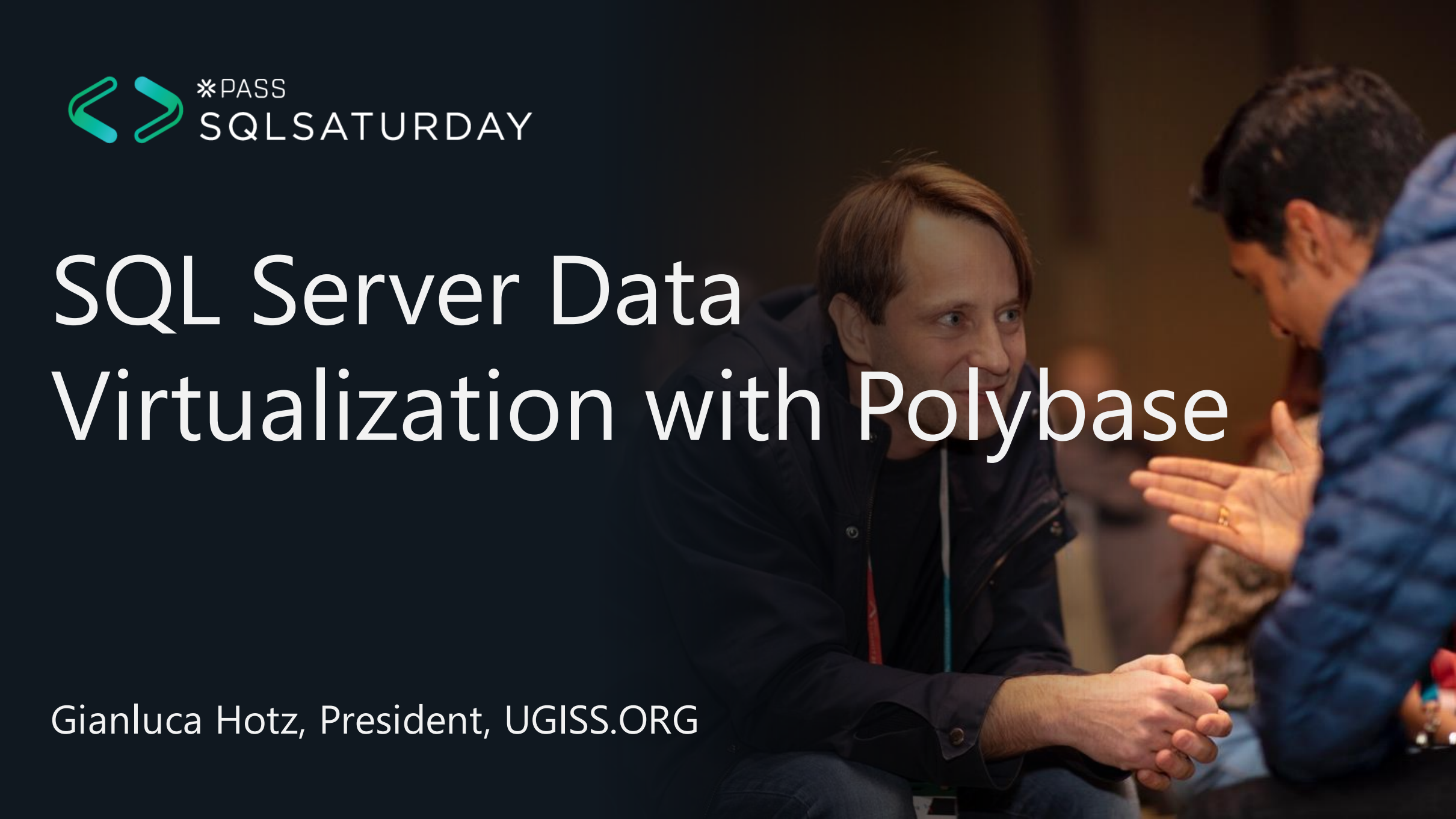

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SQL Server Data Virtualization with Polybase

Gianluca Hotz, President, UGISS.ORG

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Chi sono?

Gianluca Hotz | @glhotz | ghotz@ugiss.org

Consulente indipendente

- 20+ anni su SQL Server (dalla 4.21 nel 1996)
- Modellazione e sviluppo database, dimensionamento e amministrazione database server, aggiornamenti e migrazioni, performance tuning

Community

- 20+ anni Microsoft MVP SQL Server/Data Platform (dal 1998)
- VMware Experts SQL Server
- Fondatore e presidente UGISS (PASS Chapter)
- Co-organizzatore DAMAG Meetup Community

Problema

Sistemi DSS/OLAP/DWH necessitano di processi

- ETL (Extract, Transform, Load)
- ELT (Extract, Load, Transform)

Causano «Data Movement»!

