denodo

DATA VIRTUALIZATION
Packed Lunch Webinar Series

DATA VIRTUALIZATION
Packed Lunch Webinar Series

Sessions Covering Key Data Integration Challenges Solved with Data Virtualization

denodo

DATA VIRTUALIZATION
Packed Lunch Webinar Series

Data Services and the Modern Data Ecosystem

Paul Fearon

Sr. Solutions Consultant

denodo

Agenda

1. Data Ecosystems
2. APIs
3. Patterns & Practices
4. Use Cases
5. Capabilities
6. Q&A
7. Next Steps

Data Eco-Systems

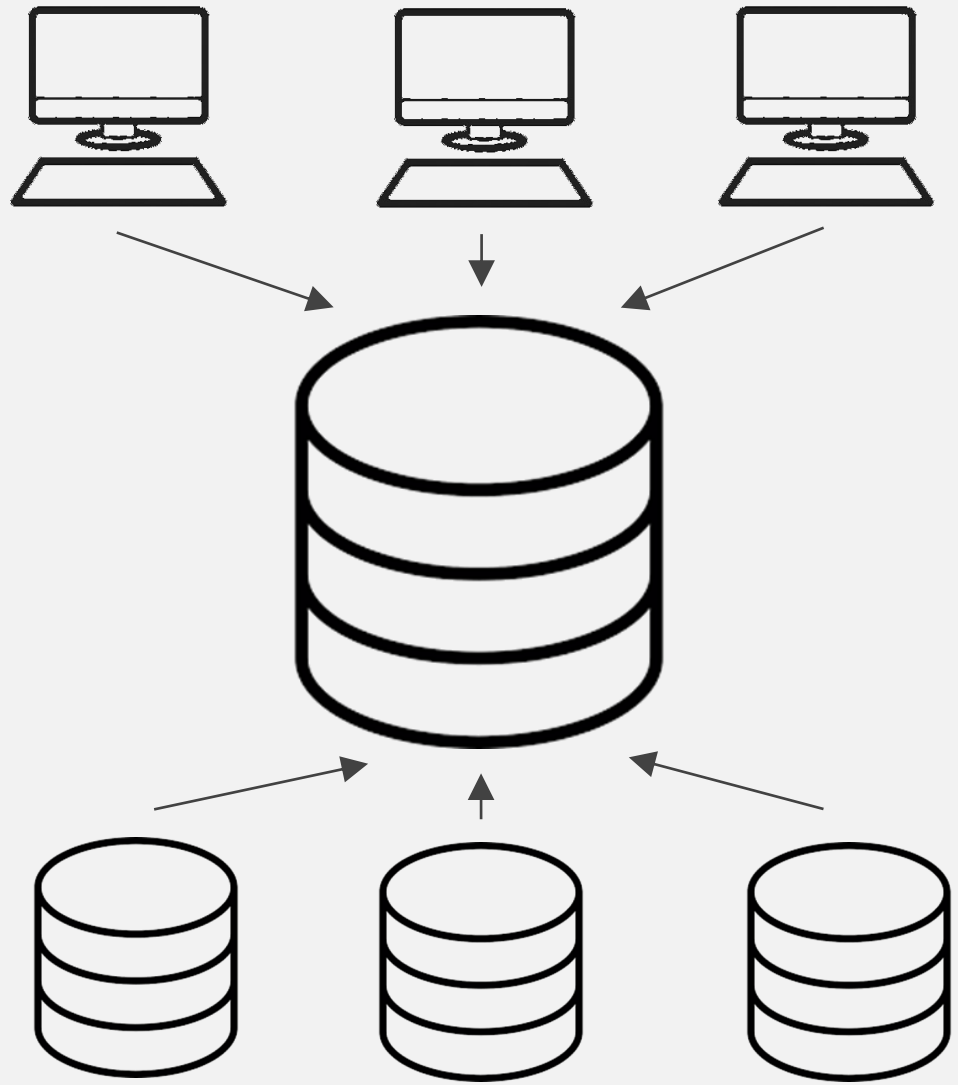

Search

The **Web** (Data Ecosystem)

