SAP Data Orchestration Options for Cloud Providers

OCTOBER 21, 2022

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Agenda

- Introduction
- Modern Data Arch
- Orchestration Tool - Key Considerations
- Options
    - SAP
    - Public Cloud
    - 3rd Party

Who We Are

SIVAKUMAR KA | Senior Manager

- 25 years of data/analytics focused career, 7+ years @ Clarkston
- Specialized in Consumer Products, Life Sciences & Retail industry
- Passionate around Data Architecture, Data Engineering & Data Visualization
- Recent projects – Design & develop data products on Azure & AWS
- Lives in Atlanta, GA. Loves traveling, hiking.

NATHAN KELIHER | Principal

- 20+ years delivering data-driven solutions with SAP and non-SAP
- Pre-sales, implementation, and training experience with S/4HANA Embedded Analytics, SAP BW, SAP Analytics Cloud
- Passionate about data quality and early adopter of custom CDS views
- Recent Projects: SAP Analytics Cloud sales and finance dashboard for Consumer Products, Healthcare Analytics in rare disease space

About Clarkston

Serving Global Consumer Products, Life Sciences, and Retail Companies Since 1991

Leading management, operations, and technology consulting firm, headquartered in Research Triangle Park, NC with offices across the country in strategic cities

Focused on the creation and execution of operational business strategies, supported by process improvements, organizational change, and related technologies

Clarkston Success

97% 22-year Average Client Satisfaction

As measured by:
THE CONFERENCE BOARD   CLIENT OPINIONS
ONLINE BUSINESS RESEARCH.CH

70% Repeat Client and Referrals

OUR PEOPLE

Averaging 15 years of experience and with extensive and unbiased business expertise, our people are personally invested in our clients' success

CLIENT PARTNERING

As a trusted advisor focused on long-term partnerships, our clients convey success through leading satisfaction and repeat/referral client business measures

INDUSTRY EXPERTISE

Our focused, thought-leading efforts within the Consumer Products and Life Sciences industries continue to generate opportunities for lasting value creation

OUR SERVICES

Our full suite of management, operations, and implementation services help seamlessly drive the greatest impact for our clients

We Have a Long History with SAP

30 — YEARS OF SAP SUCCESS

500+ — DISCRETE SAP PROJECTS

200+ — SAP CLIENTS

100% — SUCCESS RATE ON SAP PROJECTS

21 — SUCCESSFUL TAKEOVER PROJECTS

>50% — OF REVENUE FROM SAP

90% — OF SAP PRACTICE S/4HANA CERTIFIED

FOUR-TIME WINNER OF THE SAP AWARD OF EXCELLENCE

1988 — Founding partners participated in the first SAP implementation in North America

1991 — Clarkston is formed, assisting Dow Chemical pioneer its global SAP implementation

1994 — One of SAP's First National Implementation Partners

1999 — Clarkston co-developed first mySAP.com demo presented at Sapphire '99

2003 — Achieved Preferred Vendor status

2006 — Certified in SAP Value Engineering

2009 — Early adopter of SAP's PartnerEdge program

2011 — SAP VAR Partner (Crescense) and licensing re-seller

Launch SAP GRM (Grower Relationship Management) solution at Sapphire

2012 — Upgraded Clarkston Labs to newest releases of SAP including HANA

2015 — Built out S/4HANA capabilities

2017 — Exploration of SAP Leonardo industry specific applications

2018 — Cell therapy solution build out

2019 — Life Science Accelerator

2020 — Consumer Products Accelerator

Project & Service Offerings

Strategy | Implementation | Optimization | Support | Licensing

Areas of Expertise

Program Delivery | Managed Services | Process/Functional | Technical

SAP Partner

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Our Data & Analytics Services

We understand the opportunity that our clients have to strategically gather, analyze, and generate insights with their data.

