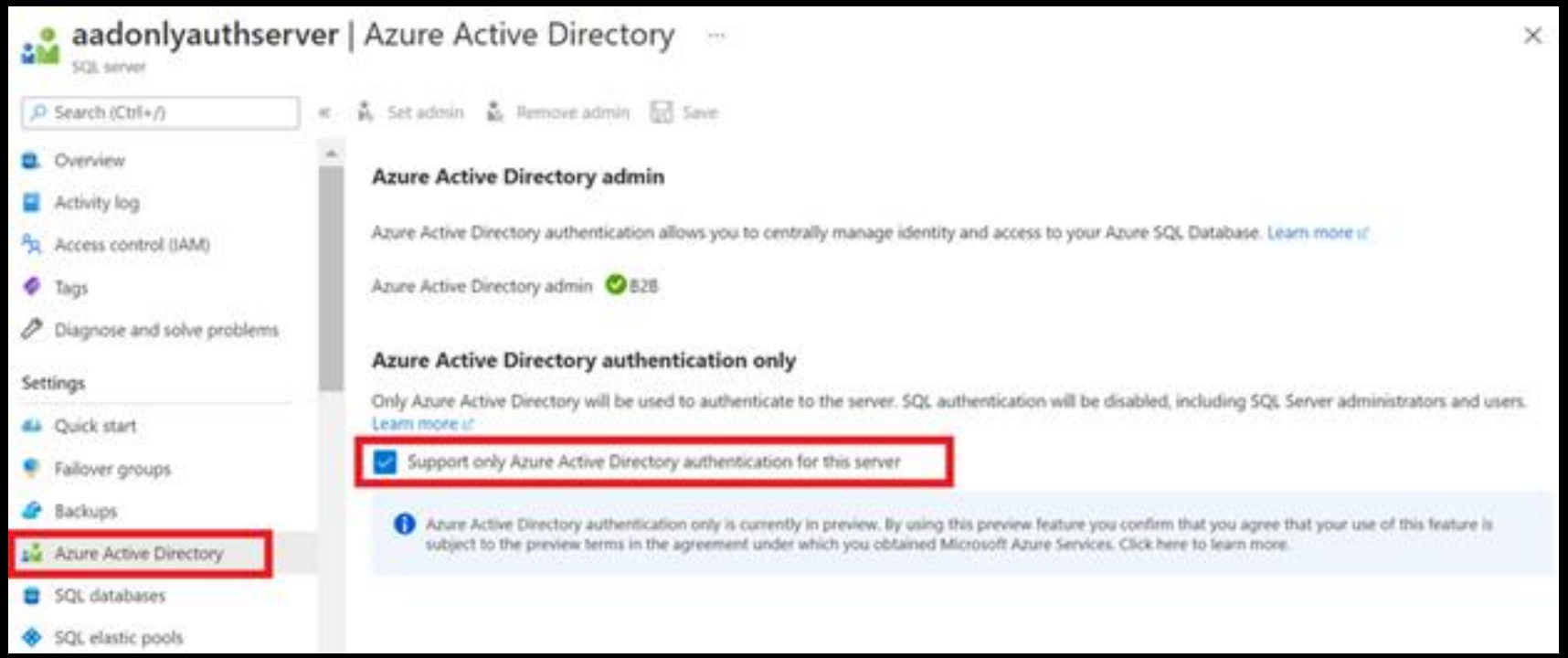




[Access control and data lake configurations in Azure Data Lake Storage Gen2 - Cloud Adoption Framework | Microsoft Docs]

Introduce yourself…– few words about identification, authentication & authorization | Azure SQLDB | Synapse Analytics



Azure Active Directory only authentication for Azure SQL - Microsoft Tech Community

Introduce yourself…– few words about identification, authentication & authorization | Azure Databricks

- Accessing ADLS from an Azure Databricks cluster **requires a service principal to be made** with delegated permissions for each user. The credentials should then be stored in **Secrets**. This creates complexity for Azure AD and Azure Databricks admins.

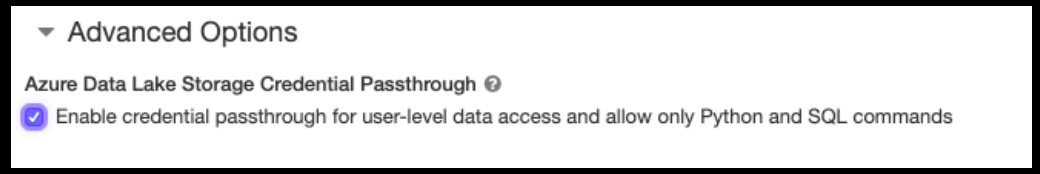
- **Mounting a filesystem to DBFS allows** all users in the Azure Databricks workspace to have access to the mounted ADLS account. This requires customers to set up multiple Azure Databricks workspaces for different roles and access controls in line with their storage account access, thereby **increasing complexity.**

- When assessing ADLS, either directly or with mount points, users on an Databricks cluster share the same identity when accessing resources. This means there is **no audit trail of which user accessed** which data with cloud-native logging such as **Storage Analytics**

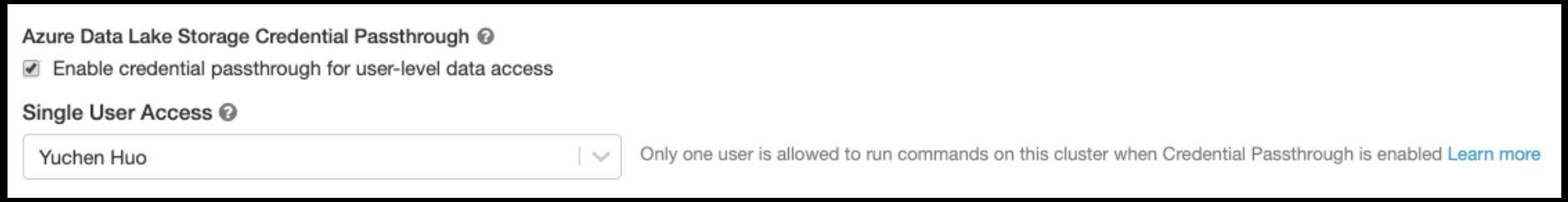
Simplify Data Lake Access with Azure AD Credential Passthrough (databricks.com)

Introduce yourself…– few words about identification, authentication & authorization | Azure Databricks

- **Azure AD Credential Passthrough** allows you to authenticate seamlessly to Azure Data Lake Storage from Azure Databricks clusters using the same Azure AD identity that you use to log into Azure Databricks.



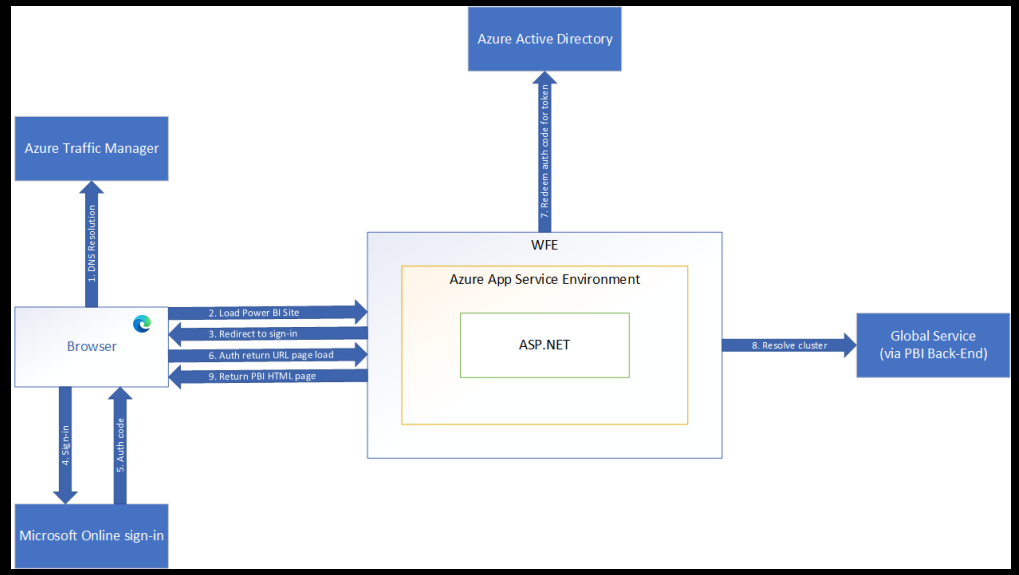
- Your data access is controlled via the ADLS roles and ACLs you have already set up and can be analyzed in Azure's Storage Analytics.



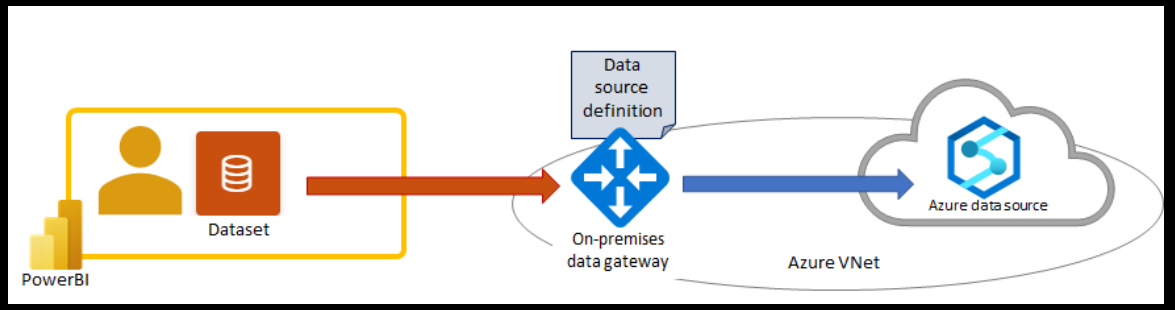
Simplify Data Lake Access with Azure AD Credential Passthrough (databricks.com)

Introduce yourself…– few words about identification, authentication & authorization | Power BI

Power BI Portal



Dataset Credentials / Power BI Gateway SSO

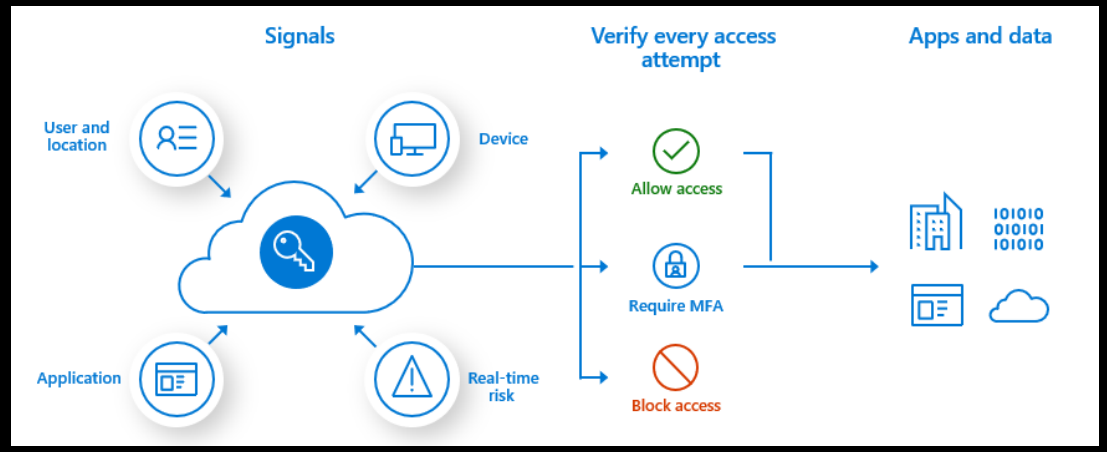


!!! A Power BI admin must enable the Azure AD Single Sign-On (SSO) for Gateway tenant setting in the Power BI admin portal !!!

[Announcing data gateway support for Single Sign-On (SSO) with Azure Active Directory | Microsoft Power BI Blog | Microsoft Power BI]

Introduce yourself….– few words about identification, authentication & authorization | Power BI MFA & Conditional Access

- Any user who wants to use Power BI has to adhere to 2 factor authentication
- You can only connect to Power BI when you are on the corporate network
- You can only connect from machines that are domain joined
- You can only connect from a machine that is complaint with the network policy
- You can only use Power BI when you are part of a special AD group

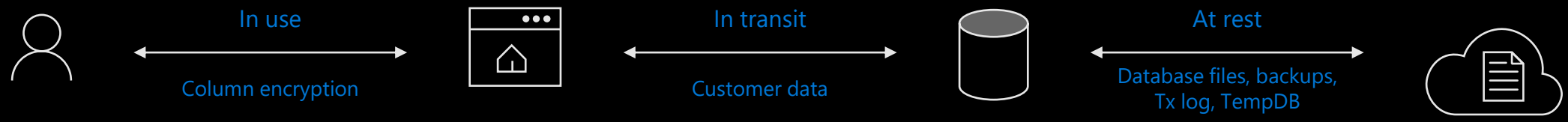


Microsoft Azure

Step 2:
Is my data safe…- the one about secure data store

Is my data safe...- the one about secure data store | Azure SQL

Data encryption	Encryption technology	Customer value
In transit	Transport Layer Security (TLS) from the client to the server	Protects data between client and server against snooping and man-in-the-middle attacks *Azure SQL Database is phasing out Secure Sockets Layer (SSL) 3.0 and TLS 1.0 in favor of TLS 1.2
At rest	Transparent Data Encryption (TDE) for Azure SQL Database	Protects data on the disk Key management is done by Azure, which makes it easier to obtain compliance
In use (end-to-end)	Always Encrypted for client-side column encryption	Data is protected end-to-end, but the application is aware of encrypted columns This is used in the absence of data masking and TDE for compliance-related scenarios



Is my data safe…- the one about secure data store | Azure Storage

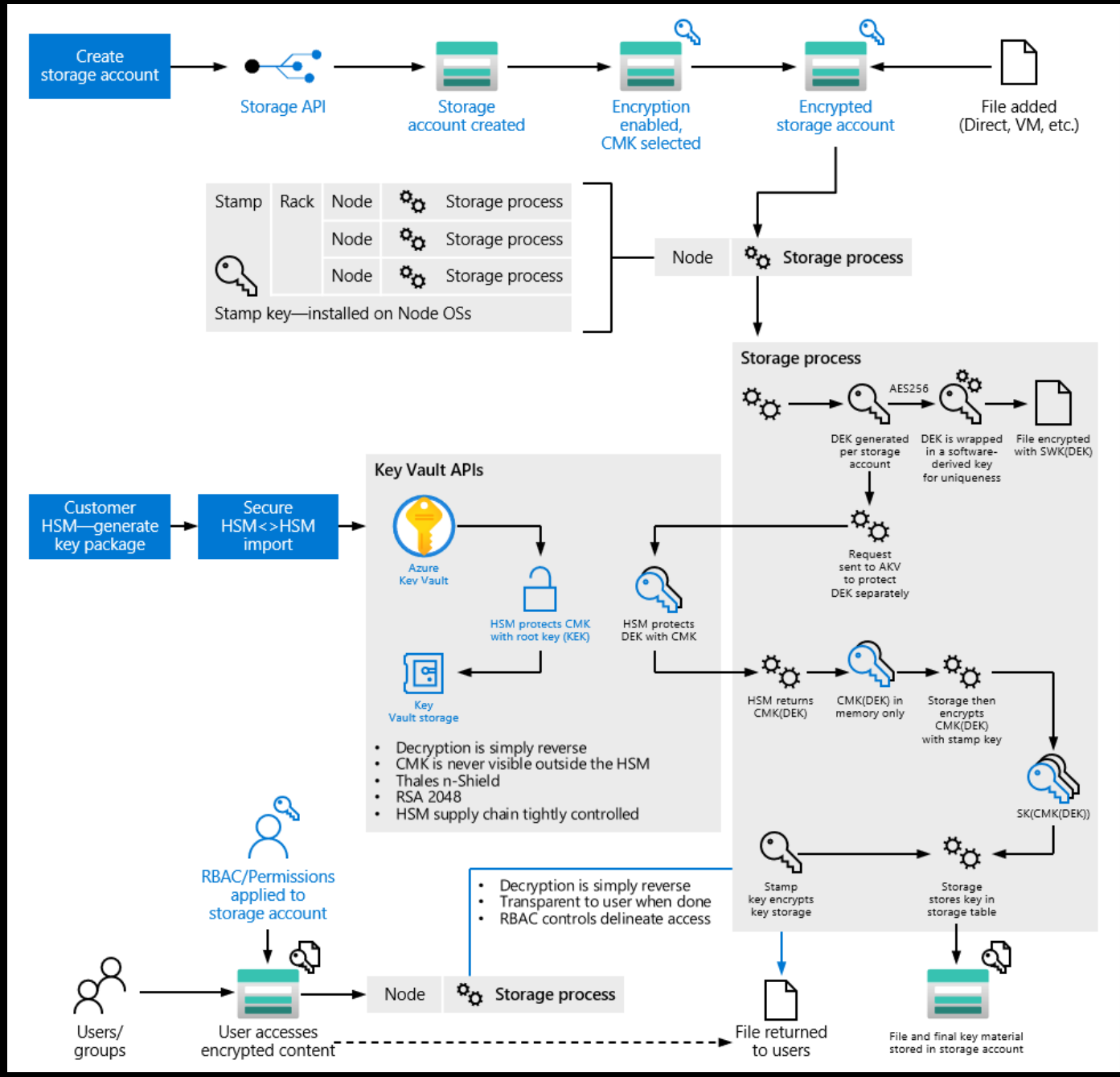
- Storage service encryption is enabled by default for all new and existing storage accounts and it cannot be disabled.