Mitigato da virtualizzazione accesso ai dati

Data Movement

- Costi
  - Costi storage duplicati
  - Sforzo per costruire/mantenere pipeline dati
- Velocità
  - Tempo integrazione nuovi dati -> sfuggono opportunità!
  - Latenza disponibilità dati -> sfuggono opportunità
- Sicurezza
  - Superfice di attacco più ampia
  - Potenziale inconsistenza politiche di sicurezza
- Qualità
  - Pipeline dati possono introdurre problemi di qualità…
- Compliance
  - Maggiori problemi di governance

Virtualizzazione

https://en.wikipedia.org/wiki/Data_virtualization

"Unlike the traditional extract, transform, load (ETL) process, the data remains in place, and real-time access is given to the source system for the data. This reduces the risk of data errors, of the workload moving data around that may never be used, and it does not attempt to impose a single data model on the data"

- Dati rimangono dove sono
- Viene dato accesso in tempo reale al dato
- Non si cerca di imporre un solo modello…

Virtualizzazione e SQL Server

Open Data Service Gateway (< SQL Server 7.0!!)

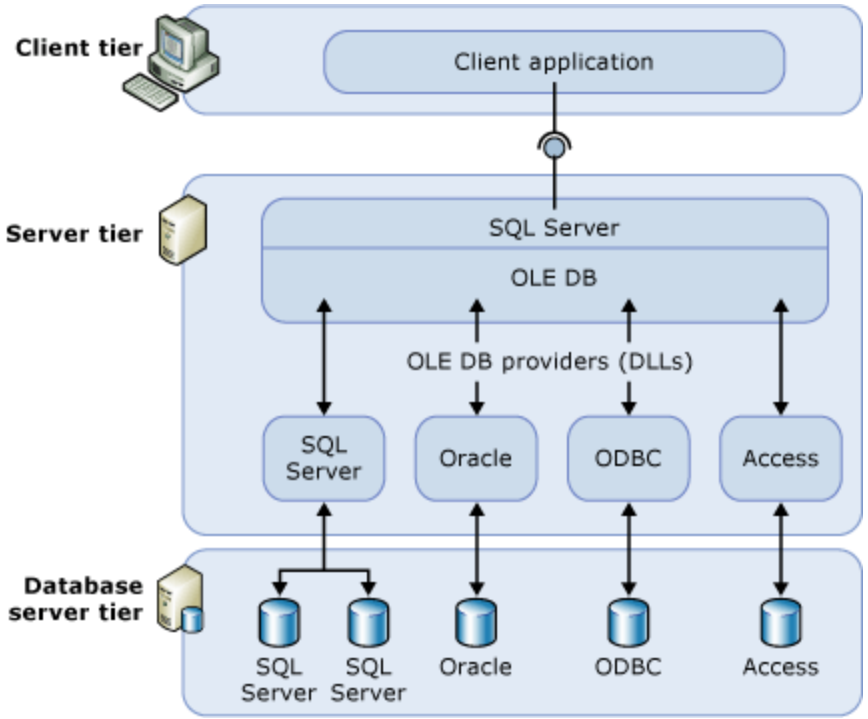
Linked Servers

PolyBase

Linked Servers

- Componenti
  - OLE DB provider
  - OLE DB data source
- Utilizzo
  - Accesso a fonti dati esterne eterogenee
  - Query e transazioni distribuite
- Supporto
  - SQL Server
  - Azure SQL Database Managed Instance
    - limitato SQL Database/SQL Database M.I./SQL Server