DATA OPERATIONS
Our data operations team can help you develop, deploy, and maintain the best data architecture tailored for your company. Our in-house data architects and data engineers will help develop the right solution for your business.
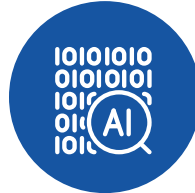
STRATEGY AND GOVERNANCE
Our data + analytics practice provides the latest next generation data architecture, machine learning and predictive analytics capabilities to solve your problems and find new opportunities.
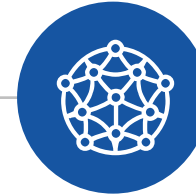
BUSINESS INTELLIGENCE
Reporting and dashboards are important descriptive analytics tools; our business intelligence team can help improve visibility and streamline your decision making.
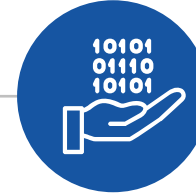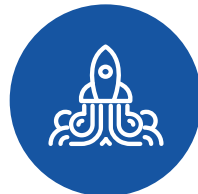
ADVANCED ANALYTICS
Our analytics and consulting practice provides the latest in machine learning and predictive analytics capabilities to solve your problems and find new opportunities.

INTELLIGENT AUTOMATION
Clarkston provides Analytics in Motion by deploying actions from advanced analytics into your processes to automate decisions.
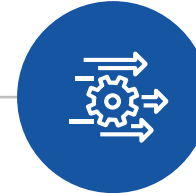
ANALYTICS ACTIVATION
Our Activation program will jumpstart analytics at your organization, using templates and checklists at every stage of a guided project to upskill your team and formalize the journey.
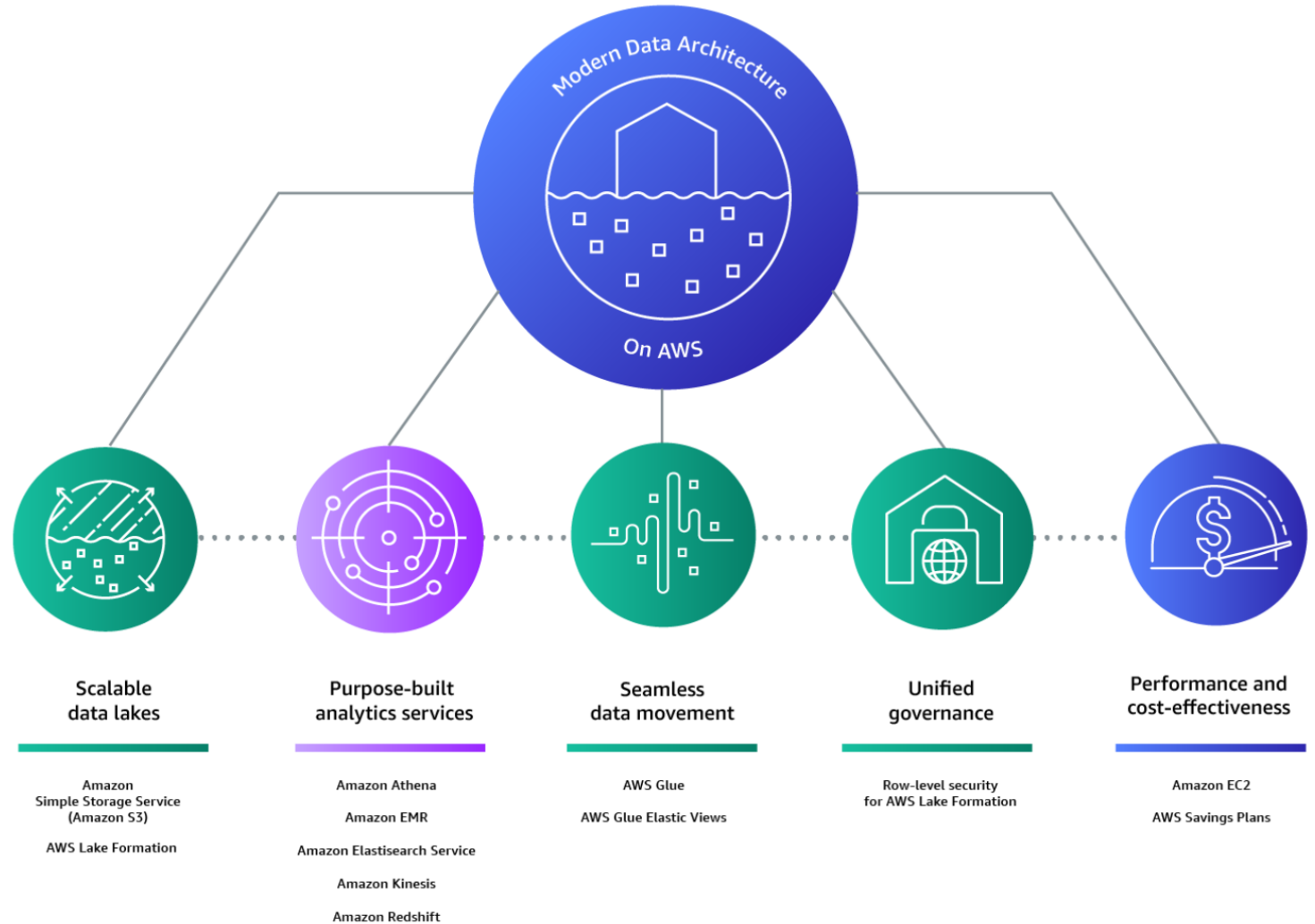
MANAGED DATA + ANALYTICS
Clarkston offers Data Management and Analytics as a Service. We are your go-to resource to offload the management, monitoring, and analysis of your data.