- The encryption process uses the following keys to help ensure cryptographic certainty of data isolation at rest:

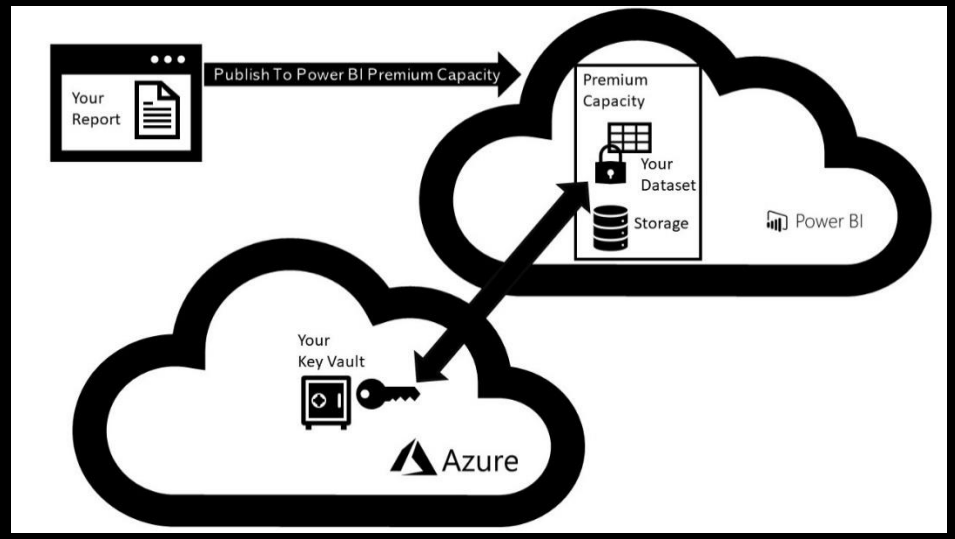
•*Data Encryption Key (DEK)*

• *Key Encryption Key (KEK)*

•*Stamp Key (SK)*



Is my data safe...- the one about secure data store | Power BI

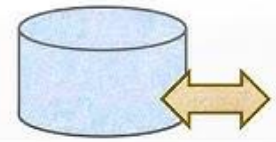


[Bring your own encryption keys for Power BI - Power BI | Microsoft Docs]

Encryption

Data at Rest

Data Source	Metadata	Data
Live Connection (Analysis Services)	Nothing stored except database name encrypted in Azure SQL DB	Nothing Stored
Direct Query (SQL Server, Oracle, etc.)	Encrypted in Azure Blob Storage	Nothing Stored
Pushed or streamed data	Encrypted in Azure Blob Storage	Depending on version, encrypted in either Azure Blob Storage or Azure SQL Database
Data loaded into model (data may be refreshable or nonrefreshable)	Encrypted in Azure Blob Storage	Encrypted in Azure Blob Storage



Data in Transit

All data is encrypted using HTTPS to connect from the data source to the Power BI Service

Data in Use

Data is cached for all connection types including DirectQuery

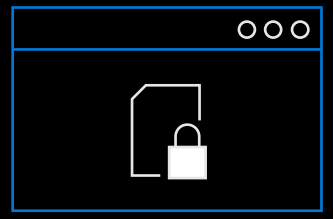
Cached data is encrypted and stored in an Azure SQL Database

Image Source : Power BI Security Best Practices Pragmatic Works (Power BI Security Best Practices – YouTube) & Power BI security white paper - Power BI | Microsoft Docs

Is my data safe...- the one about secure data store | Microsoft Information Protection & Azure Data Services

Discover

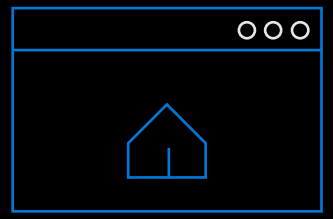
Will be integrated into the Microsoft Information Protection framework
Protects data and moves across database boundaries in your organization



Classify

Automatic Data Discovery and recommendations to classify sensitive data
Each column associated with a sensitivity label and label type
Manual classification on data can also be added

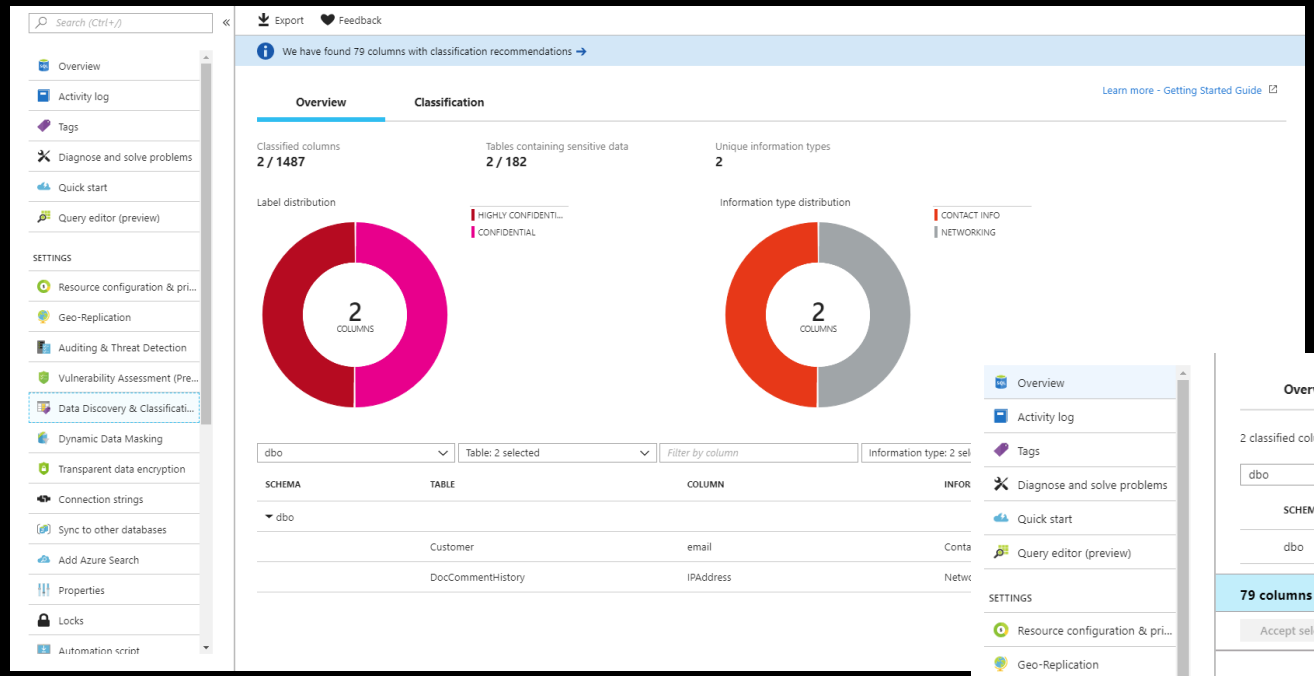
Column label persisted as column metadata as new classification attributes in SQL Engine
Export classification information to Excel report for internal or external auditing purposes

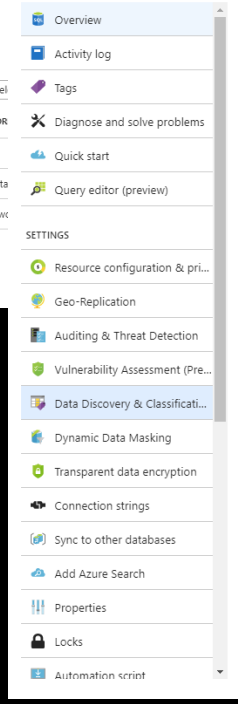


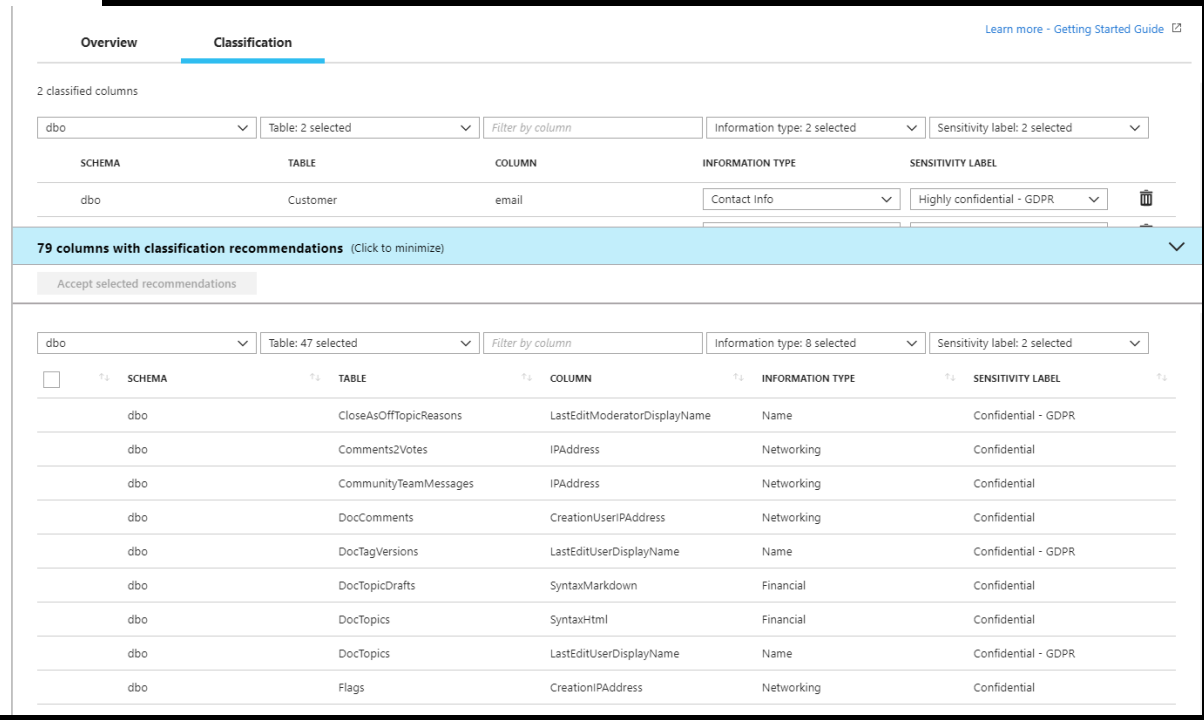
Label

Once a column is labeled it can be used for auditing and protection purposes
All labeled columns will be fully audited at run time for any queries that access them
Auditing will monitor which users access sensitive data and how much sensitive data they access

Is my data safe...- the one about secure data store | SQLDB

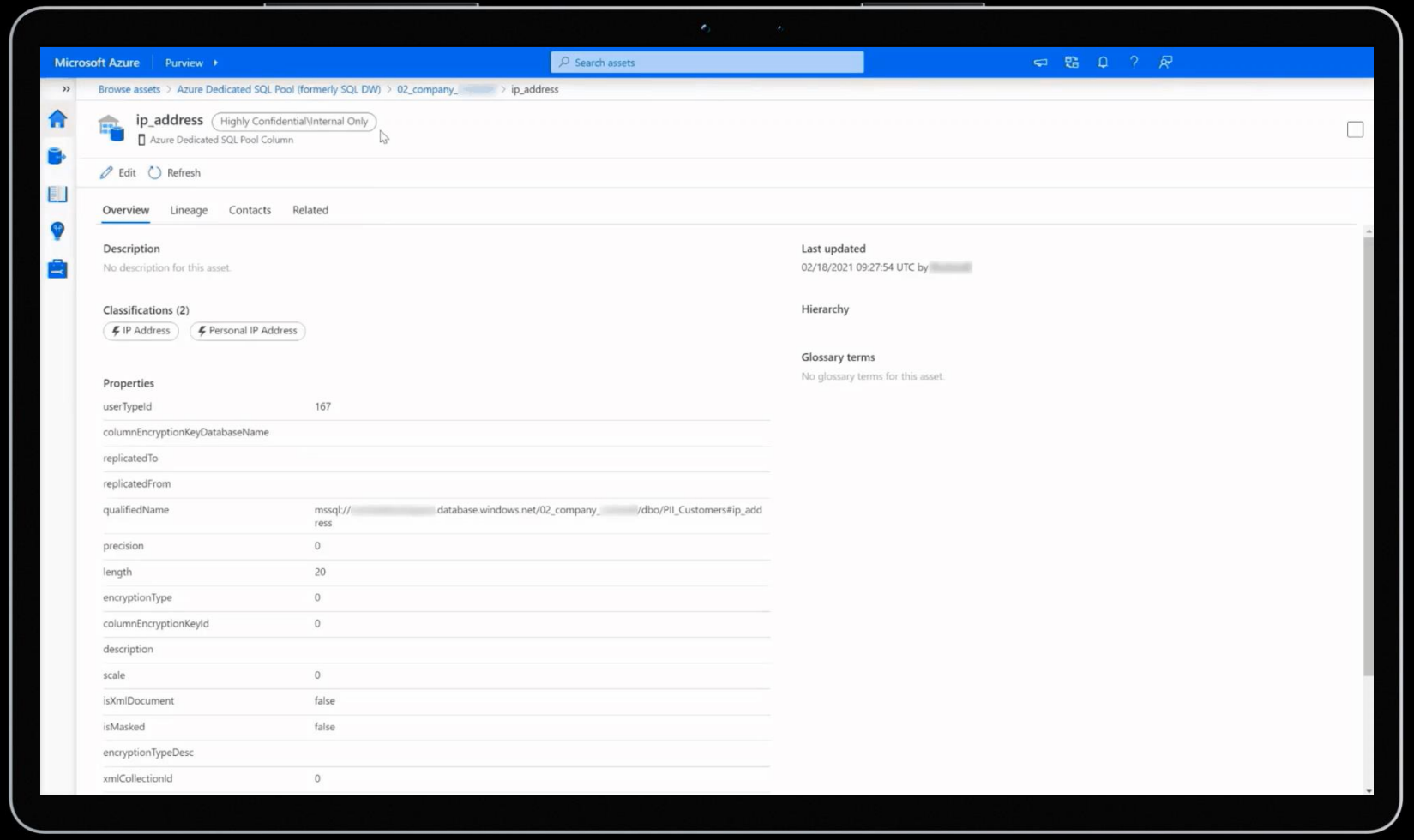






End-to-End protection

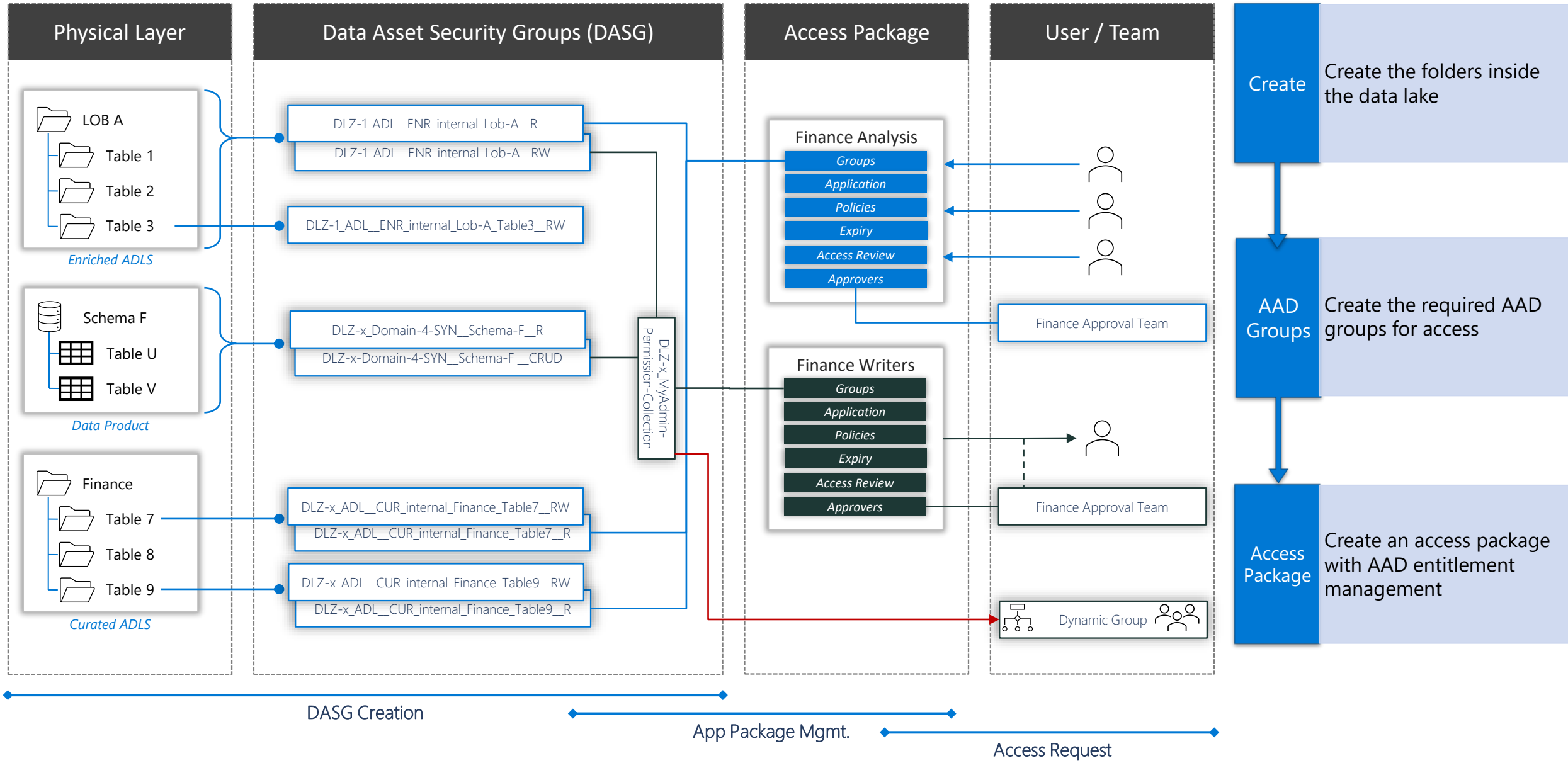
Securing the full data journey from Azure to Office



Microsoft Azure

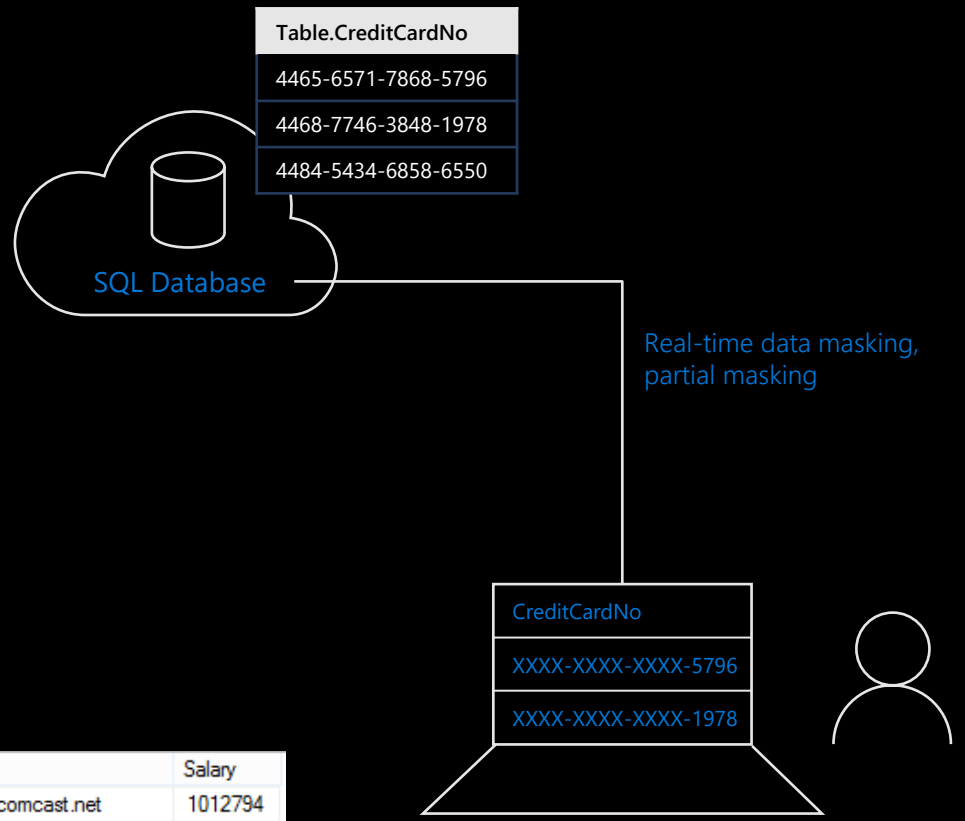
Step 3:
Secure data interaction…- how to work with data in a secure way