Instant **access** to everything
without needing to **store** anything

The **Traditional** Data Ecosystem

Delayed **access** to somethings
while needing to **store** everything



The **Modern** Data Ecosystem

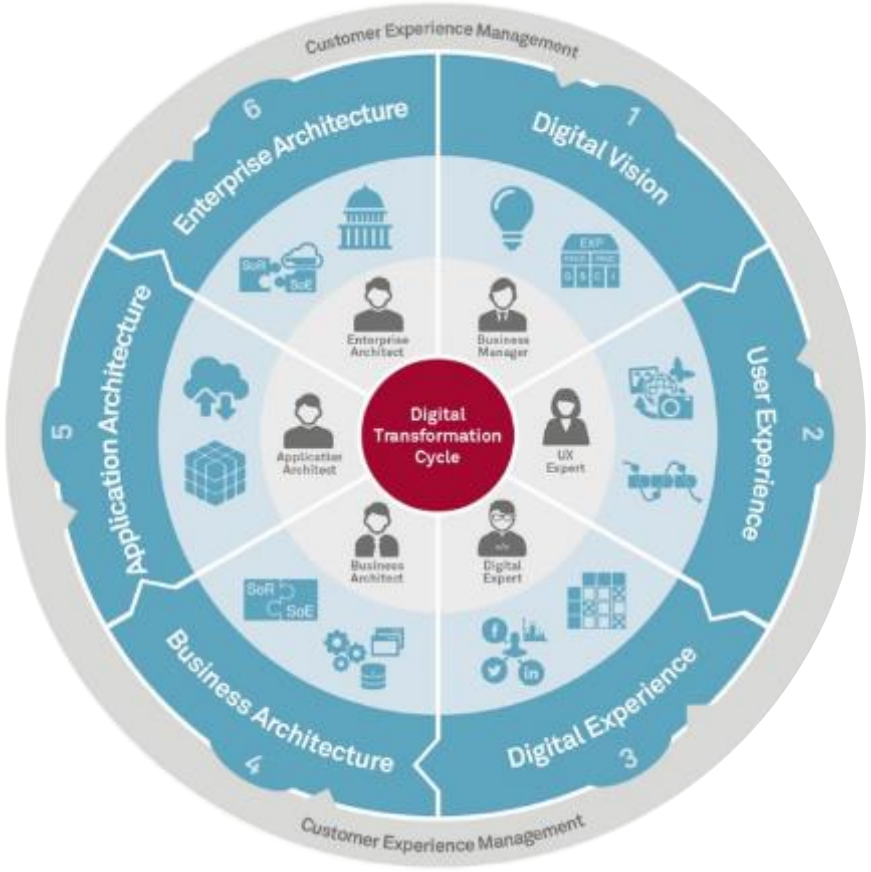
Deployment	On-premise	Cloud
Processing	Batch	Real-time
Access	Point-to-point	Decoupled
Data Models	Rigid	Flexible
Orchestration	Manual	Automated





Digital Transformation

- Digital transformation is a strategic initiative for most organizations
- The concept reflects technology's role in strategic decision-making, with its ability to **automate and simplify** business processes, improve customer relationships, enhance productivity, and cost savings
- Driven from CEO's office: Highest level of visibility & fully funded
  - Gartner – 28% of CIO budget in 2018
  - IDC – 2/3 of CEOs in global 2000 have digital transformation in the center of their corporate strategy
- Seen as do-or-die initiative
  - "If you don't, someone else will"



The Rise of Digital IT

And the challenges for traditional IT

- Often called shadow IT, LOB's have more sophisticated tools and needs.
- Digitization of society provides more channels or systems of engagements managed/owned or interacted with by LOB's.
- Operational systems are automated and access to information is vital to help manage operations (supply chain, order fulfillment, etc.)
- LOB's need agile access to information to analyze data, experiment and fail fast where necessary.
- Increased demand for different types of data including image, video, audio, etc.