DEMO:
Linked Servers



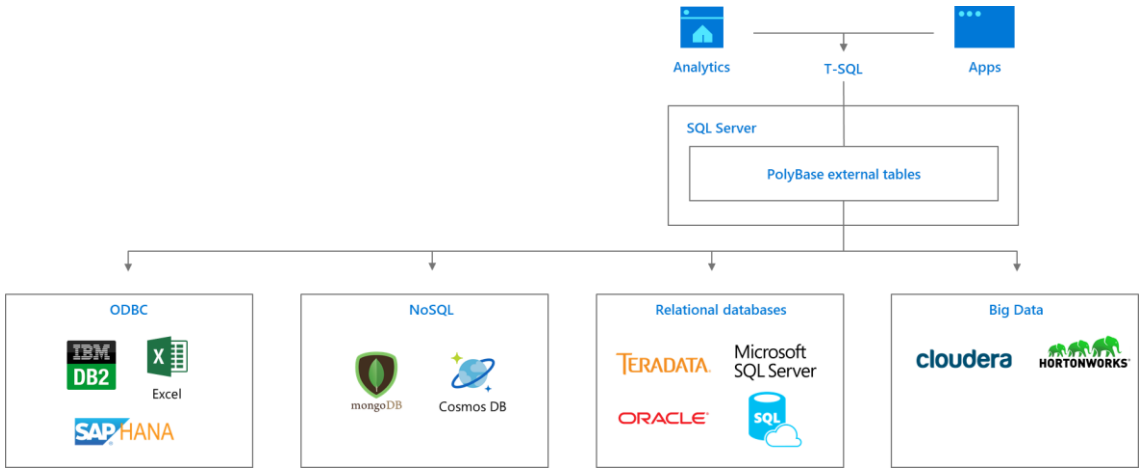
PolyBase

Distributed Compute Engine

- Integrato con SQL Server
- Combina fonti eterogenee tramite query distribuite

Componenti Virtualizzazione

- External Data Source
- External Tables



Supporto PolyBase

SQL Server 2016+

- Azure Blob Storage, Hadoop (Cloudera or Hortonworks)

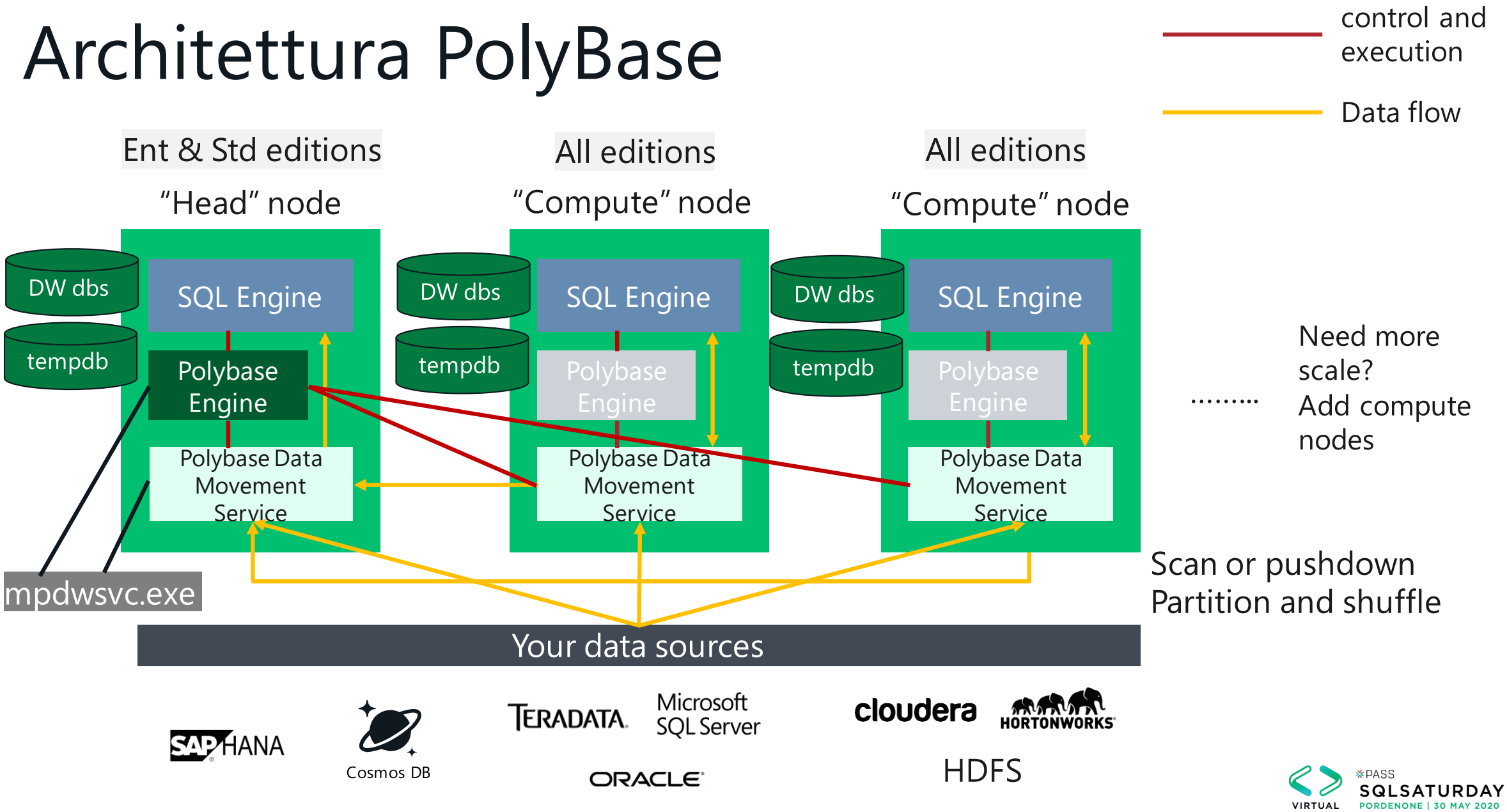
(SQL Server 2017+)