Security Provisioning



Secure data interaction…- how to work with data in a secure way | SQL DB / Azure Synapse

- Prevent abuse of sensitive data by hiding it from users
- Data masking applied in real-time to query results based on policy
- Multiple masking functions available, such as full or partial, for various sensitive data categories (credit card numbers, SSN, etc.)



other logon

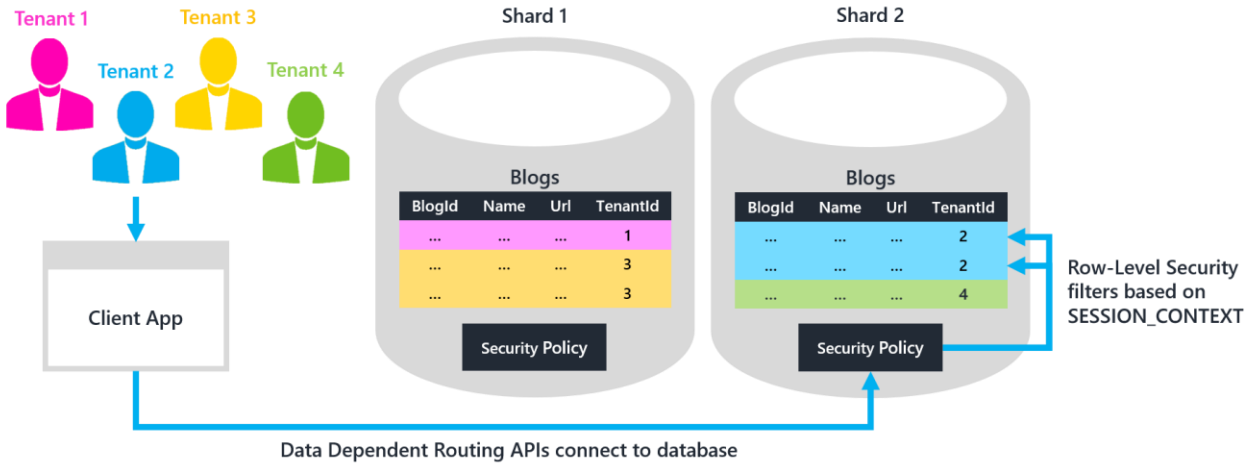
	First Name	Social Security Number	Email	Salary
1	LILA	XXX-XX-XX37	lXX@XXXX.net	8940
2	JAMIE	XXX-XX-XX14	jXX@XXXX.com	19582
3	SHELLEY	XXX-XX-XX28	sXX@XXXX.net	3713
4	MARCELLA	XXX-XX-XX65	mXX@XXXX.net	11572
5	GILBERT	XXX-XX-XX87	gXX@XXXX.net	4487

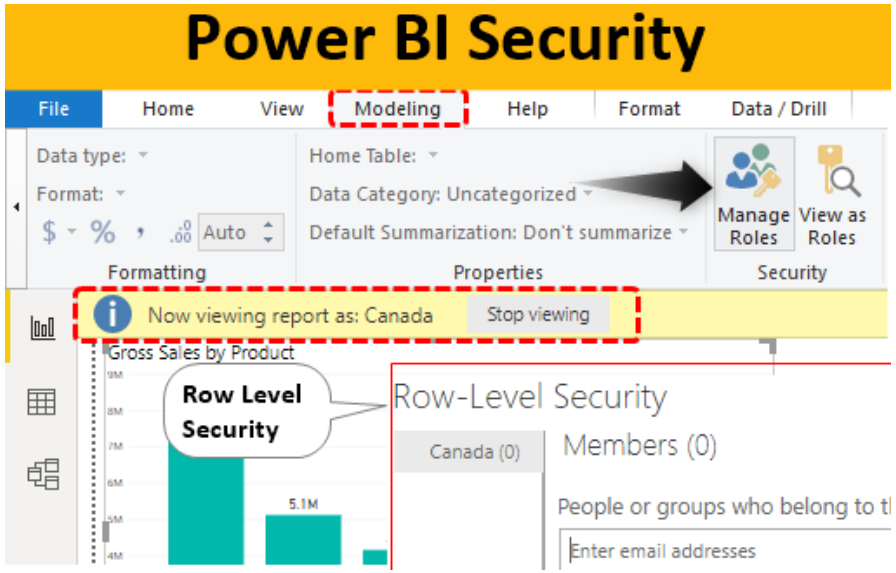
admin1 logon

	First Name	Social Security Num...	Email	Salary
1	LILA	758-10-9637	lila.barnett@comcast.net	1012794
2	JAMIE	113-29-4314	jamie.brown@ntlworld.com	1025713
3	SHELLEY	550-72-2028	shelley.lynn@charter.net	1040131
4	MARCELLA	903-94-5665	marcella.estrada@comcast.net	1040753
5	GILBERT	376-79-4787	gilbert.juarez@verizon.net	1041308

Secure data interaction...- how to work with data in a secure way | SQL DB / Azure Synapse / Power BI

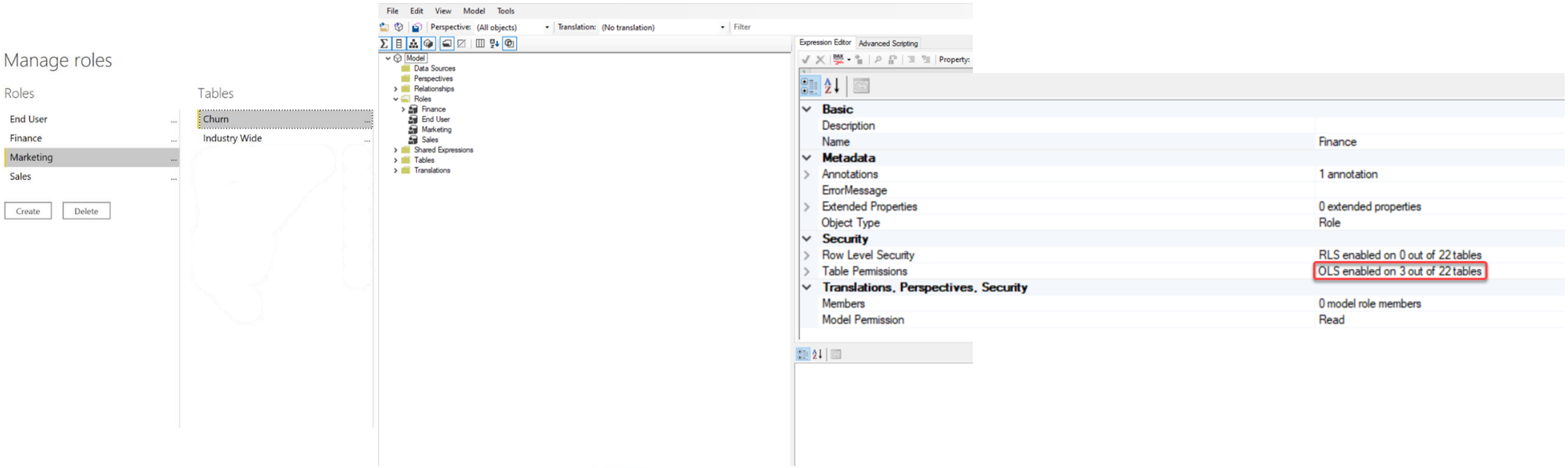
RLS or **Row-Level Security – use it in a wise way**





Secure data interaction...- how to work with data in a secure way | SQL DB / Azure Synapse / Power BI

OLS – Object Level Security in Power BI

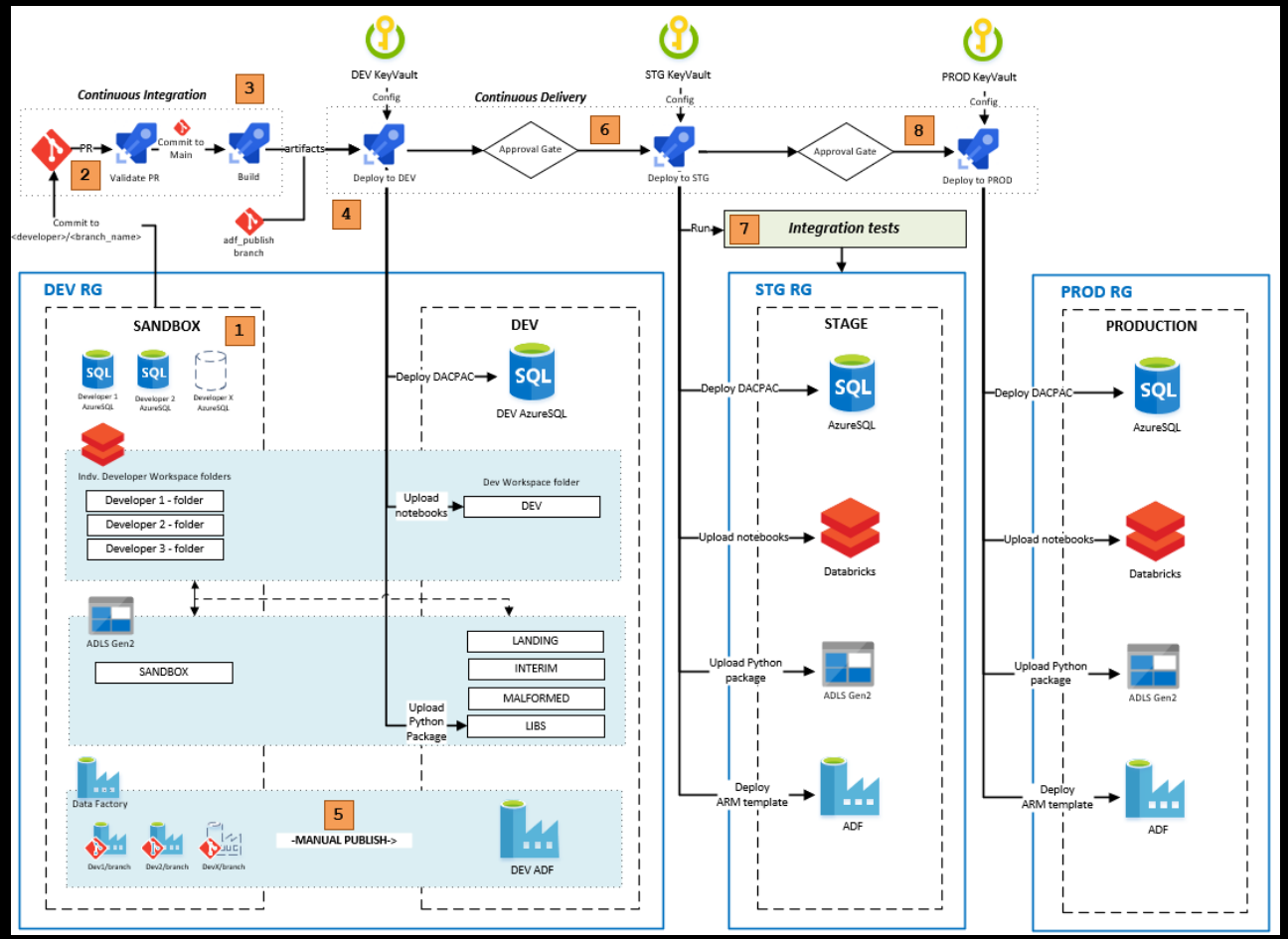


Data loss prevention

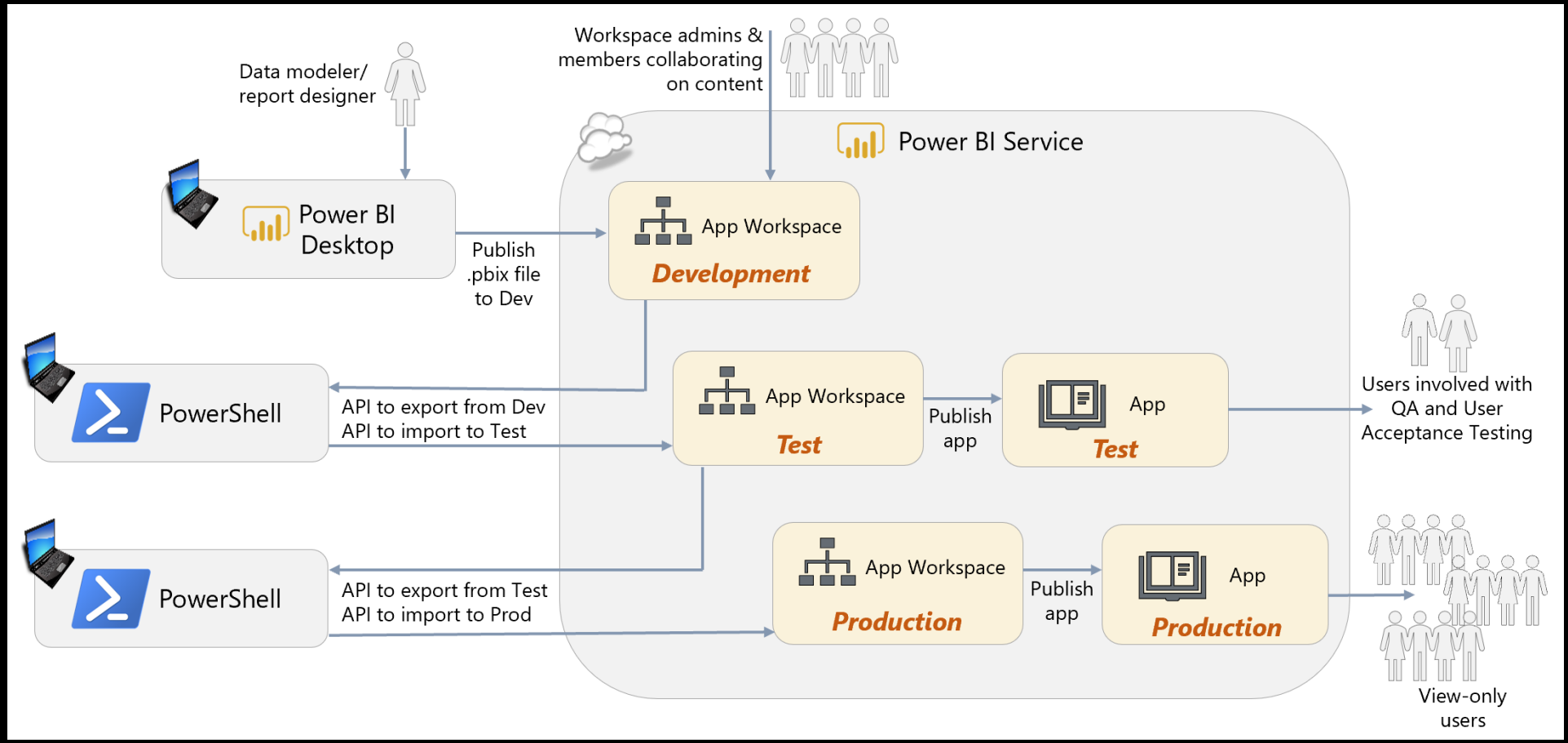
Microsoft Cloud App Security (MCAS) Integration

Secure data interaction...- how to work with data in a secure way | Dev / Test / Prod Environments

[DataOps for the modern data warehouse - Azure Architecture Center | Microsoft Docs]

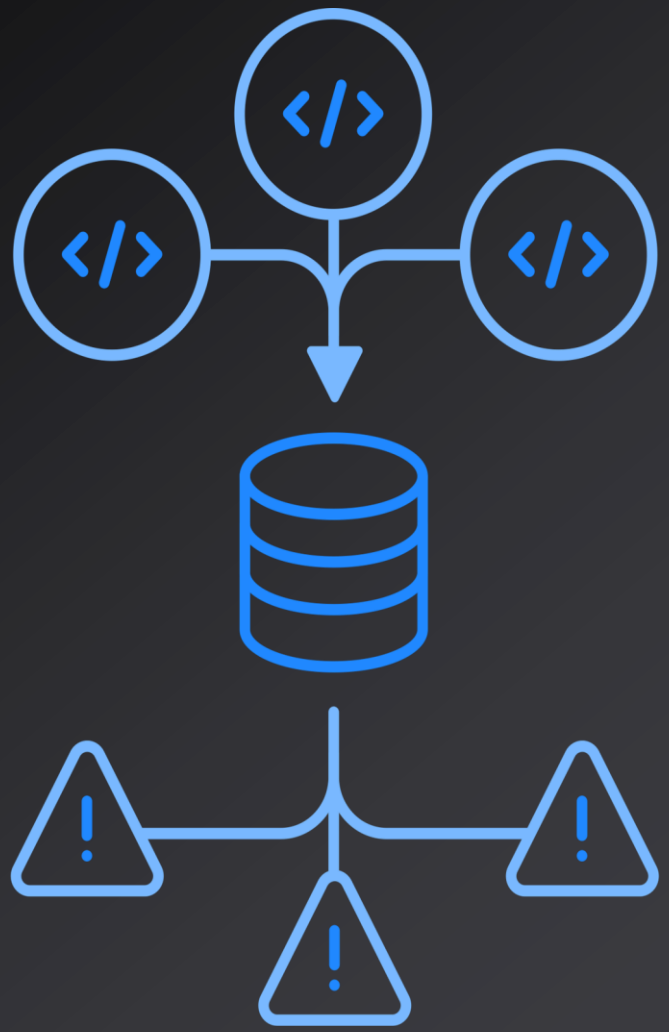


Secure data interaction...- how to work with data in a secure way | Dev / Test / Prod Environments



[Power BI enterprise deployment whitepaper - Power BI | Microsoft Docs]

Main goals to address



- **Version Control -** The ability to manage your solution in versions. Tracking changes and maintain the history for review and recovery.