The Relevance of **APIs**

Definitions

API - an interface

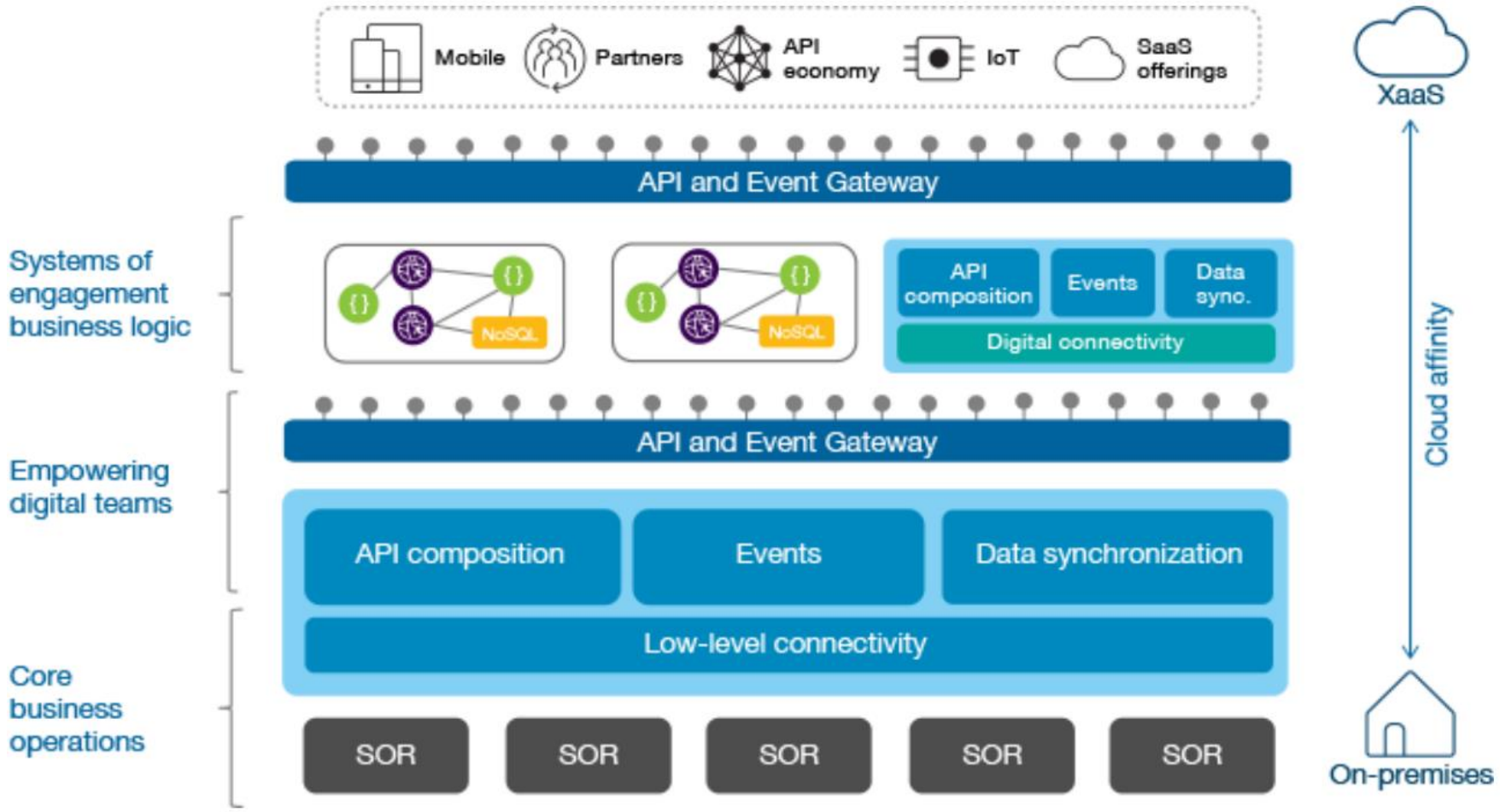
Web Service - a remote API via the web

Data Service - a web service for data

Microservice - an architectural style

- The internet has created an interconnected world
- Similarly, different processes and applications within a company also need to communicate with each other
- Web services are the building blocks of this interconnected world
- The concept of “an application exposing functionality” has evolved into “the web service is the application” (microservices)

Modern Data Ecosystem from an **App** Perspective



https://www.omg.org/cloud/deliverables/CSCC-Cloud-Customer-Architecture-for-Hybrid-Integration.pdf

Why are data services important

- Abstraction
  - Consumer need not concern themselves with the complexities of data acquisition and composition.
  - IT flexibility with limited impact on business
  - Aggregation of data providers
- Utilizable
  - Multiple consumers can share the same service for a myriad of use cases (generic, interoperable, flexible consumption patterns),
- Governance
  - Data services also perform a critical governance function - they help centralize metrics, monitoring, version management, reuse of data types, and enforce data visibility and access rules.
- Semantics –
  - Alignment with logical data models
- Controlled Access
  - single point of interaction.

Common Scenarios for Data Services

Real-time data access without replication

Consolidated views across myriad sources

A single point for implementing security and governance protocols

The ability to connect with most legacy and modern sources

Patterns and Practices

Data Virtualization in the API

denodo

DATA VIRTUALIZATION
Packed Lunch Webinar Series

Data Services Layer (Data API)

A data access layer that abstracts underlying data sources and exposes them as discrete services to form a ‘data API’

- Different users and developers across the enterprise can access data in a secure and managed fashion and share a common data ‘model’
- Provides secure and managed access to data across the enterprise
- Provides consistency of data
- Hides complexity, format, and location of actual data sources
- Supports many consumption protocols and patterns

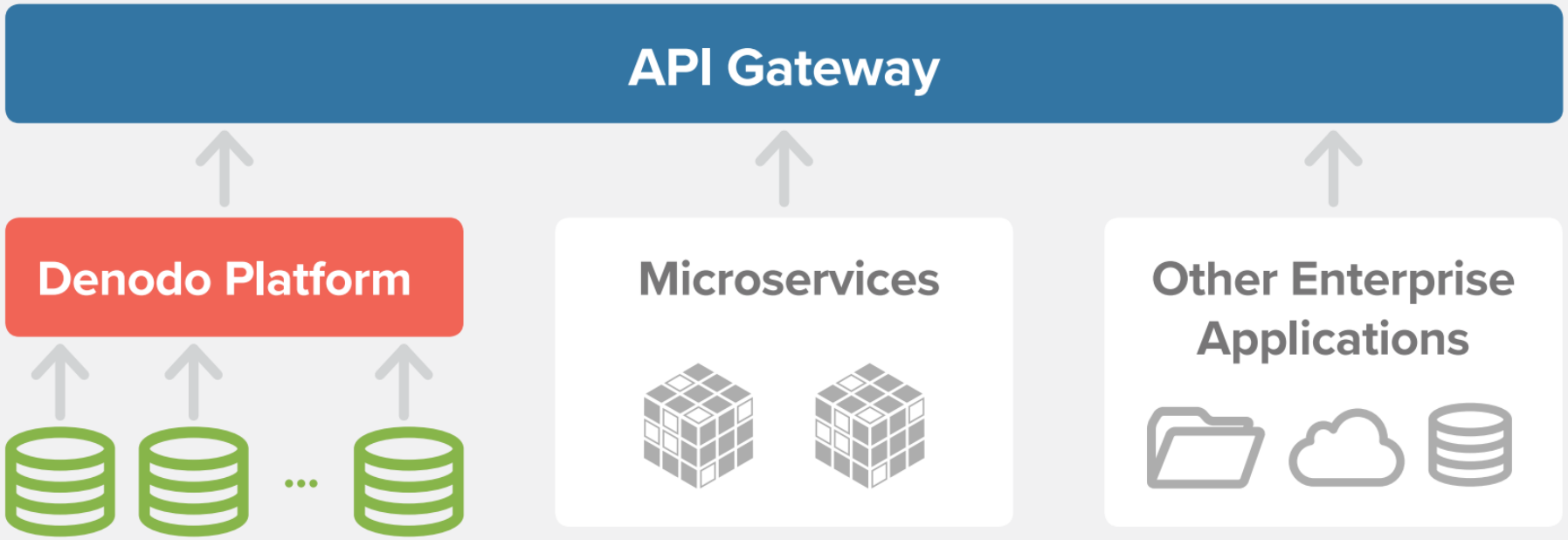
Example: Single data access layer for all development teams to avoid ‘hunting down and interpreting data differently by project’