- Operazioni BULK INSERT/OPENROWSET Blob Storage

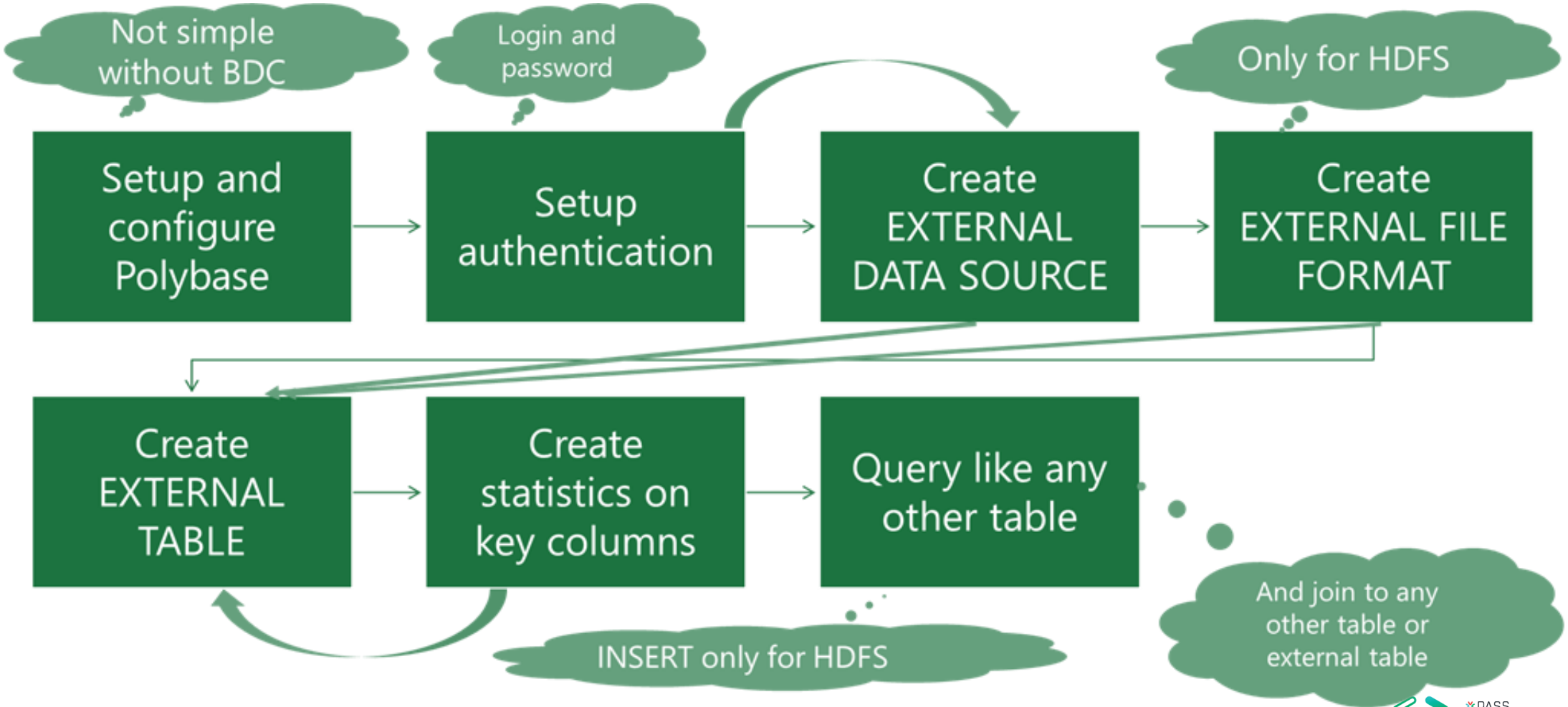
SQL Server 2019

- SQL Server (all flavors), Oracle, Teradata, MongoDB, CosmosDB (Mongo API)
- ODBC Generic Type (e.g. DB2, SAP Hana, Excel, ...)