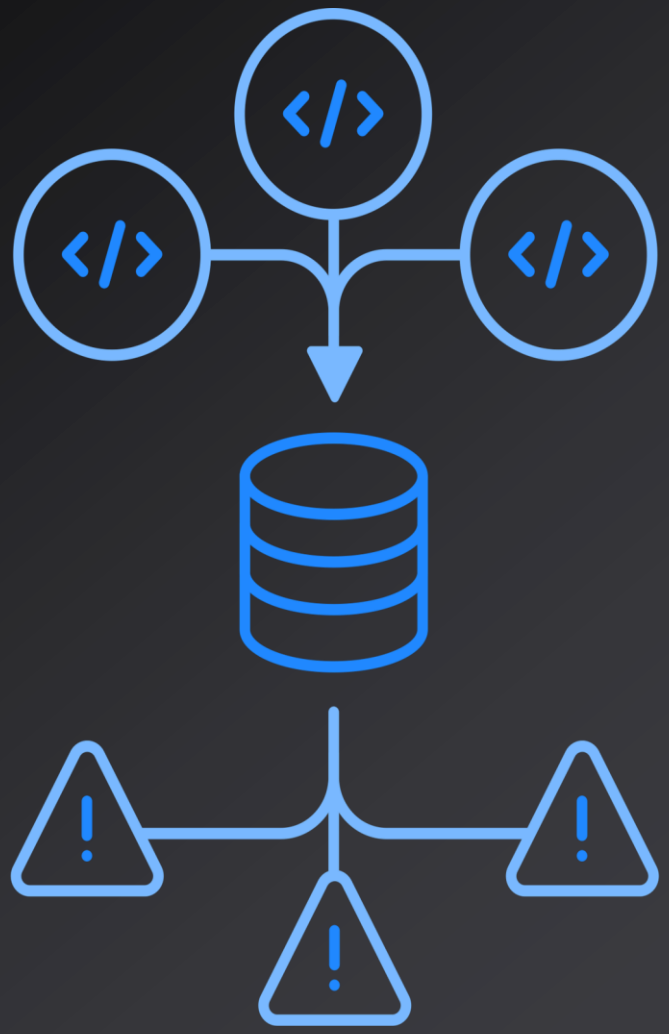
- **Branching -** The ability to support multi developer scenarios with each developer working on his own copy of the solution to enhance it with features

- **CI/CD -** Continuous Integration and Continuous Delivery targets an incremental metadata merge of new

- **Environments -** Support for work in several separated development stages (e.g. DEV, TEST and PROD) enabling secure development and testing in environments with different characteristics.

- **Automation -** The ability to provide secure, reliable, fast and repeatable development and deployment processes

Why it is a challenge



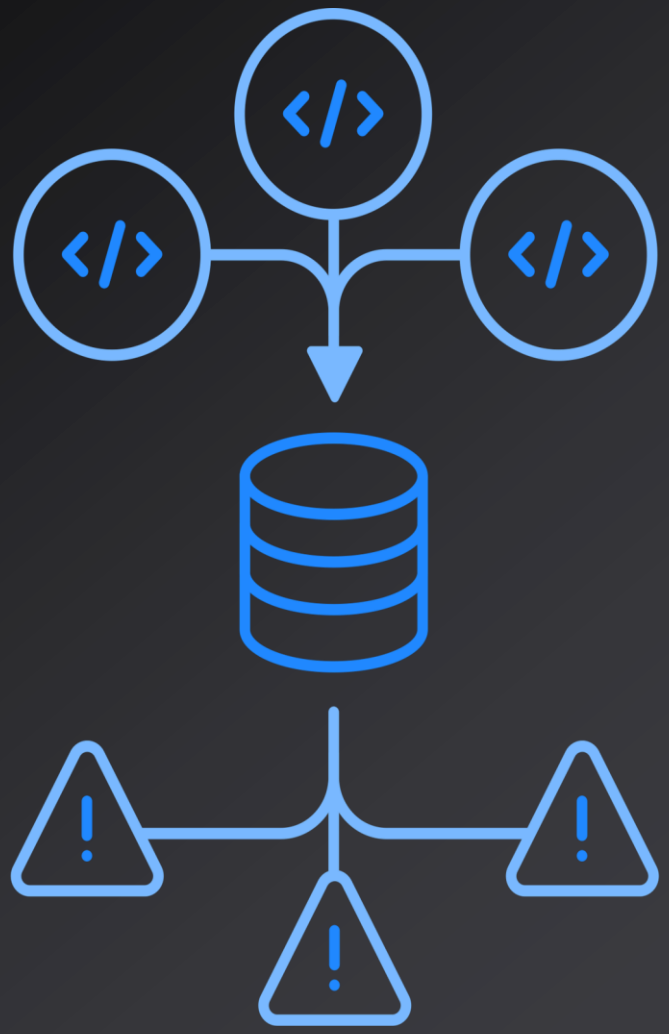
- **ETL/Pipeline** - PowerQuery imports to fetch data from sources
- **Datamodel** - Model containing imported tables,
- **Visual Layer** - Report canvas

Power Query

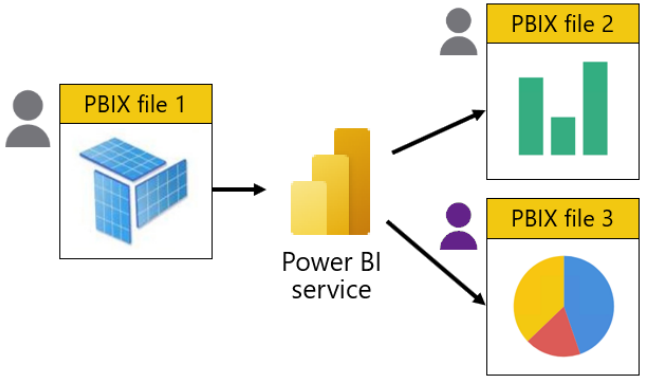
Data Model

Visualization

How to…

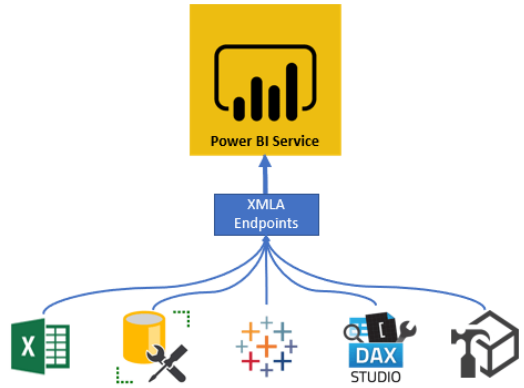


- **Separation of reports and data model**



[Separate reports from models in Power BI Desktop - Power BI | Microsoft Docs]

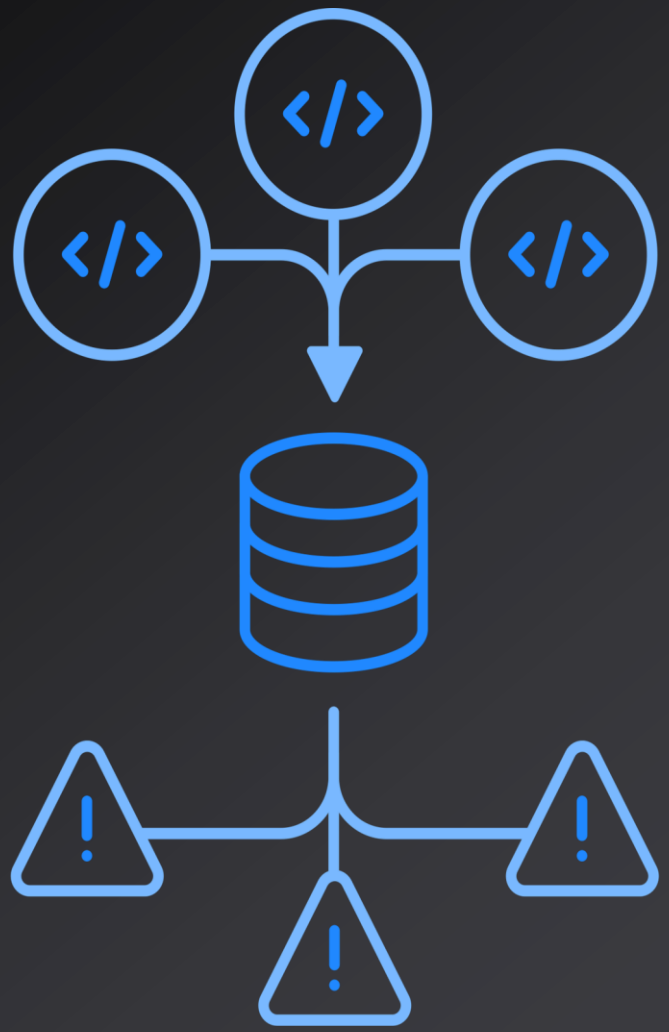
- **Power BI Premium or Premium per User** to utilize XMLA read/write Endpoints as well as Deployment Pipelines



[Power BI XMLA Endpoint: Why you should care - Guy in a Cube]

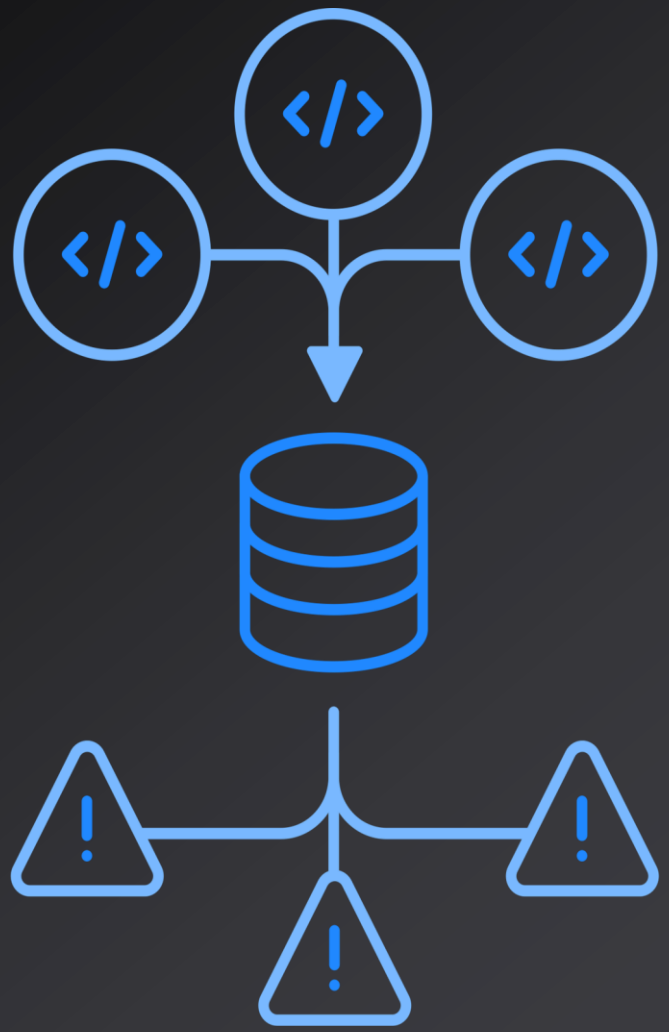
Microsoft

How to…version history



- OneDrive / SharePoint sync
  - Good for small projects & teams
- Git repositories
  - pbix files are binary files, there is no way of checking-in only the code changes
  - Git extension called Large File Storage (LFS)

How to…automate



PowerShell cmdlets, REST APIs, and .NET Client library for Power BI administration

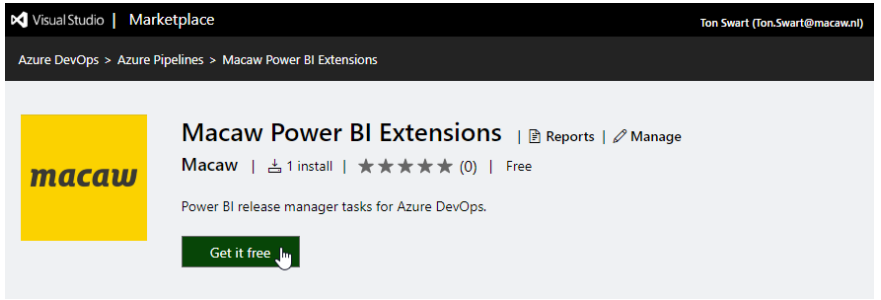
Power BI enables administrators to script common tasks with PowerShell cmdlets.

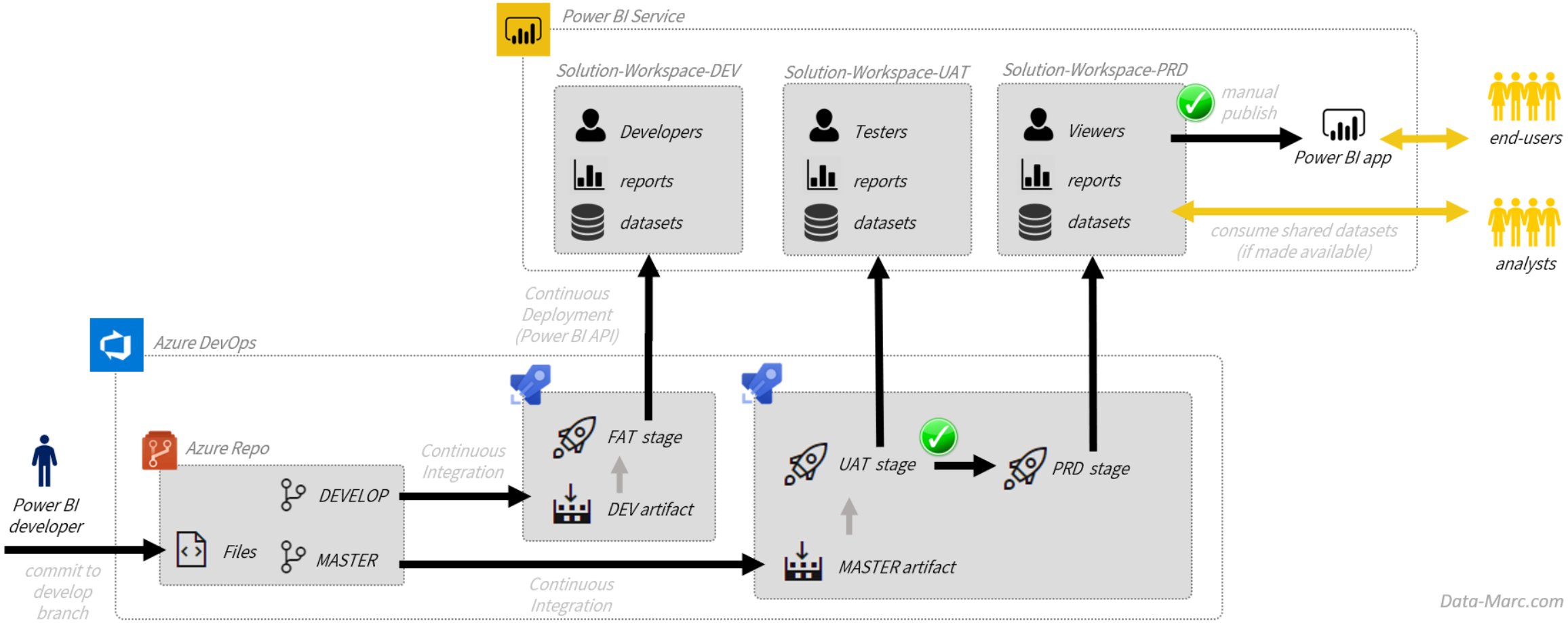
- PowerShell download and documentation

It also exposes REST APIs and provides a .NET client library for developing administrative solutions.

- REST API documentation
- .NET Client library download

Continuous Delivery with Azure DevOps

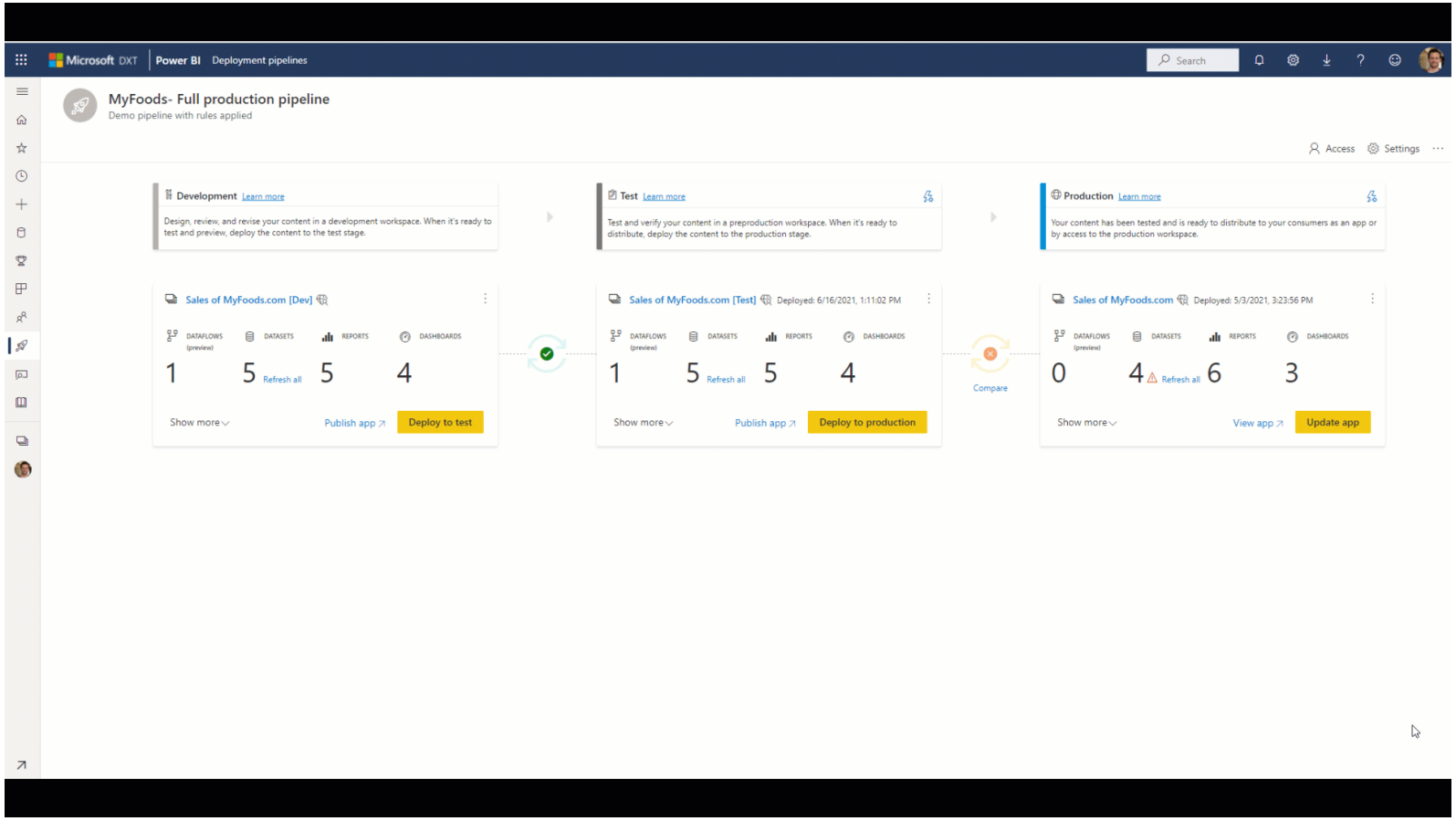




[Versioning and CI/CD for Power BI with Azure DevOps – Data – Marc (data-marc.com)]

[Power BI Dataset CI/CD Pipeline (Azure Dev Ops, XMLA Endpoint, Tabular Editor & Service Connection)]