Data Virtualization for Data-as-a-Service

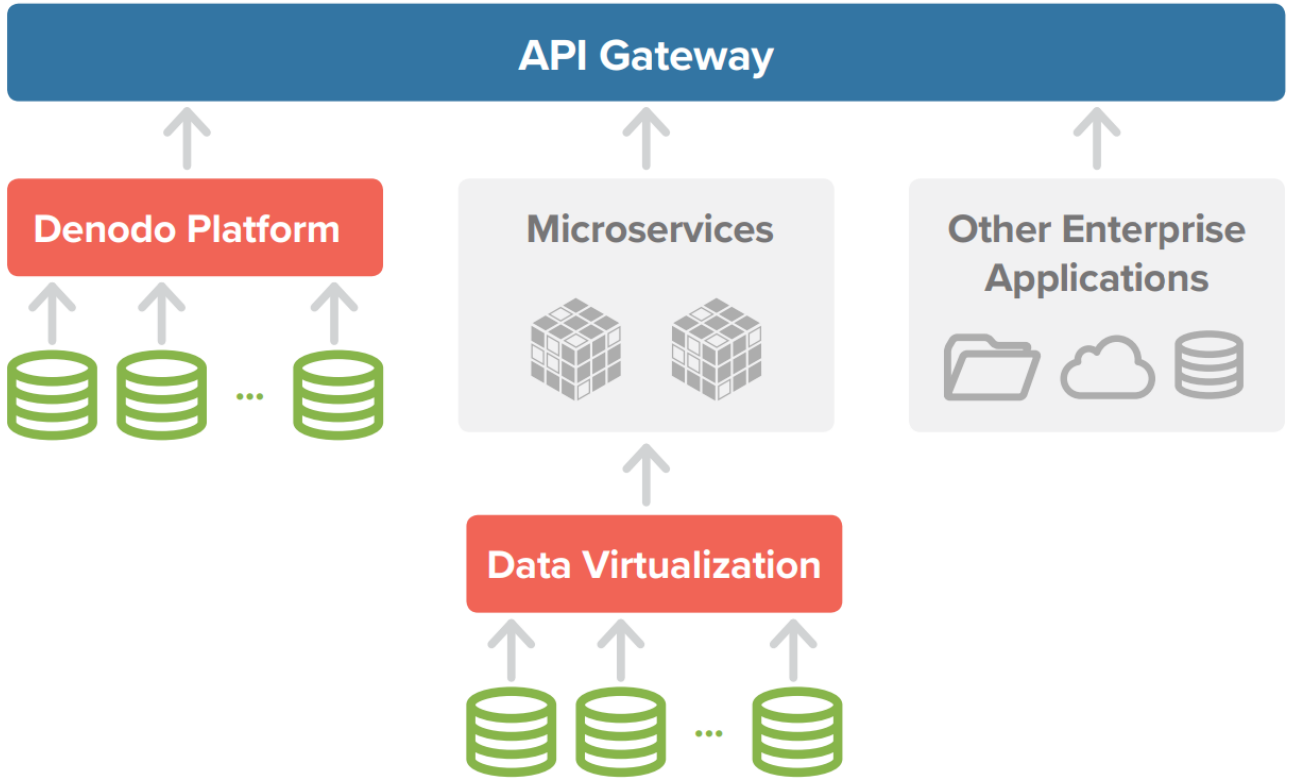
Denodo provides one-click, zero development REST web services on top of any data model with full-fledge capabilities:

- Support XML, JSON, GeoJSON, RSS and HTML
- Support for hierarchical structures
- Authentication with basic HTTP, Kerberos, OAuth 2.0 and SAML
- Self documented with OpenAPI
- Available in REST, OData, and GraphQL formats