Architettura PolyBase



DEMO: PolyBase



PolyBase con Azure SQL Database

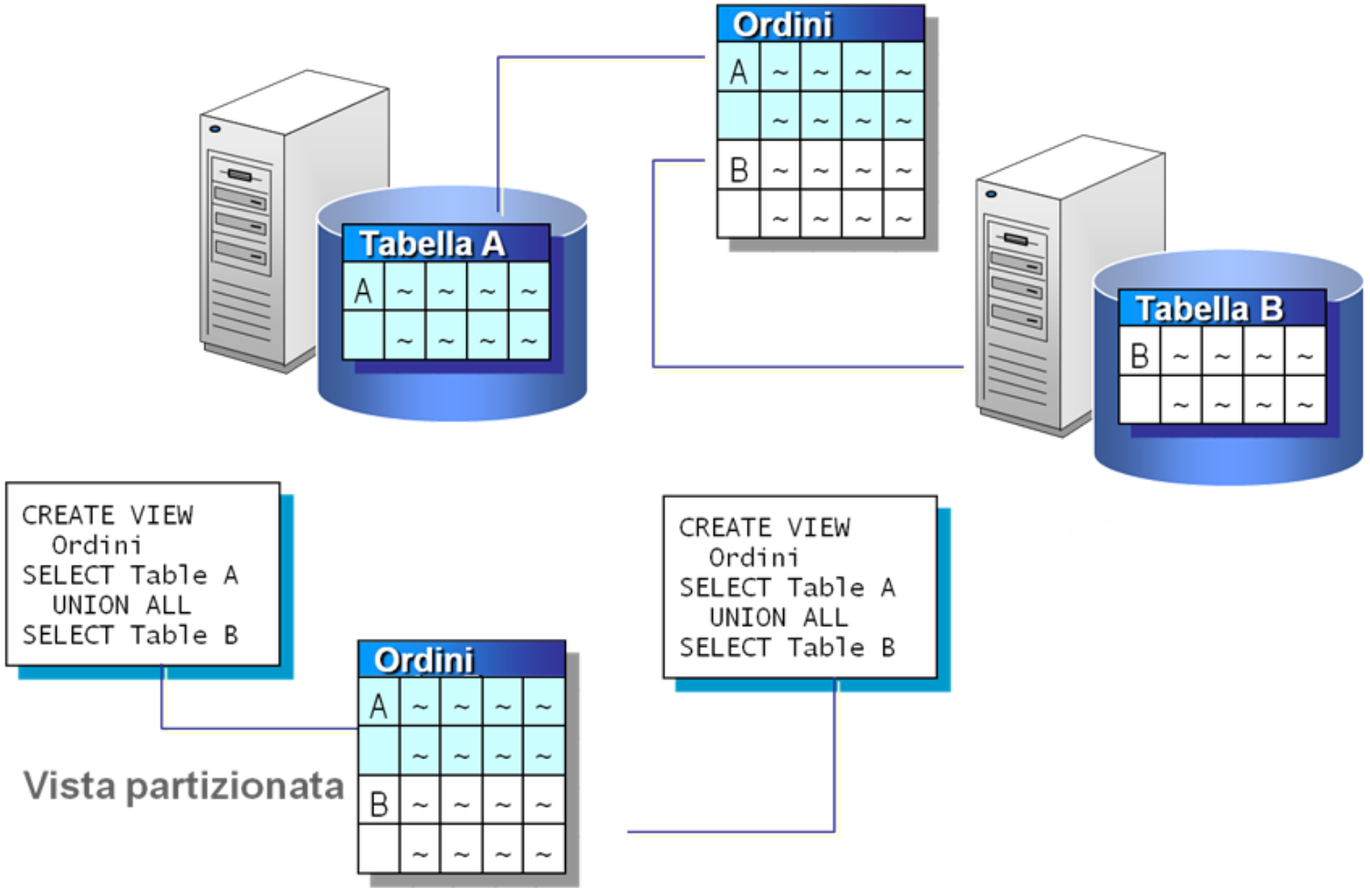
Bug nella versione 2019 RTM

- https://github.com/MicrosoftDocs/sql-docs/issues/3727
- Bisogna specificare database nel data source
- **CONNECTION_OPTIONS = 'Database=pbdemo’**
- Fix non documentato nella GDR
  - https://support.microsoft.com/en-us/help/4517790