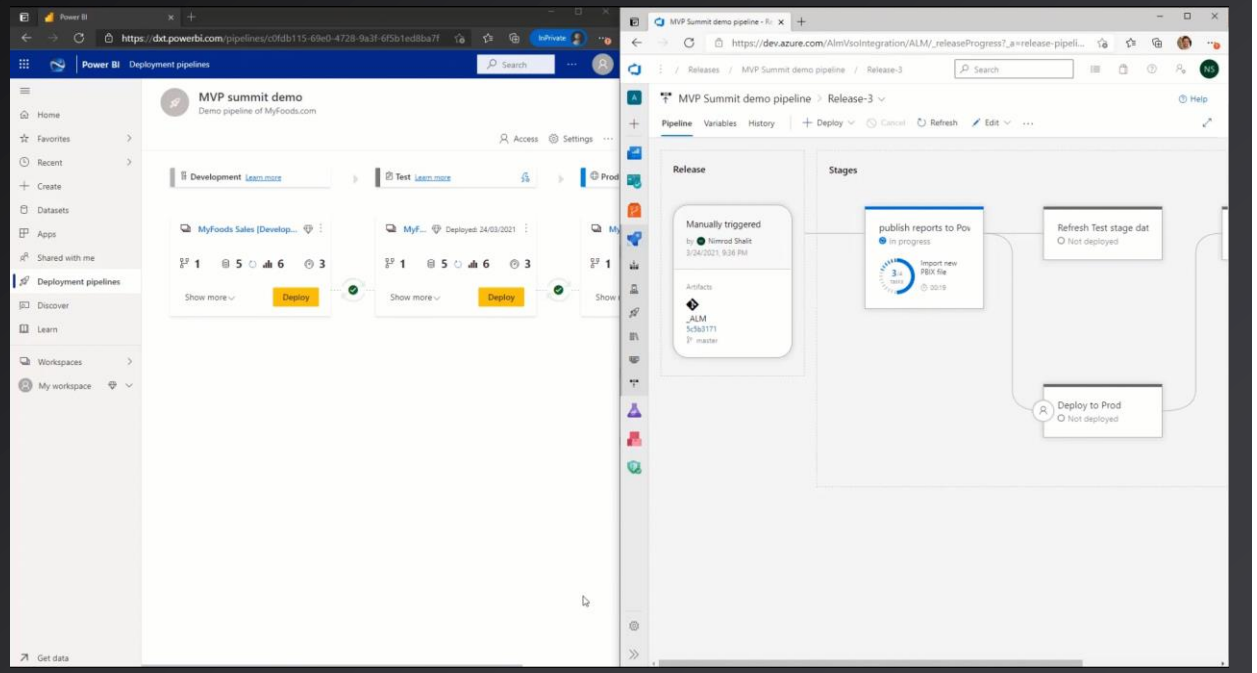
Deployment pipelines, the Power BI Application lifecycle management (ALM) tool, process - Power BI | Microsoft Docs



[Introducing Power BI deployment pipelines (Preview) | Microsoft Power BI Blog | Microsoft Power BI]

[Announcing new deployment pipelines capabilities | Microsoft Power BI Blog | Microsoft Power BI]

Automate your deployment pipeline, the Power BI Application lifecycle management (ALM) tool - Power BI | Microsoft Docs



[Deployment pipelines Power BI REST APIs]:

- Integrate Power BI into familiar DevOps tools such as Azure DevOps or GitHub Actions.
- Schedule pipeline deployments to happen automatically at a given time.
- Deploy multiple pipelines at same time.
- Cascade depending pipeline deployments – If you have content that's connected across pipelines, you can make sure some pipelines are deployed before others.

[PowerBI-Developer-Samples/PowerShell Scripts at master · microsoft/PowerBI-Developer-Samples (github.com)]

[Automate deployments with deployment pipelines API | Microsoft Power BI Blog | Microsoft Power BI]

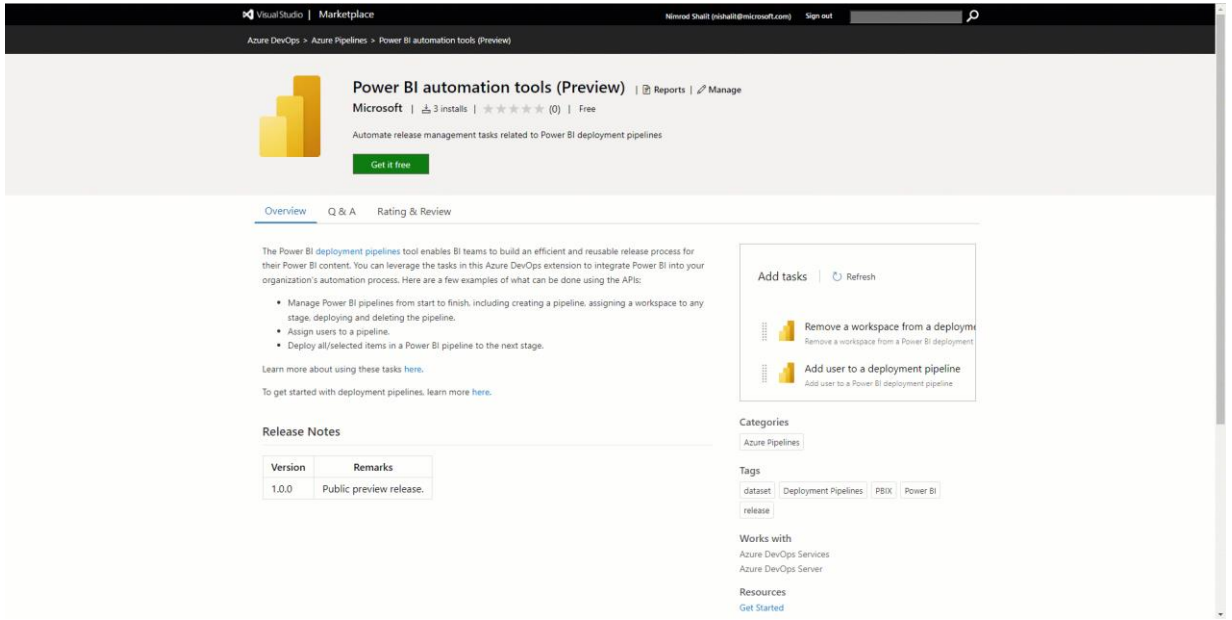
Microsoft

Deployment pipelines- Azure DevOps extension, multiple pipelines working together, Dataflows GA | Microsoft Power BI Blog | Microsoft Power BI

[Deployment pipelines- Azure DevOps extension | Microsoft Power BI]

The extension contains all the API operations available today for deployment pipelines. Using the extension, you can set tasks for:

- Creating and editing pipelines
- Assigning workspaces
- Adding users to a pipeline and a workspace
- Managing deployments across the pipeline stages



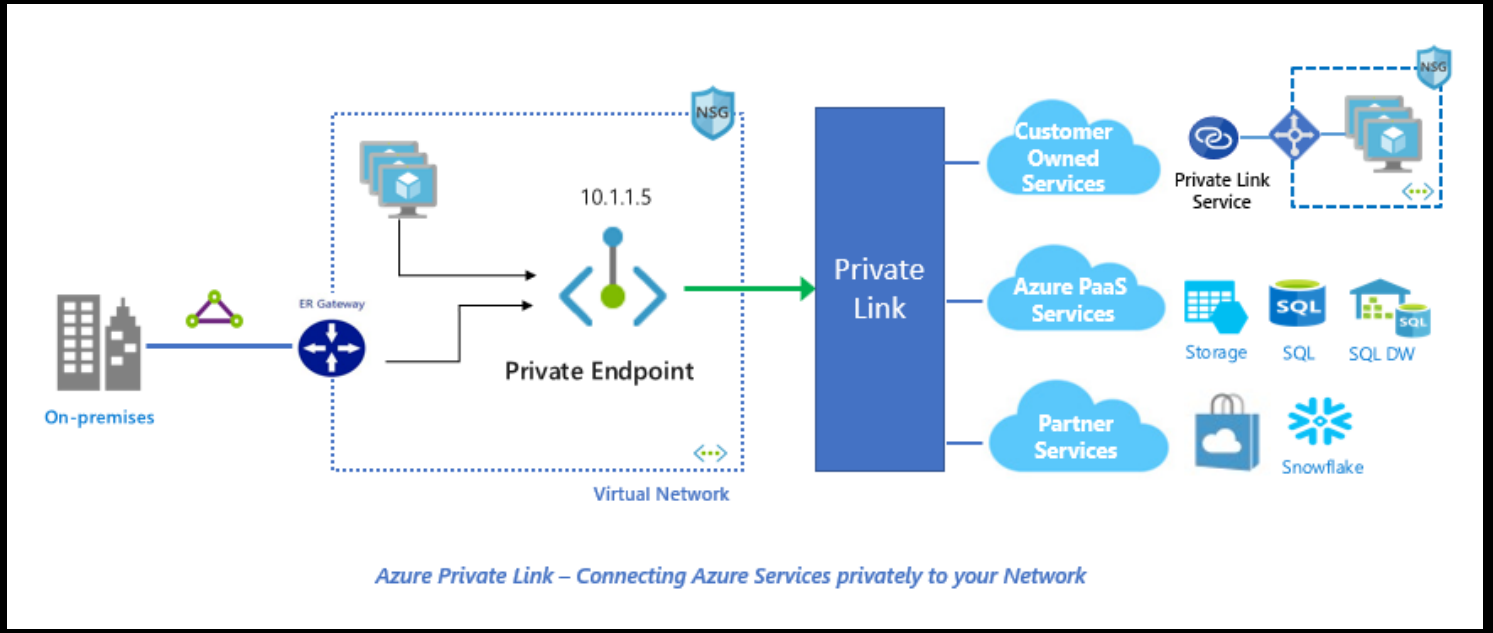
Microsoft Azure

Step 4:
Make it private…- Isolated environment

Make it private...- Isolated environment

Private endpoint enables connectivity between the consumers from the same:

- Virtual Network
- Regionally peered virtual networks
- Globally peered virtual networks
- On premises using VPN or Express Route
- Services powered by Private Link

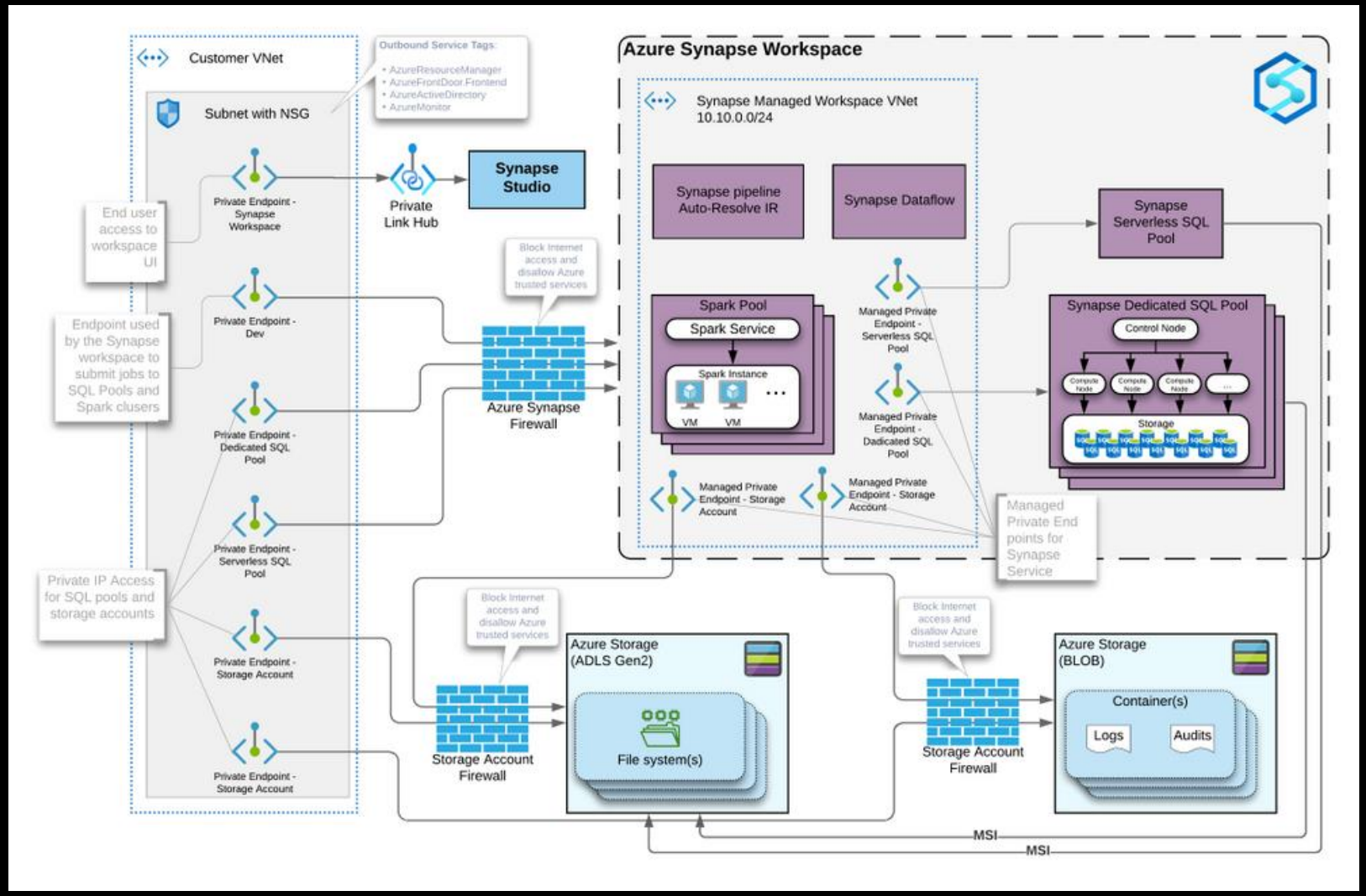


Make it private...- Isolated environment

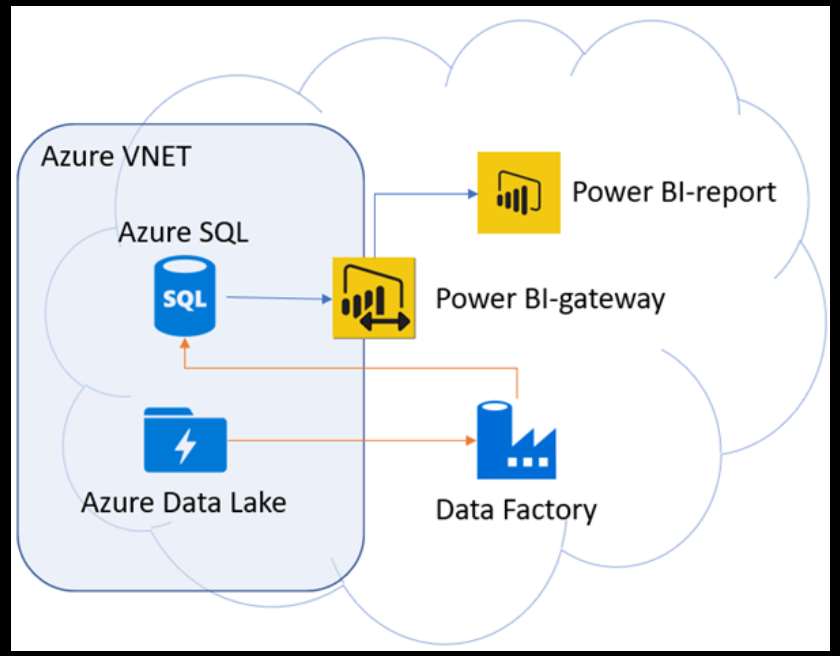
[Understanding Azure Synapse Private Endpoints - Microsoft Tech Community]

GitHub:
https://aka.ms/azsynapsee2e-git

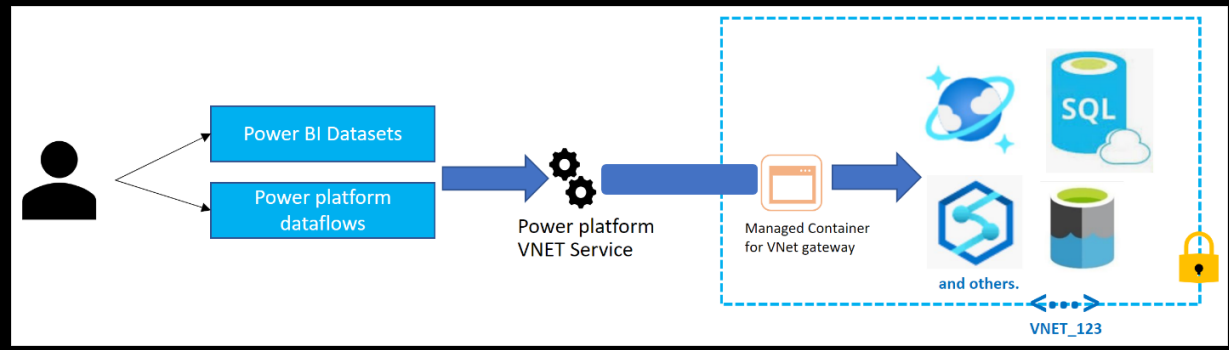
AAC Article:
https://aka.ms/azsynapsee2e-doc



Make it private…- Isolated environment



Power BI Gateway



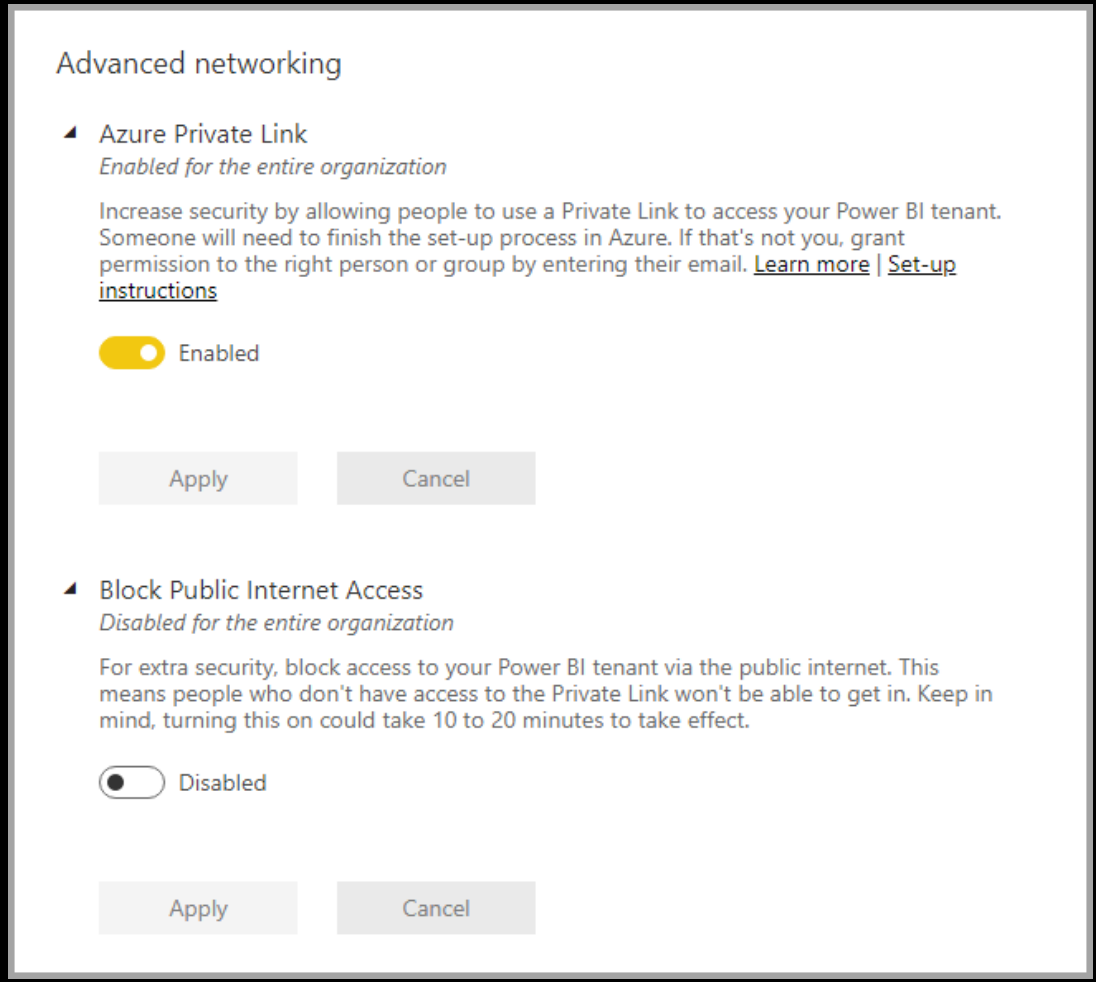
Power Platform VNET Service

[What is a virtual network (VNet) data gateway (Preview) | Microsoft Docs]

[Virtual network (VNet) data gateway architecture]

Make it private…- Power BI isolated environment

- Private endpoints guarantee that traffic going *into* your organization's Power BI artifacts (such as reports, or workspaces) always follow your organization's configured private link network path. User traffic to your Power BI artifacts must come from the established private link.
- You can configure Power BI to deny all requests that don't come from the configured network path.
- Private endpoints *do not* guarantee that traffic from Power BI to your external data sources, whether in the cloud or on premises, is secured. Configure firewall rules and virtual networks to further secure your data sources.