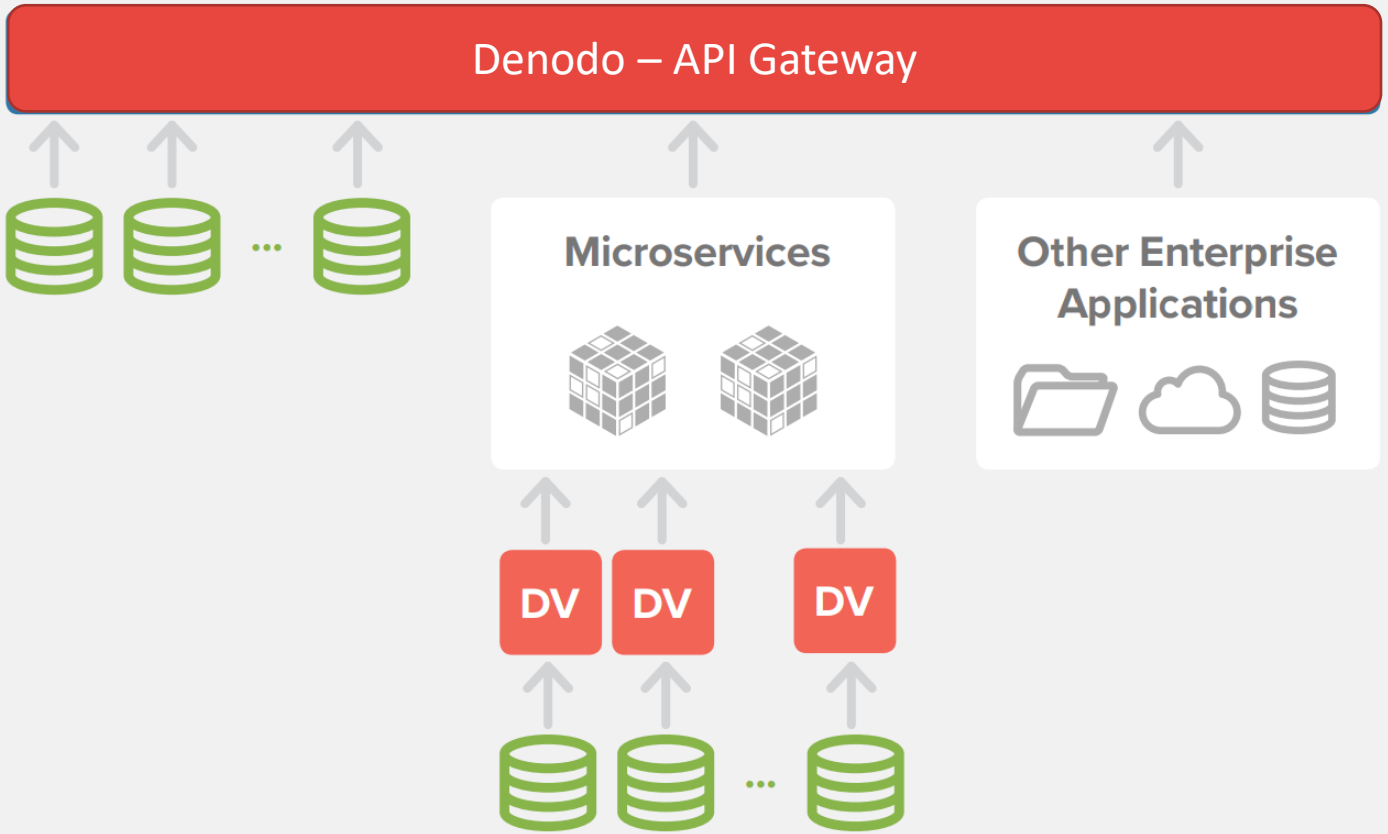
Uses – Service Container



Uses – Data Source



Uses – API Gateway



Patterns – Data Access

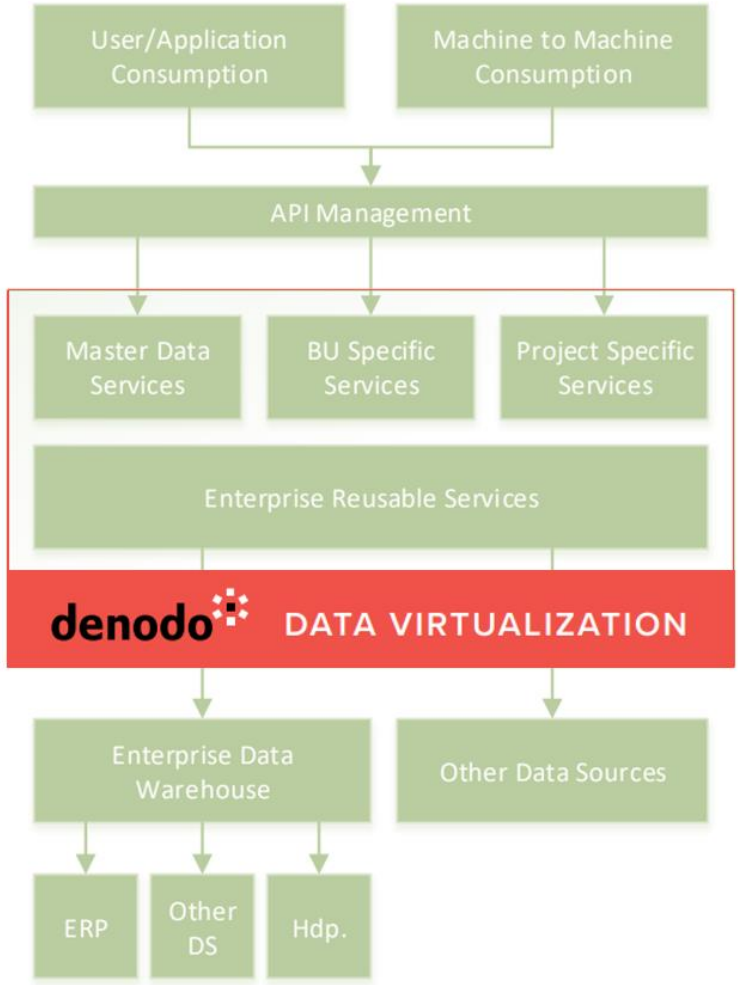
Pattern	Description	Use
Aggregation	Aggregate result sets for consumption	Offload processing from front-end to back-end. Exploits pushdown capability. Also, can be used in conjunction with caching and/or query acceleration.
Augmentation (Fusion)	Provide additional calculated or derived elements	New fields that contain data expanded from existing. Often done to avoid storing or modifying the underlying system. Examples include adding geospatial info or formulas sourced from multiple columns.
Blending	Link multiple data elements (from different sources) into one service	Service that incorporates multiple elements together. May specify rules for what/when to blend. Data exists in separate repositories linked by unique identifier(s).
Filtering	Limit data returned in result	Often driven by security to limit (rows) or restrict (columns) based on the type of requestor. When used for performance, becomes Microservice Architecture Pattern.