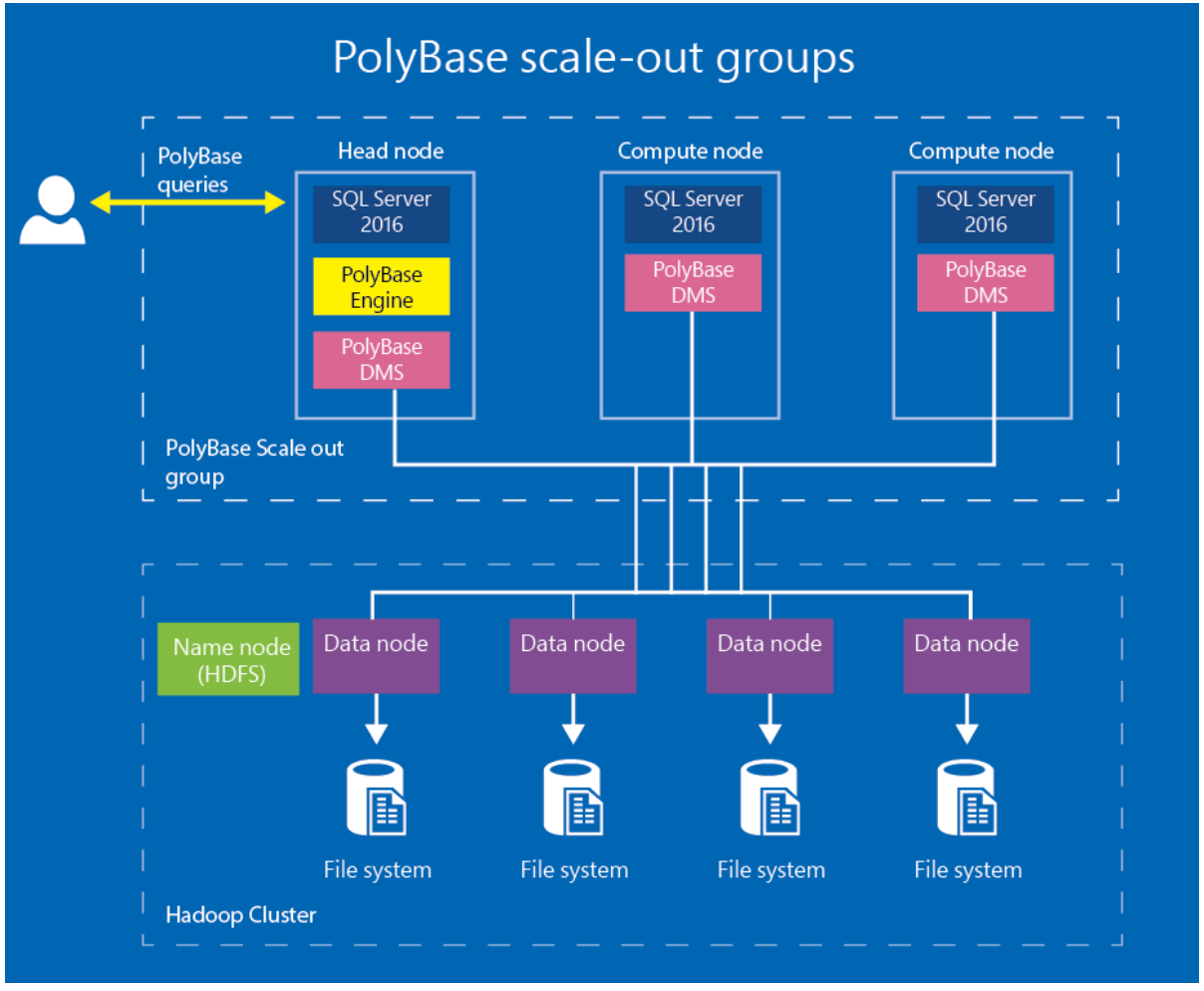
Scale-Out con Linked Server

- Distributed Partioned Views
  - Aka Federated Database Server in SQL Server 2000
- Partizionamento orizzontale tramite viste
  - Tabelle con partizioni dati distribuite su più istanze
  - Vincoli CHECK identificano la partizione
  - Viste su tutti i nodi con SELECT * [...] UNION ALL
- Query Processor riconosce lo scenario
  - Distribuisce il carico eseguendo query remote/locali
  - Predicato deve operare su colonna del vincolo CHECK
- Disponibili ancora solo con edizione Enterprise
- Funzionalità poco documentata...