[Private endpoints for accessing Power BI - Power BI | Microsoft Docs]

Make it private…- Power BI isolated environment

WHY you shouldn’t use private endpoints for accessing Power BI

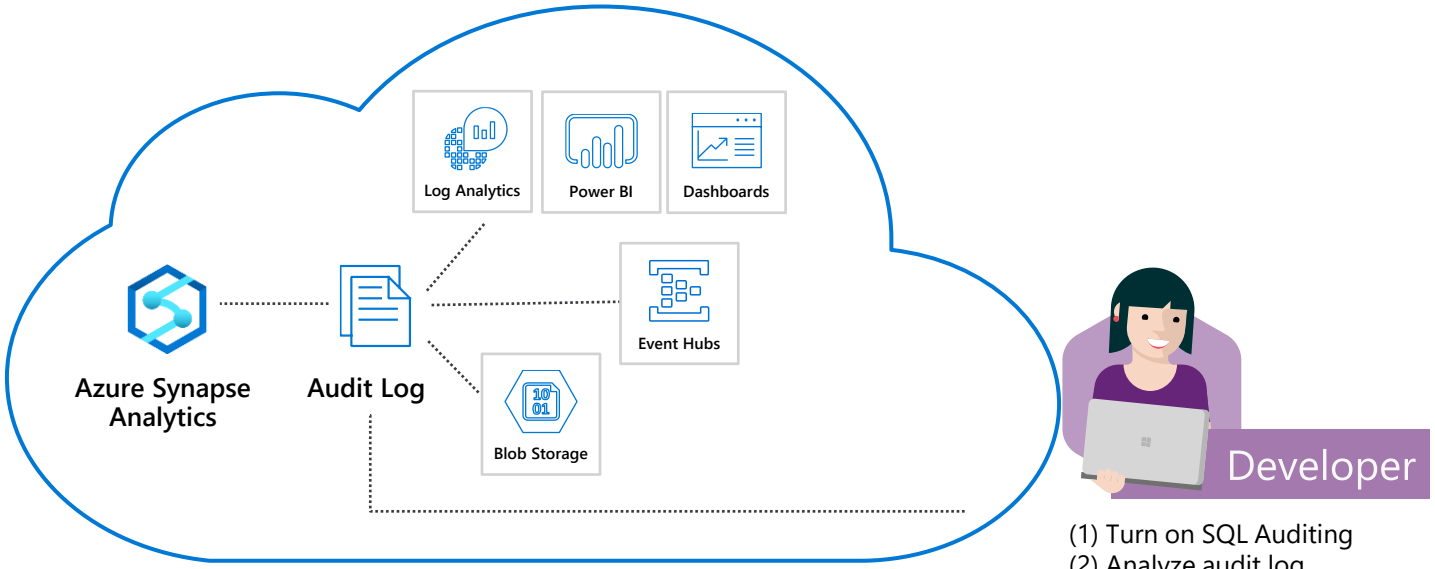
Private endpoints for accessing Power BI - Power BI | Microsoft Docs

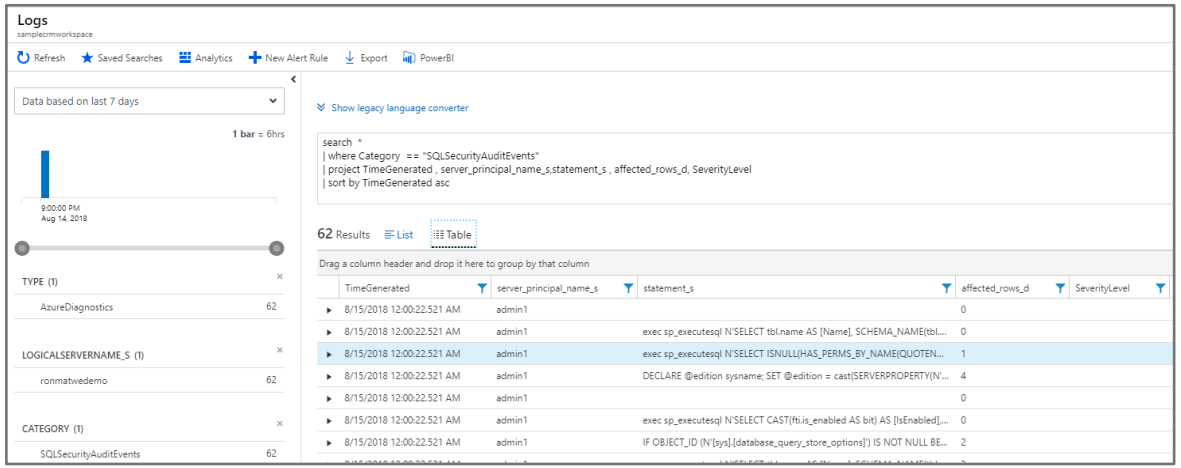
Microsoft Azure

Step 5:
I know what you did…- monitoring & auditing

I know what you did…- monitoring & auditing

Gain insight into database audit log

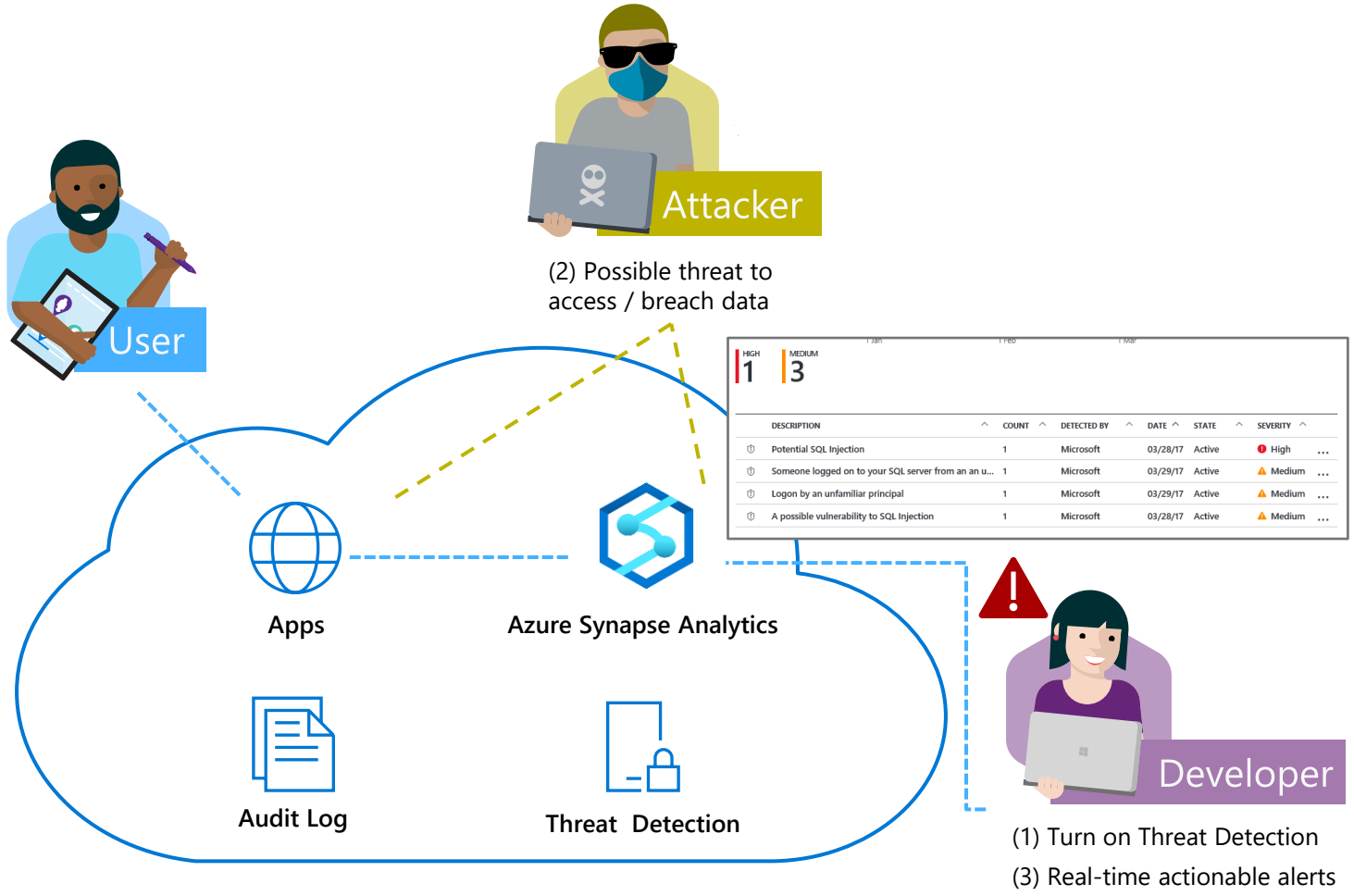




- ✓ **Configurable via audit policy**
- ✓ **SQL audit logs can reside in**
  - Azure Storage account
  - Azure Log Analytics
  - Azure Event Hubs
- ✓ **Rich set of tools for**
  - Investigating security alerts
  - Tracking access to sensitive data

I know what you did…- monitoring & auditing

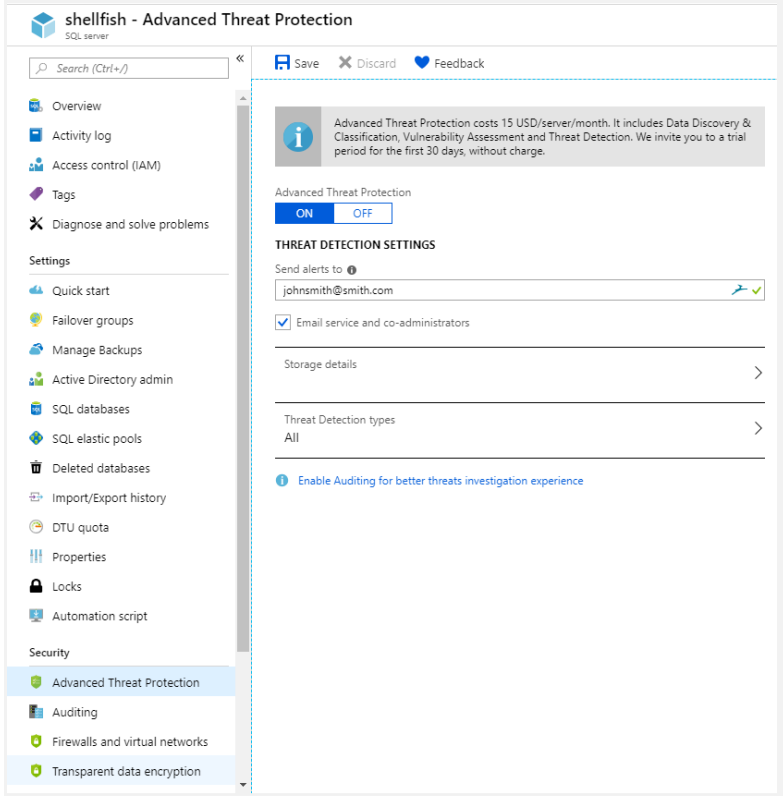
Detect and investigate anomalous database activity



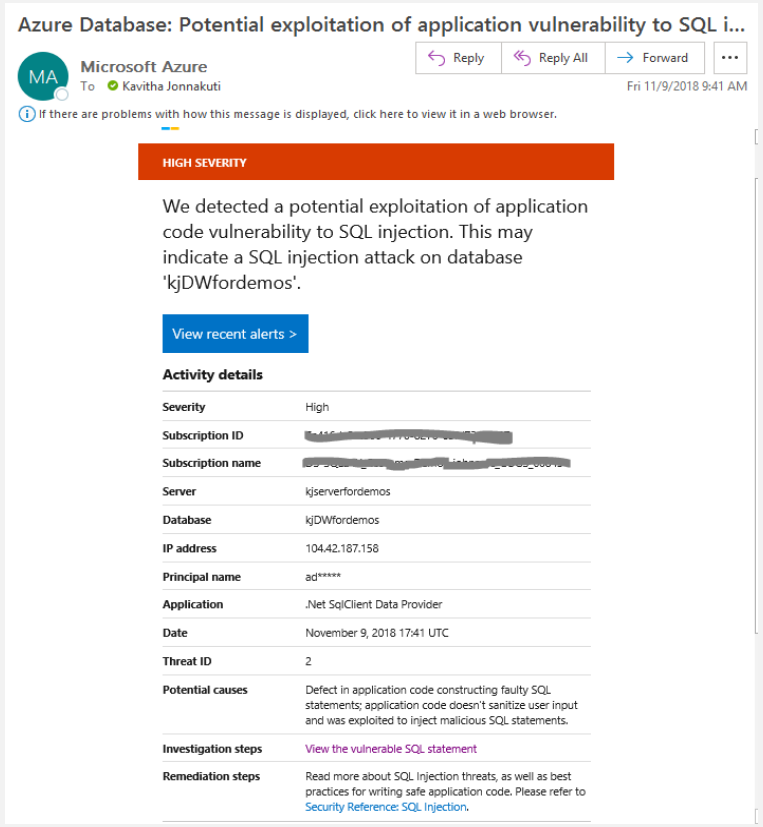
- ✓ Detects potential SQL injection attacks
- ✓ Detects unusual access & data exfiltration activities
- ✓ Actionable alerts to investigate & remediate
- ✓ View alerts for your entire Azure tenant using Azure Security Center