Patterns – Microservice Architecture

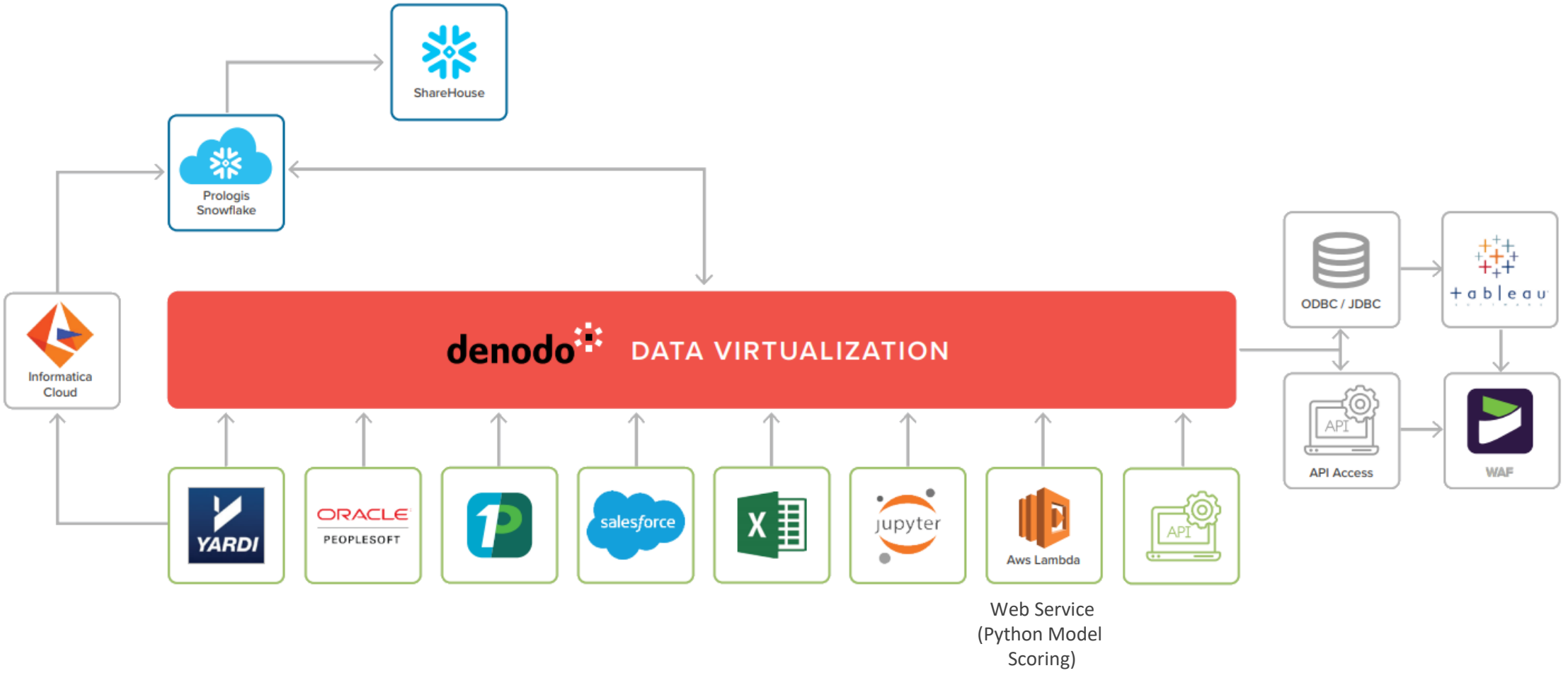
Pattern	Description	Use
(Entity) Domains	Surface logical data domains over existing systems	Enable microservices to be grouped together to express particular (functional) domain areas. Often driven by ownership (centralized or distributed) and control (e.g. official/curated). Leverage traversable relationships.
Composite	Combine (multiple) other service calls through a single “composite” service	Abstract complexity of underlying services, including drivers for security, transactionality, performance, and modeling.
Sharing	Expose service to a different tier	Typically used to expose “data” to “application” tier or from “internal” an org to “external.” Often used in association with an API Management tool and use of Web-based IdP (SAML, OpenID, and OAuth2) solutions.