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Modern Data Architecture & Data Needs

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Modern Data Architecture – Key Drivers

- More complex environments

- Non-sap systems

- Streaming data

- User demands
  - Business
  - Data scientists
  - Data analysts
  - Data engineers

- ETL vs data engineers

- Data NEEDS
  - Lineage
  - "Data map"
  - Business glossaries

Modern Data Architecture

On AWS

Scalable data lakes	Purpose-built analytics services	Seamless data movement	Unified governance	Performance and cost-effectiveness
Amazon Simple Storage Service (Amazon S3)	Amazon Athena	AWS Glue	Row-level security for AWS Lake Formation	Amazon EC2
AWS Lake Formation	Amazon EMR	AWS Glue Elastic Views		AWS Savings Plans
	Amazon Elastisearch Service			
	Amazon Kinesis			
	Amazon Redshift			

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Modern Data Architecture - Sample
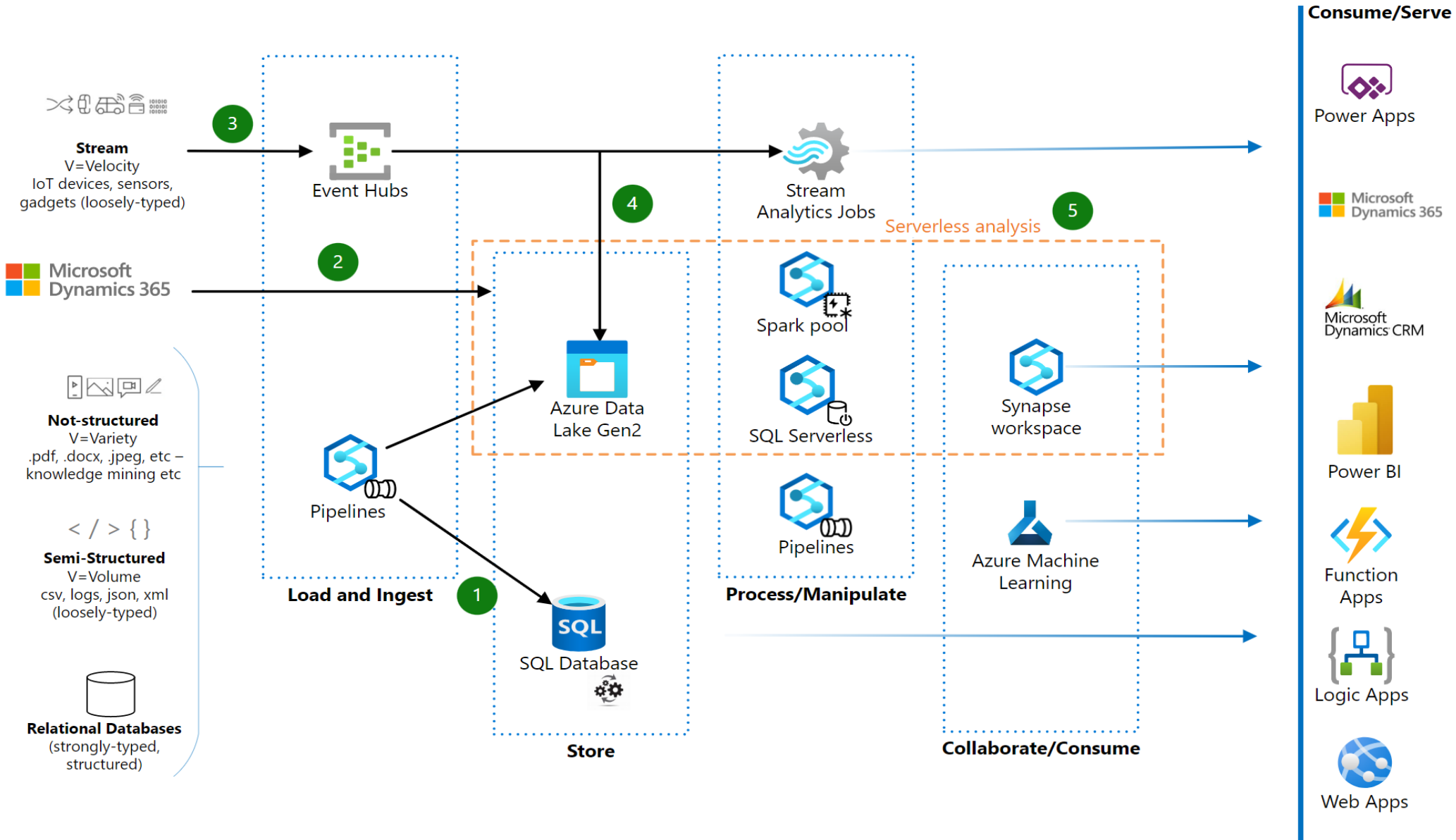
Orchestration Tools - Key Considerations