DEMO: Viste partizionate distribuite



DEMO: PolyBase Scale-Out Groups



A confronto

External Tables

- Database Scoped
- ODBC Drivers
- Read-only*
- Scale out queries with push-down
- Failover with AG
- Basic authentication
- Distributed Transactions not supported
- Better for OLAP workloads

* Insert into HDFS allowed

Linked Servers

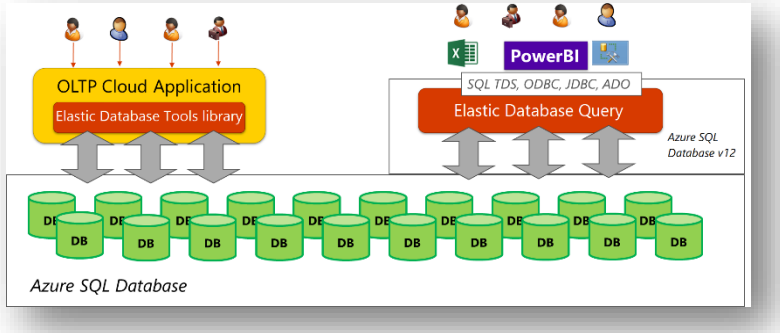
- Instance Scoped
- OLEDB Providers
- Read/write
- Single threaded queries with (limited) push-down
- Requires separate config from AG
- Basic and integrated authentication
- Distributed Transactions supported
- Better for OLTP workloads

Scale-Out OLTP Azure SQL Database

Elastic Database Queries

- Supporto T-SQL per query distribuite
  - CREATE EXTERNAL DATA SOURCE
  - CREATE EXTERNAL TABLE
- Partizionamento verticale: «cross-database queries»
  - TYPE = RDBMS
- Partizionamento orizzontale: «Sharding»
  - TYPE = SHARD_MAP_MANAGER

https://azure.microsoft.com/en-us/documentation/articles/sql-database-elastic-query-overview



Scale-Out OLAP

Azure Synapse Analytics

- aka Azure SQL Data Warehouse
- aka APS/PDW in Azure
- PolyBase è nato qui, principalmente per integrazione HDFS

Altre soluzioni virtualizzazione OLAP

Power BI

- Limite memoria portato da 10GB a 400GB
- 20-30% circa per esecuzione query
- https://docs.microsoft.com/en-us/power-bi/power-bi-data-sources