Use Cases

Business Process – Chip Manufacturer

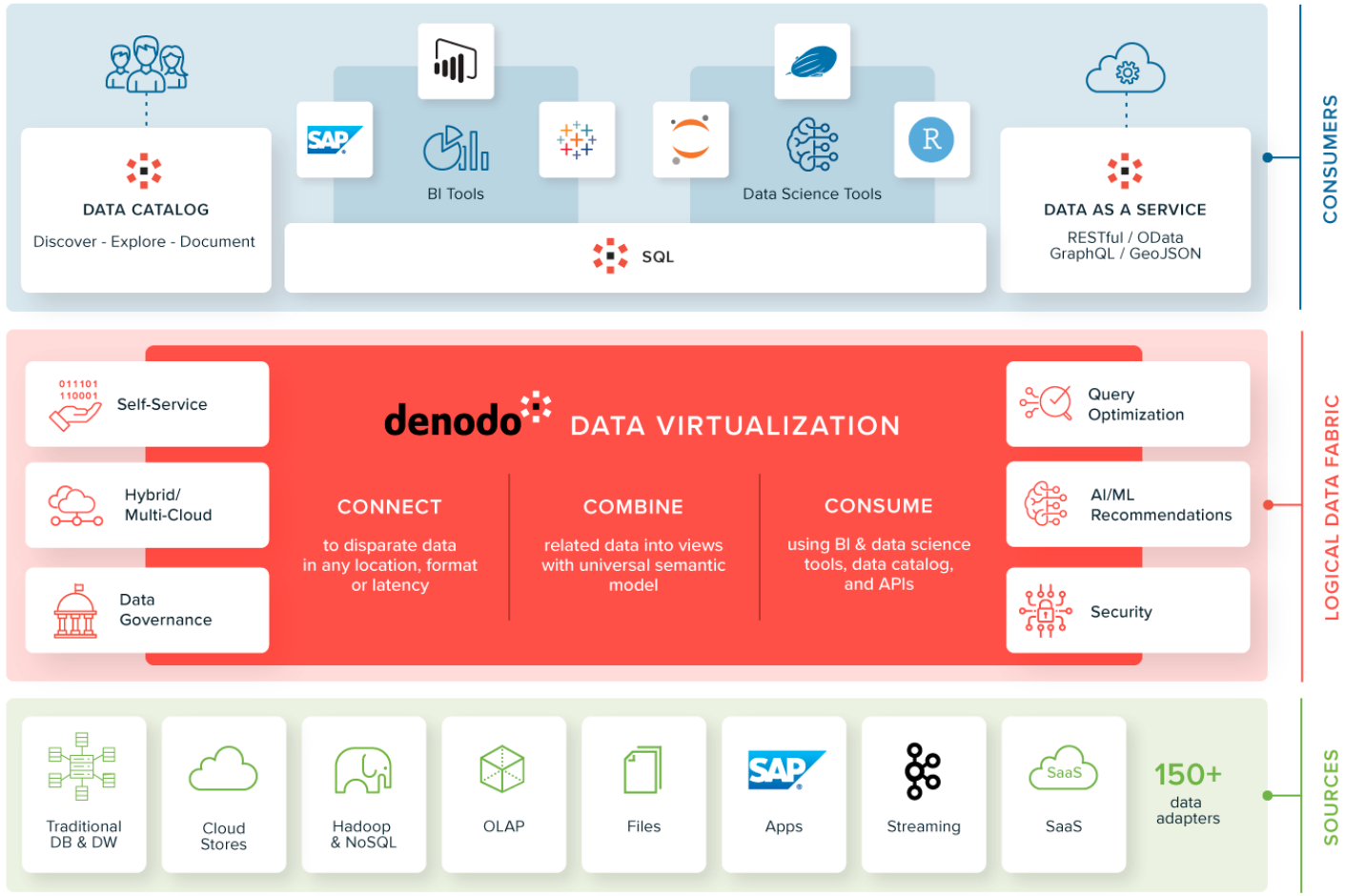


Analytic Models – Prologis



Capabilities

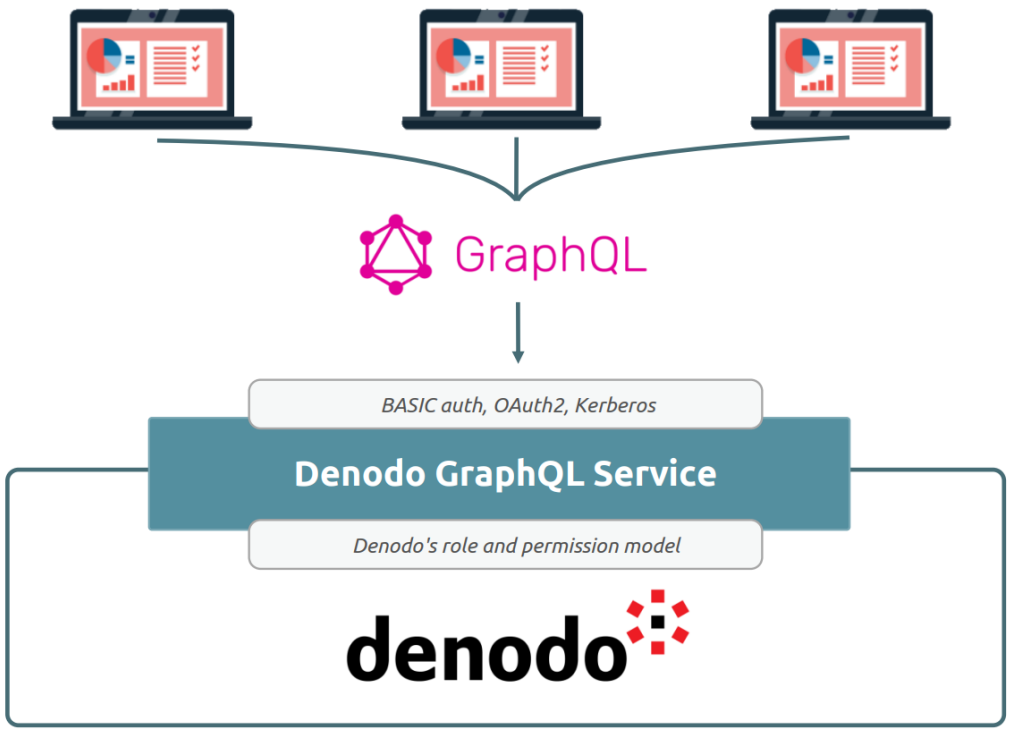
Data as a Service (DaaS) using Microservices