I know what you did…- monitoring & auditing

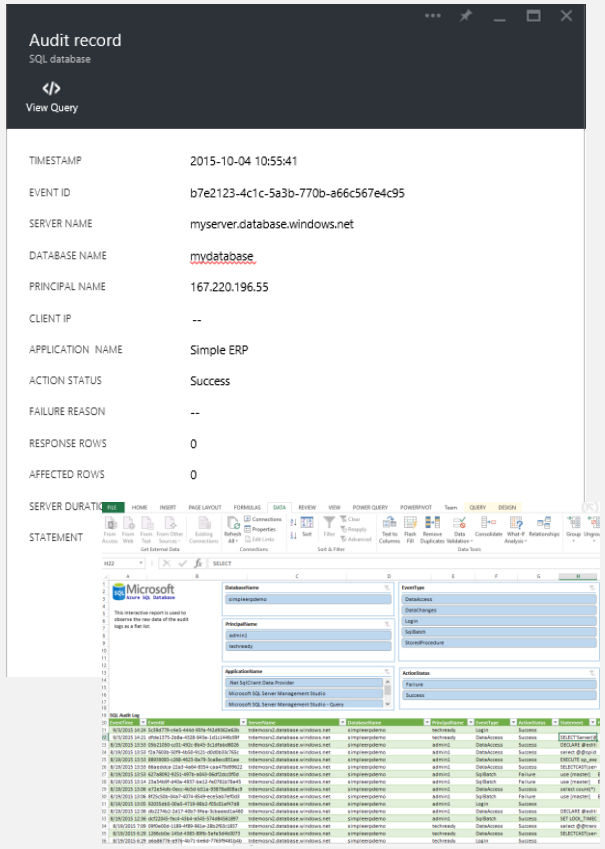
Set up



Alert



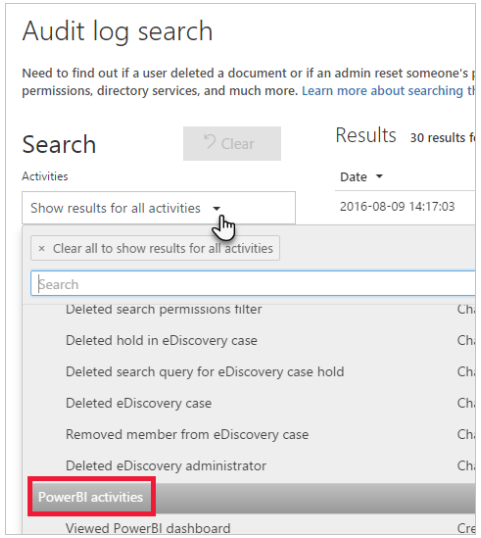
Explore

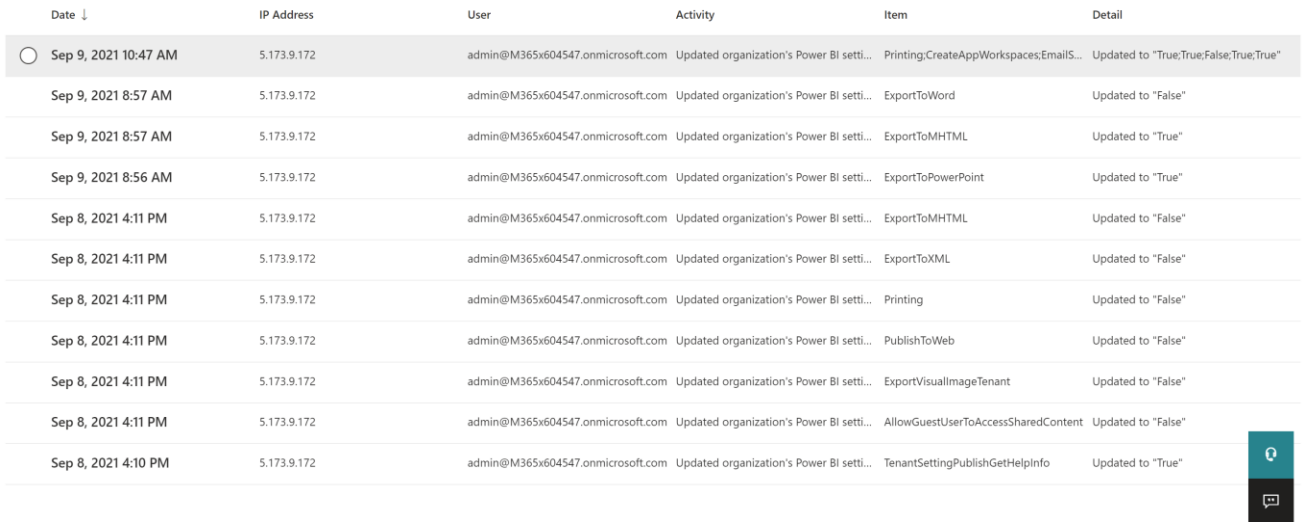


Threat Protection

I know what you did…- monitoring & auditing

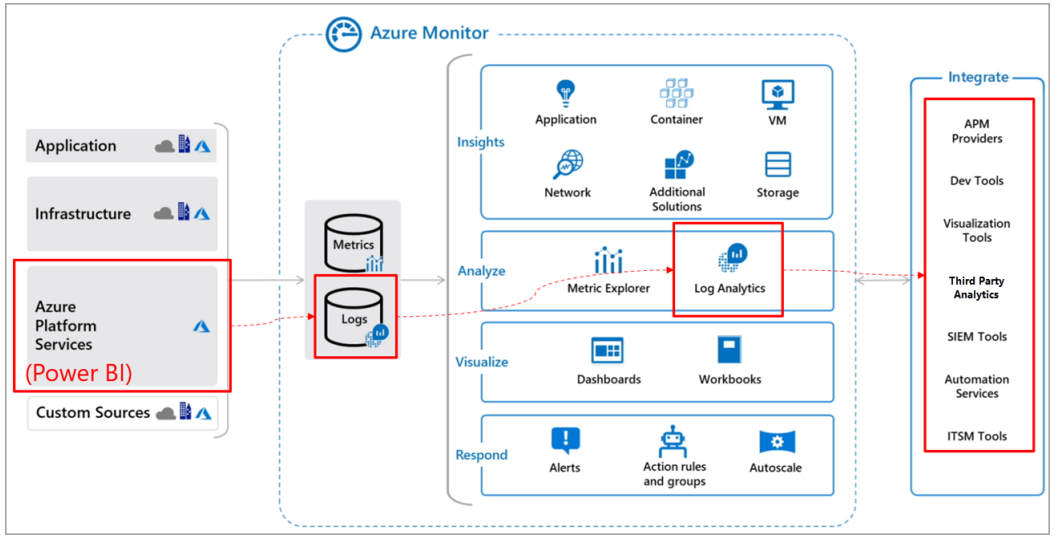
Power BI
Activity Log & Office365





Date	IP Address	User	Activity	Item	Detail
Sep 9, 2021 10:47 AM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	Printing;CreateAppWorkspaces;EmailS...	Updated to "True;True;False;True;True"
Sep 9, 2021 8:57 AM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	ExportToWord	Updated to "False"
Sep 9, 2021 8:57 AM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	ExportToMHTML	Updated to "True"
Sep 9, 2021 8:56 AM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	ExportToPowerPoint	Updated to "True"
Sep 8, 2021 4:11 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	ExportToMHTML	Updated to "False"
Sep 8, 2021 4:11 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	ExportToXML	Updated to "False"
Sep 8, 2021 4:11 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	Printing	Updated to "False"
Sep 8, 2021 4:11 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	PublishToWeb	Updated to "False"
Sep 8, 2021 4:11 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	ExportVisualImageTenant	Updated to "False"
Sep 8, 2021 4:11 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	AllowGuestUserToAccessSharedContent	Updated to "False"
Sep 8, 2021 4:10 PM	5.173.9.172	admin@M365x604547.onmicrosoft.com	Updated organization's Power BI setti...	TenantSettingPublishGetHelpInfo	Updated to "True"

Power BI & Log Analytics



[Using Azure Log Analytics in Power BI (Preview) - Power BI | Microsoft Docs]

Well-Architected Security Checklist for Azure Data/Analytics Services

	Azure Data Factory	Databricks	SQLDB	Azure Synapse Analytics	Power BI
Data Factory	❑ Enable CMK (Customer-Managed Keys) ❑ Use AAD-based MSI auth for Azure data services ❑ Use AKV to store non-AAD credentials ❑ Enable TLS 1.2 for connecting to data stores ❑ Enable corporate firewall for on-prem sources and only open outbound 443 port on specific domains ❑ Enable VNet for all Azure resources using PE or injection and use ADF managed VNet to connect securely to PEs	❑ Enable Access Control Lists to configure permissions at workspace, clusters, pools, jobs, and data tables ❑ Use Credential passthrough to authenticate automatically to ADLS from Azure Databricks clusters using user identity ❑ Use AKV to store credentials to be used in notebook ❑ Enable CMK for notebooks ❑ Enable CMK for root DBFS ❑ Encrypt traffic between cluster worker nodes ❑ Deploy Databricks workspace in your own VNet ❑ Enable IP Access Lists to restrict access to certain IP addresses ❑ Leverage Private Endpoint (preview) for users to connect to Databricks ❑ Leverage No Public IP (preview)	❑ Avoid duplications and complexity with central management for identities ❑ Implement principle of least privilege to reduce attack surface and harden database access ❑ Encrypt data in transit and at rest to protect your data ❑ Connect securely to Azure SQL from your applications ❑ Implement monitoring, logging and auditing ❑ Proactively assess and remediate database security ❑ Enable Advance Thread Protection for your databases ❑ Consider Azure Policy for database regulatory compliance ❑ Protect sensitive data with Dynamic Data Masking	❑ Establish network security with Firewall rules, Managed VNet ❑ Use SQL auth or AAD auth for Azure Synapse SQL pools ❑ Collaborate in a single workspace with access control management ❑ Secure data at rest with TDE ❑ Protect data with use of CLS, RLS, DDM and CLE ❑ Track database events, activities to gain insights and maintain regulatory compliance with Auditing	❑ Enable MFA/Conditional Access for Power BI ❑ Network Isolation with Power BI Private Endpoint & VNET Connectivity Private endpoints for accessing Power BI - Power BI | Microsoft Docs ❑ End 2 End Data Protection with Microsoft Information Protection and Data Loss Prevention Microsoft Information Protection sensitivity labels in Power BI - Power BI | Microsoft Docs ❑ Data encryption Power BI security white paper - Power BI | Microsoft Docs

Microsoft

Introducing Enterprise Scale Analytics and AI

Principles

- Classify governance activities into a single Landing Zone called Data Management Landing Zone.
  - Governance is decentralized and democratized but controlled by centrally applied policies.
  - Solving compliance and security challenges once.
- Group analytics, data integrations and products into Data Landing Zone(s)
- In case of multiple Data Landing Zones subscriptions:-
  - Simplification of communication over peer to peer
  - Scale using subscriptions of Data Landing Zone
  - Customizable and reusable deployment templates
- Organizational guidance to maintain security boundaries.

Data Management Landing Zone

Governance

Data discovery
Business glossary
Data catalog

Data Contracts
SLAs

Data quality
Business Rules

Master data
Ref. data mgmt.
Master record mgmt.

Data use governance
Data policy
Access governance
Loss prevention

Data privacy
Privacy operations
Risk assessment

Automation

Landing Zone Onboarding
Automation for provisioning landing zones, data integrations and products

Networking

Networking
Preconfigured network and monitoring setup

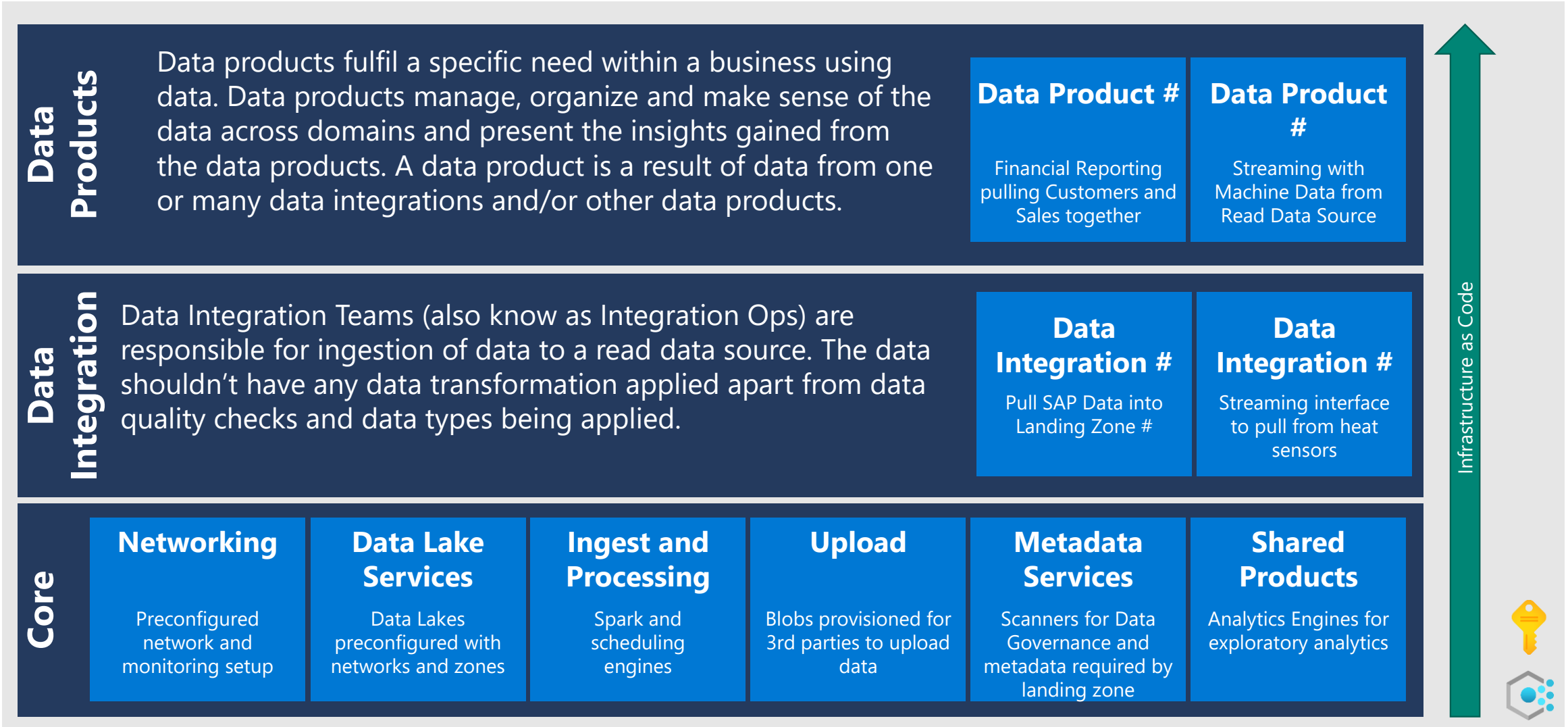
Containers

Container Registry
Standard images for deployment into analytics and ai

Data Modelling
Repository for Data Models
i.e. Erwin

API Catalog
Integration
API Documentation

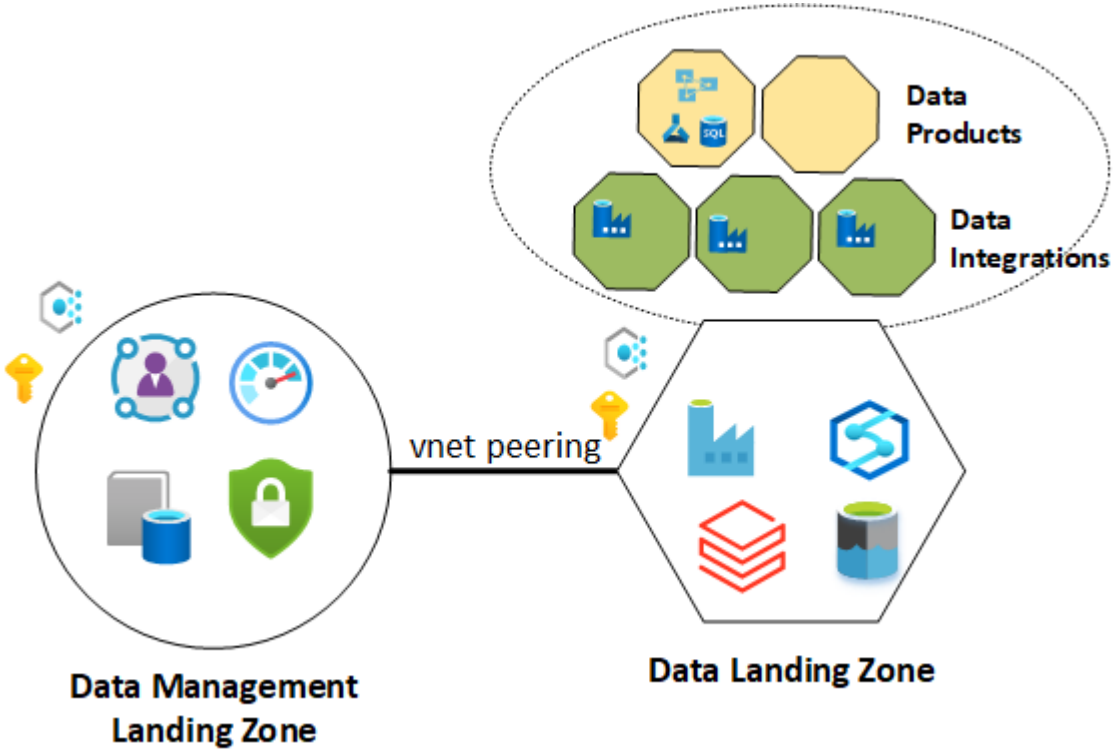
Data Landing Zone



Enterprise Scale Analytics Option I

Single Data Landing Zone

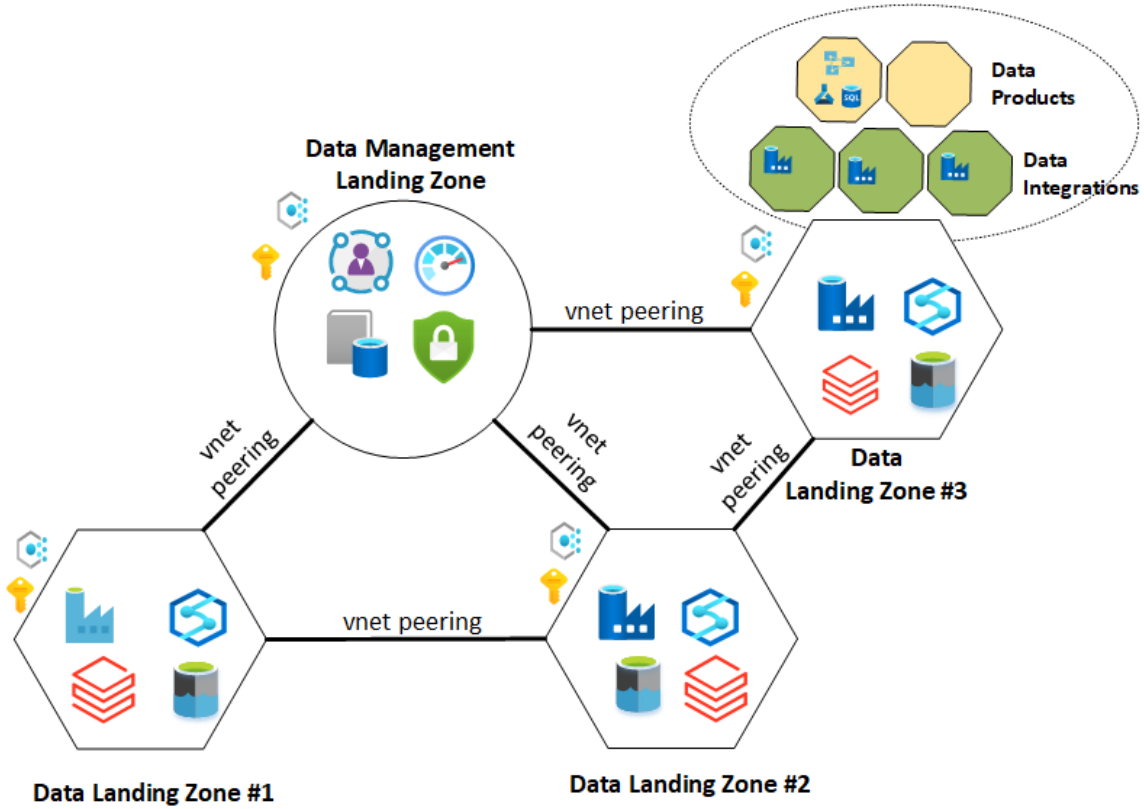
- Central Data Office and no business Data offices
- Enable Self Service Reporting