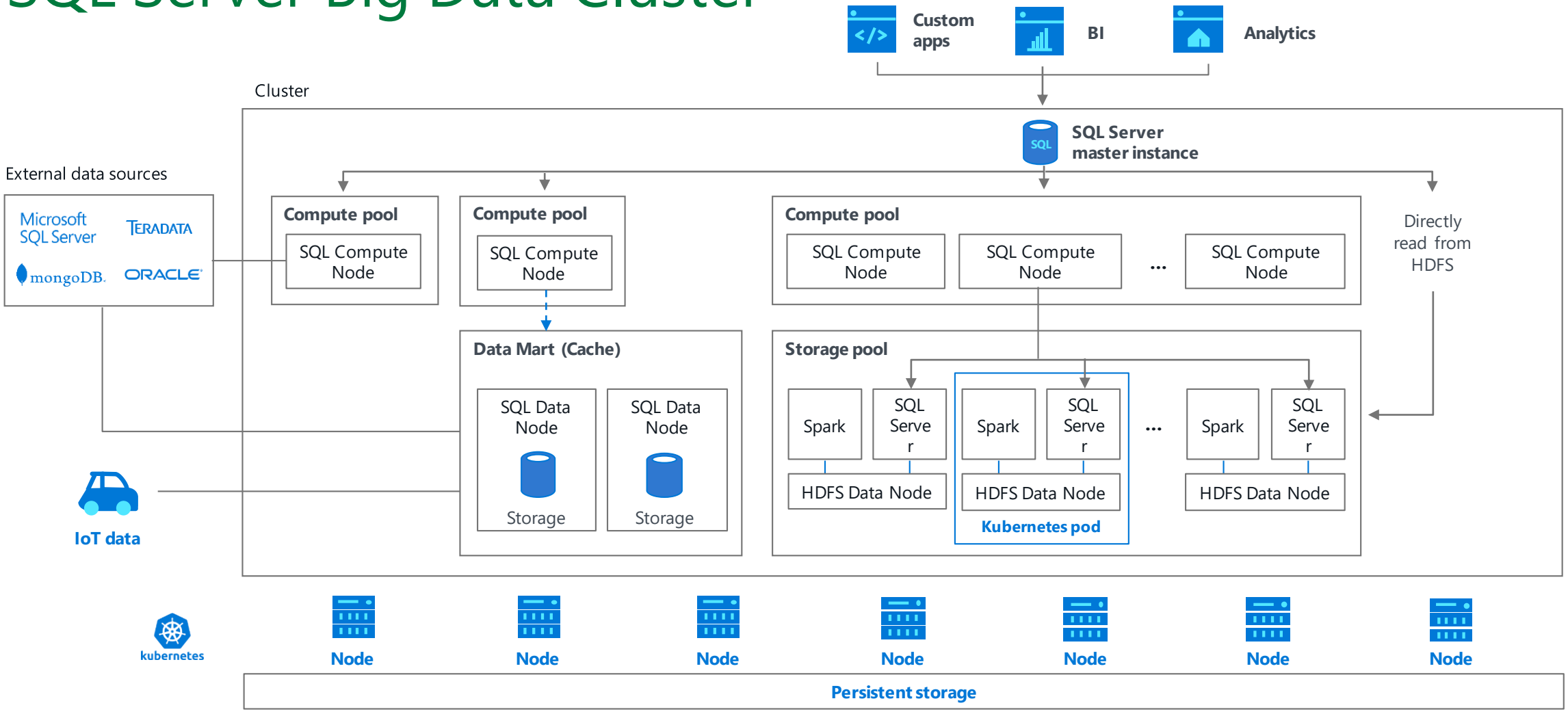
Azure Analysis Services

- https://docs.microsoft.com/en-us/azure/analysis-services/analysis-services-datasource

On-Premise Data Gateway

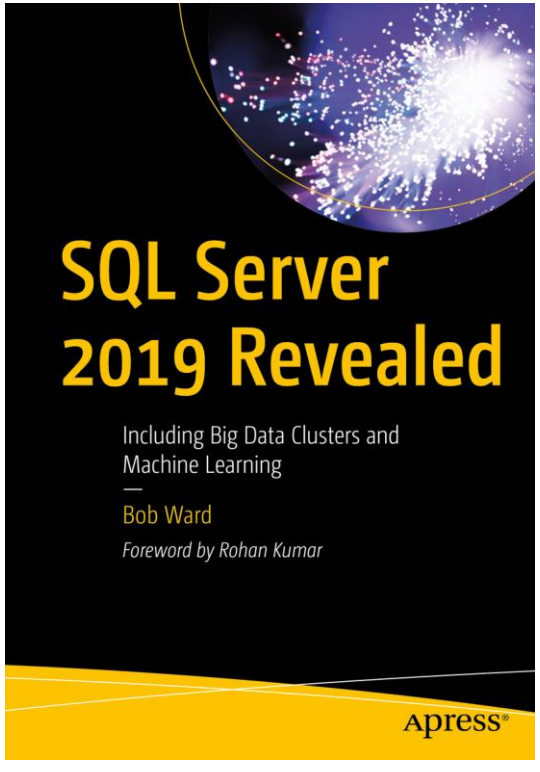
- Può essere usato da Power BI o Azure Analysis Service
- https://docs.microsoft.com/en-us/data-integration/gateway/service-gateway-onprem

SQL Server Big Data Cluster



https://docs.microsoft.com/en-us/sql/big-data-cluster/big-data-cluster-overview

Risorse


SQL Server
2019 Revealed
Including Big Data Clusters and
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Bob Ward
Foreword by Rohan Kumar
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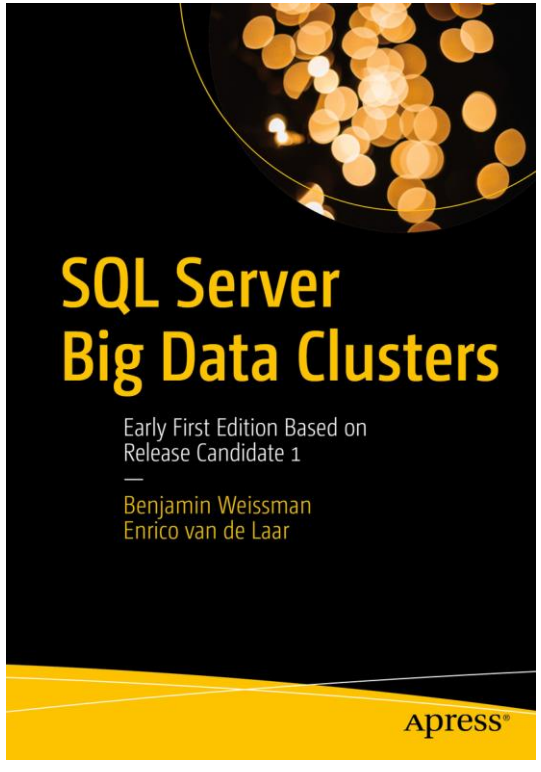
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Big Data Clusters
Early First Edition Based on
Release Candidate 1
Benjamin Weissman
Enrico van de Laar
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https://speakerscore.com/8P1Q

Thank you

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