Capabilities for Data Services

- Data models (tables, views, stored procedures) available automatically as web services - **zero coding required**
- Available in **multiple formats**: RESTful (XML, JSON), OData 4, GeoJSON
- Support for **GraphQL**: flexible new format for data services
- Automatic documentation (**OpenAPI**) and integration with Data Catalog
- **Authentication** with modern protocols like **OAuth 2.0**
- **Authorization** based on roles with, including column/row restrictions and masking
- **Workload management**: priorities, quotas (queries per hour), restrictions by user/role/IP, etc.
- **Caching** and **query acceleration** capabilities
- Integrates with BPMs, iPaaS and **API Management** tools
- **Monitoring**, access auditing

GraphQL



- **Zero code** needed to publish a GraphQ interface
- **No n+1 query** issue
- **All the power** of the Denodo **Data Virtualization** engine underneath
- **Advanced query capabilities** (optional)
- Integrated with Denodo's **security infrastructure**
- GraphQL-enabled **web applications and frameworks** can now talk to Denodo

Key Takeaways

Key Takeaways

1. Data Virtualization **enables reduced time-to-market** and **improved data asset utilization** via APIs in modern data ecosystems
2. **Decoupling access and storage** is a fundamental concept with APIs and Data as a Service
3. **Real-time** is especially important when interacting with **business processes** and **analytic models**
4. Microservice approaches like **REST**, **OData** and **GraphQL** augment data use

denodo

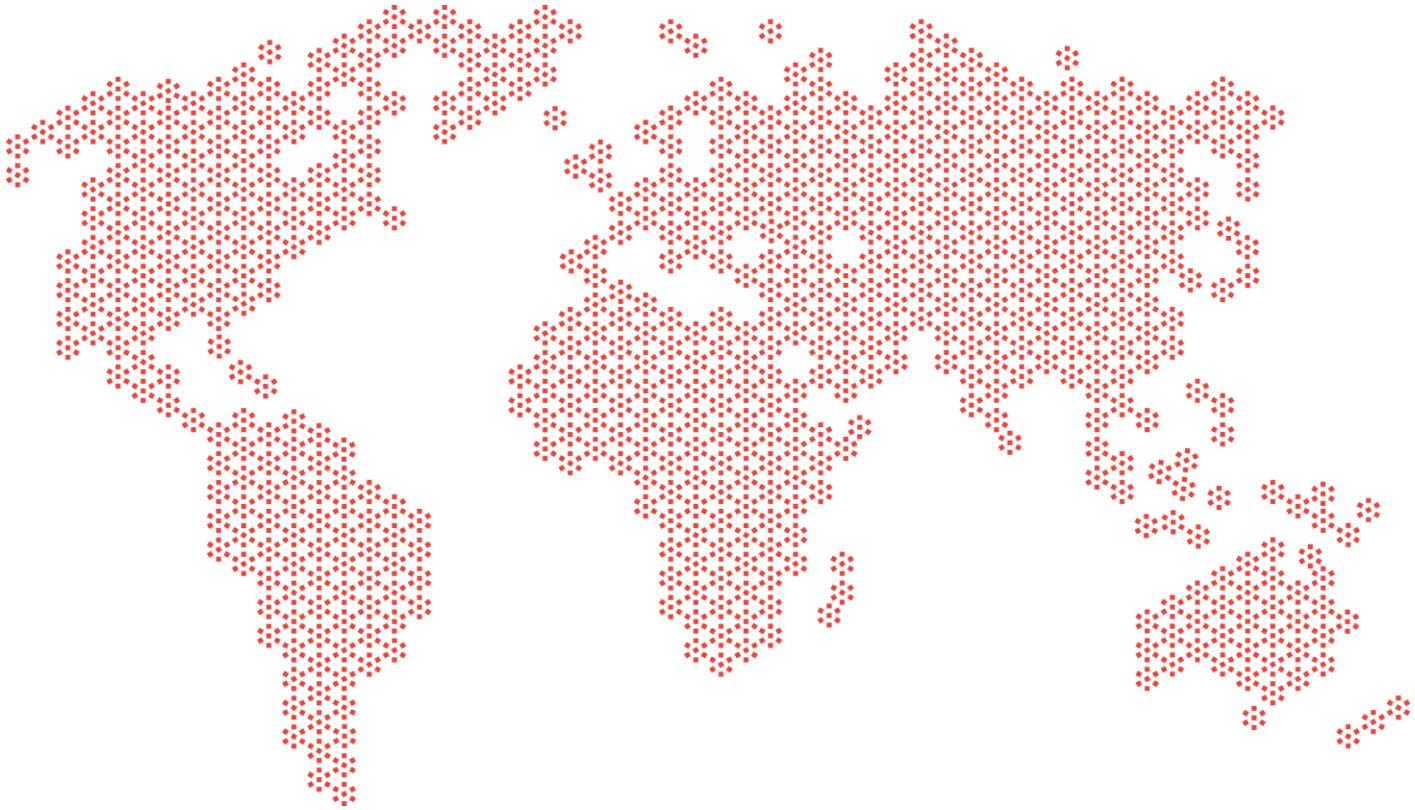
DATA VIRTUALIZATION
Packed Lunch Webinar Series

Q&A

Next Steps


GET STARTED TODAY
Access Denodo Platform in the Cloud!
Start your **Free Trial** today!
www.denodo.com/free-trials
aws

Thanks!



denodo | www.denodo.com | info@denodo.com