Enterprise Scale Analytics Option II

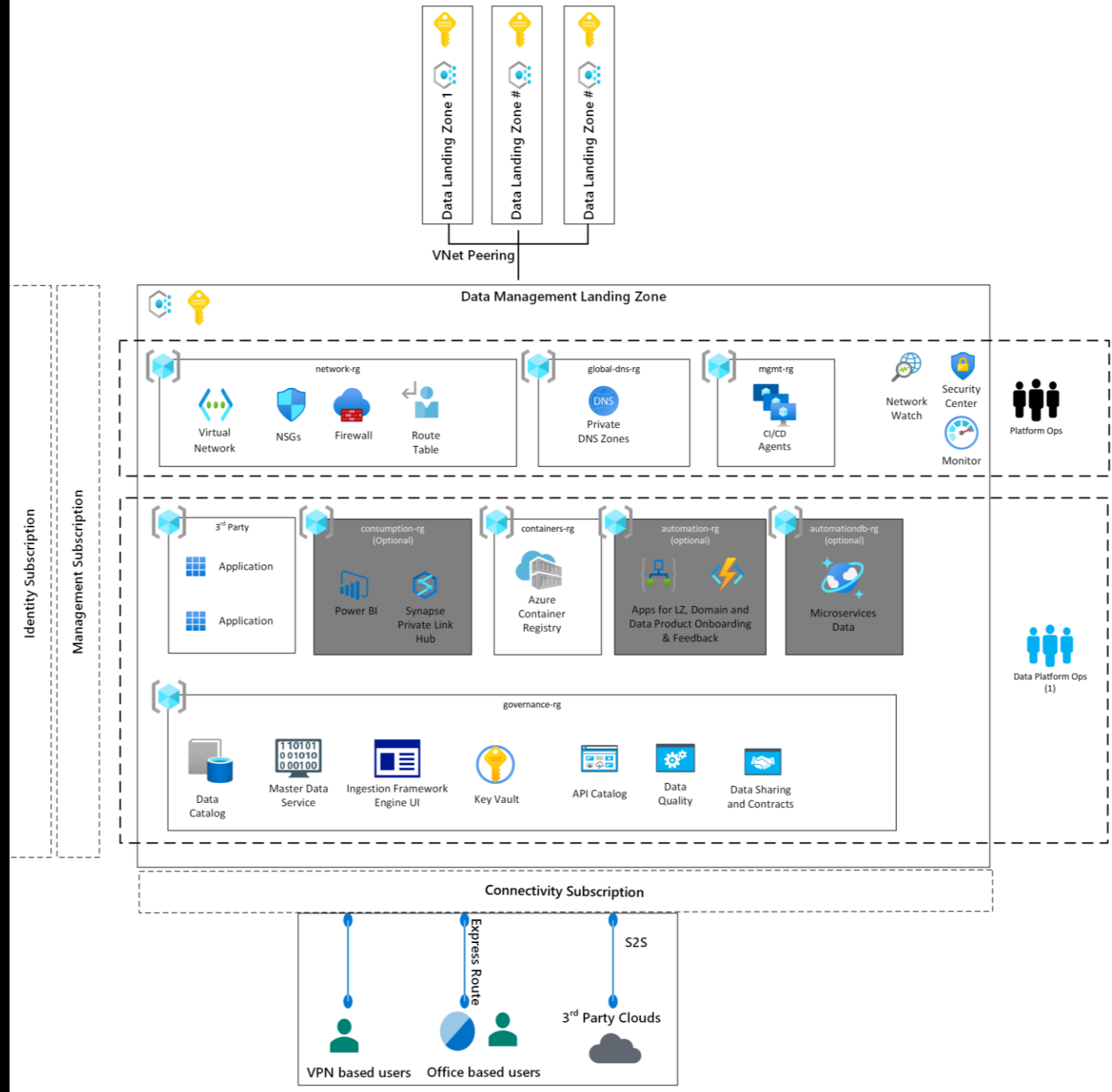
Multiple Data Landing Zones

- Multi Subscription
- Multiple Data Landing Zone Subscriptions
- Business Driven
- Combination of Central and Business Data Offices
- Example:
  - Car Group Holding company with multiple divisions.
    - Each car brand would have their own data landing zone
    - One Data Management Landing Zone



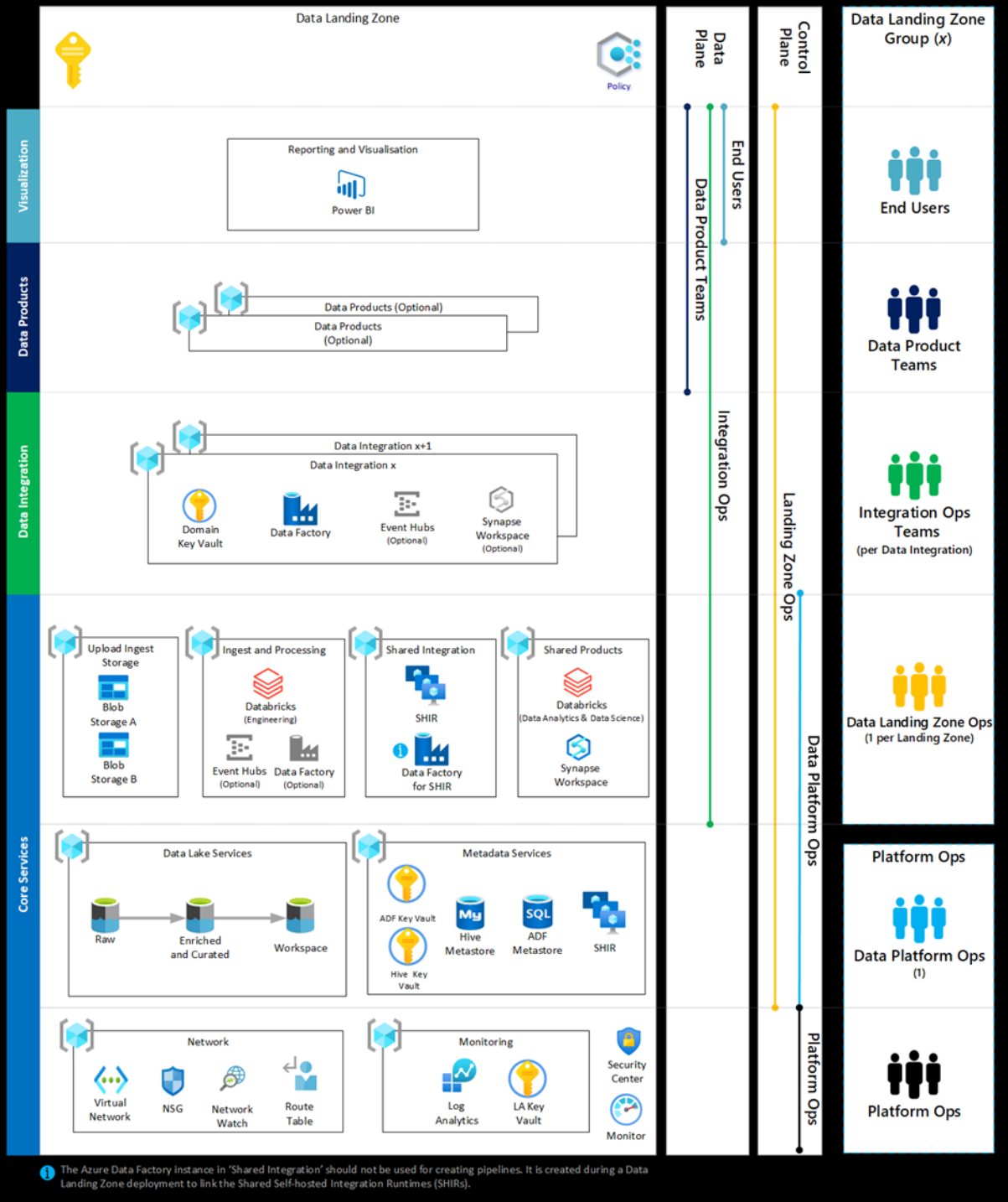
Sample

Data Management Landing Zone



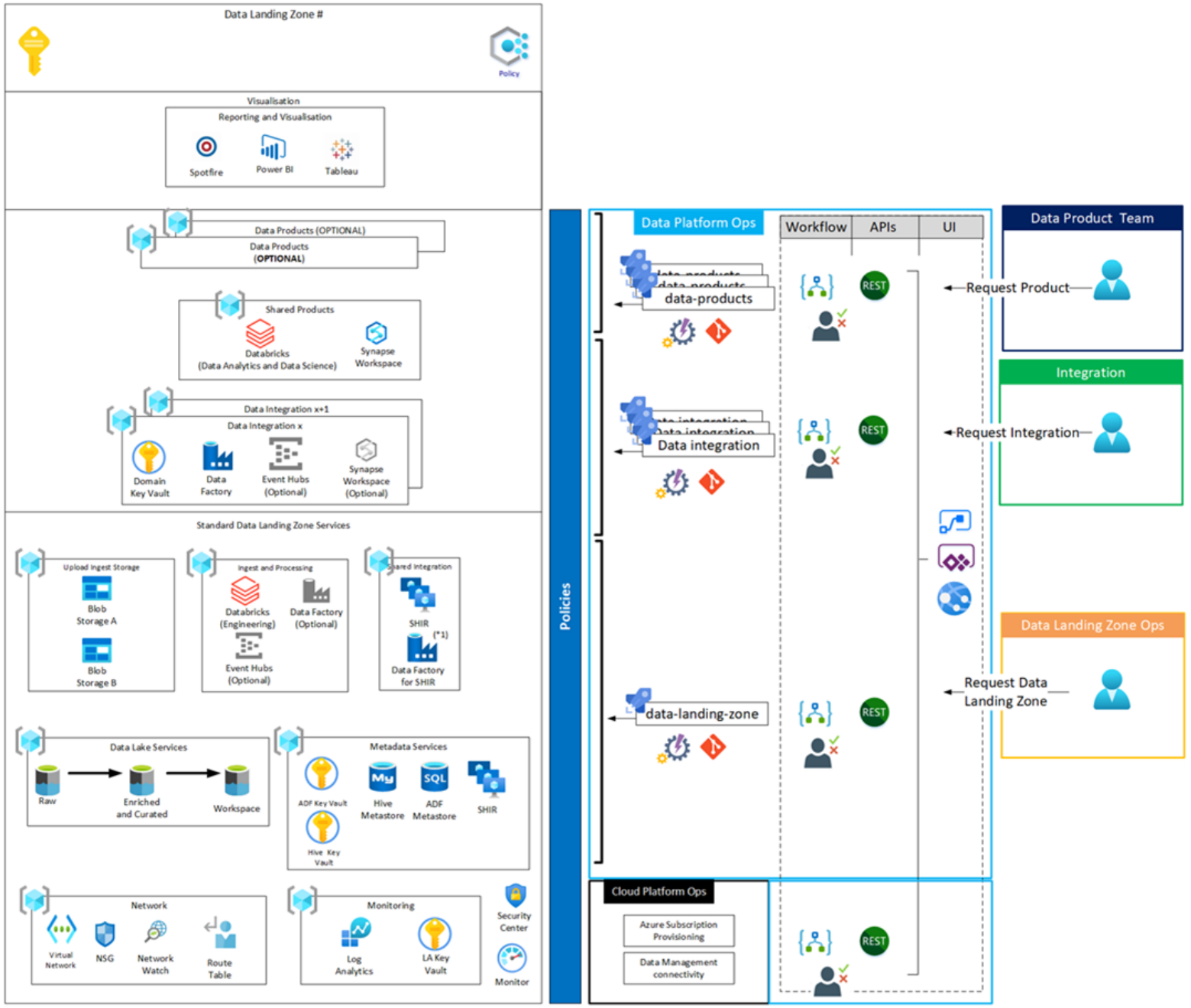
Sample

Landing Zone



Sample

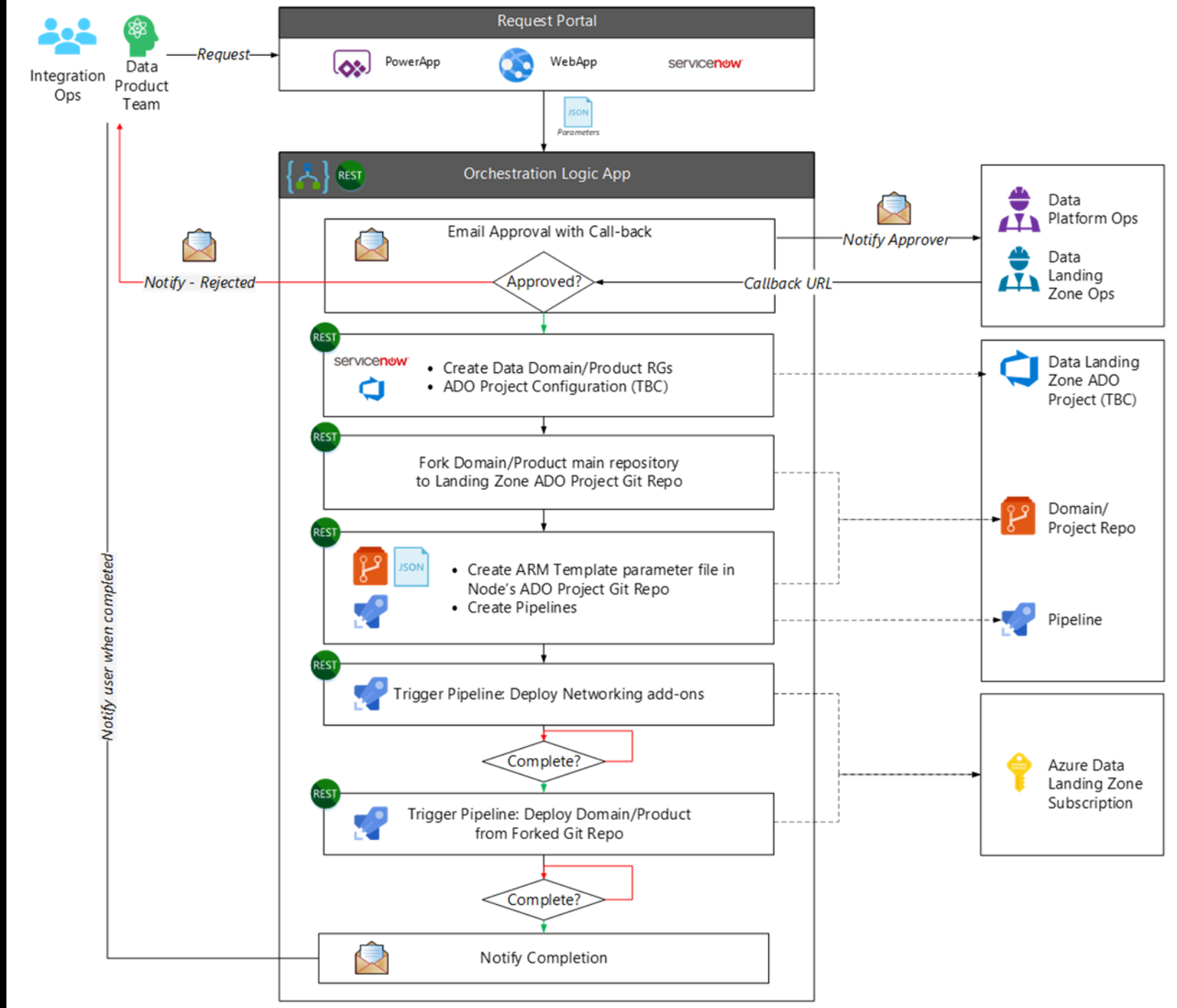
Automation High Level Principles



*1 This Data Factory shouldn't be used for creating pipelines. It is created during a Data Landing Zone deployment to link the Shared Integration Runtimes to.

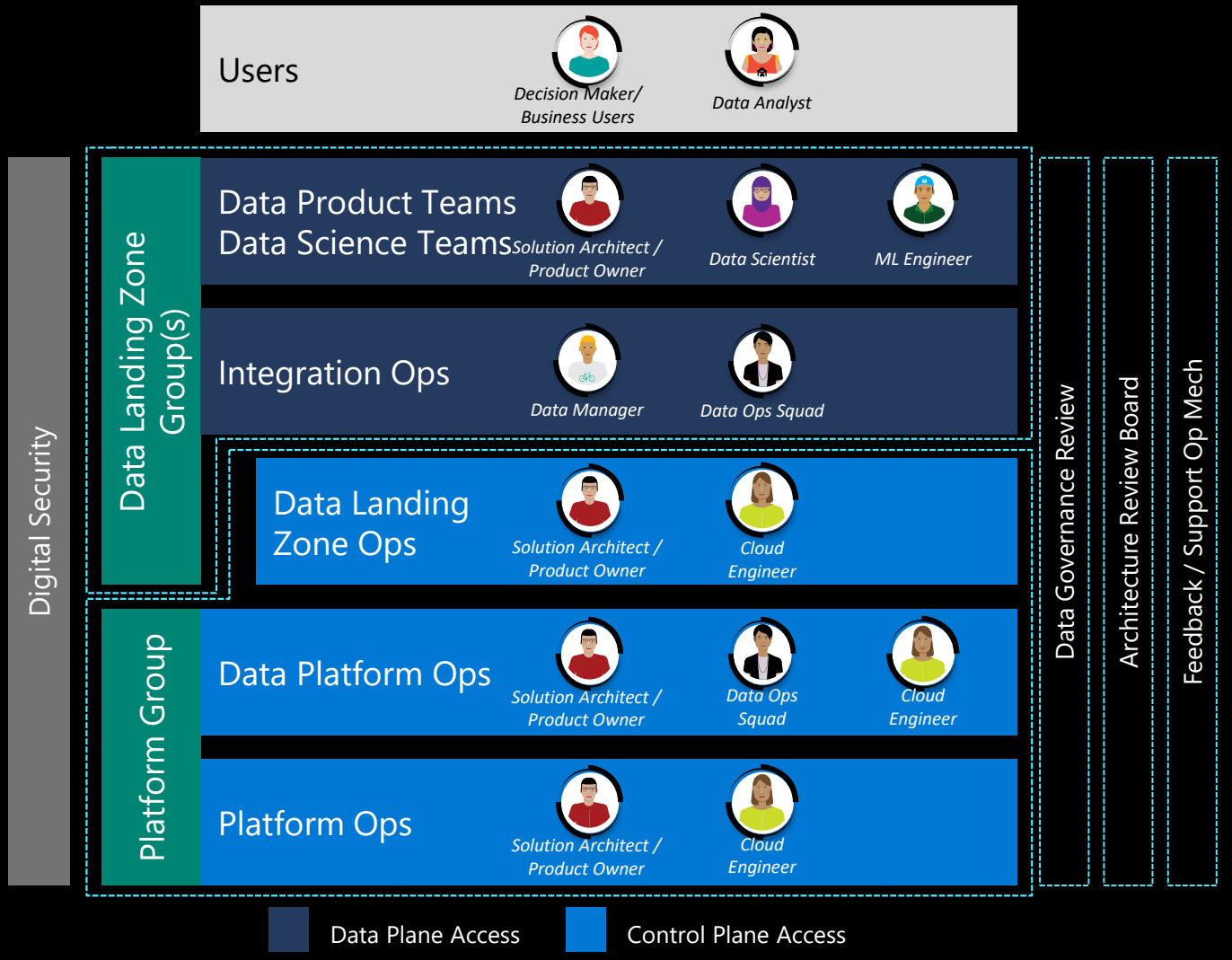
Sample

Data Integration | Data Product Deployment Automation



Organize Teams for Data Operations

- The Data Landing Zone Group:
  - Data Product Teams (per product)
  - Integration Ops (per integration)
  - Data Landing Ops (per node)
- The Platform Group:
  - Data Platform Ops
  - Platform Ops



Microsoft

CAF/WAF for data management and analytics:
https://aka.ms/adopt/datamanagement

Templates:
https://aka.ms/adopt/datamanagement/templates

WAF review assessment (and more):
http://aka.ms/assessments