STRATEGIC

- Business drivers
- Existing investments
- Other SAP products in the mix - SAC, BW, IBP/CPI-DS, SAP DS, SLT
- SAP Licensing aspects (Enterprise vs Runtime)
- 3rd party products with SAP connectors
- On-prem vs Cloud
- Small vs large enterprise implementations
- Skills required – code free/low-code/drag & drop

TACTICAL

- Change Data Capture?
- Real-time vs batch
- Different types of objects in SAP (Tables – transparent, pooled, cluster, CDS views, extractors, etc.)
- Raw vs modeled (Tables vs CDS)
- Business Content
- Current data platforms & level of effort to migrate/maintain parallel system

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Some of the Options

Supported Data Extraction Methods

Platform	OData	RFC	ODBC*	ODP**	SLT***	ABAP CDS
Azure Data Factory (ADF)	X		X		via ODP	
Amazon Glue	X		X	X	via ODP	
Cloud Data Fusion	X		X	X	via ODP	
SAP Data Services		X	X	X	via ODP	
SAP Data Intelligence			X	X		X
Informatica	X	X	X	X	via ODP	via ODP
Talend		X	X			
ETLeap			X			
Pentaho		X	X			
Bryteflow	X		X	X		

*   ODBC / JDBC style connections only available with SAP HANA Enterprise Edition

** Some ODP scenarios such as table replication only supported with SLT

*** Additional licensing may be required for SLT

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SAP Orchestration Options

SAP ETL Options

SAP Data Services (DATA INTELLIGENCE SAP)

OPTIONS AVAILABLE

Cloud and On-premise ETL tools that integrate natively with SAP systems:

- SAP Data Services
- SAP Data Intelligence (formerly SAP Data Hub)

MECHANISMS FOR EXTRACTION OF SAP DATA

- SAP Extractors (formerly BW Extractors) via ODP
- RFC supporting table, view, and function-based reads
- CDS Views: Native ABAP CDS Reader or via ODP
- Several mechanisms support Change Data Capture (CDC)

KEY FEATURES / BENEFITS

- Robust connectivity, transformation, and scheduling
- Native support for SAP sources and Cloud Storage/DBs
- Additional functionality such as Data Quality
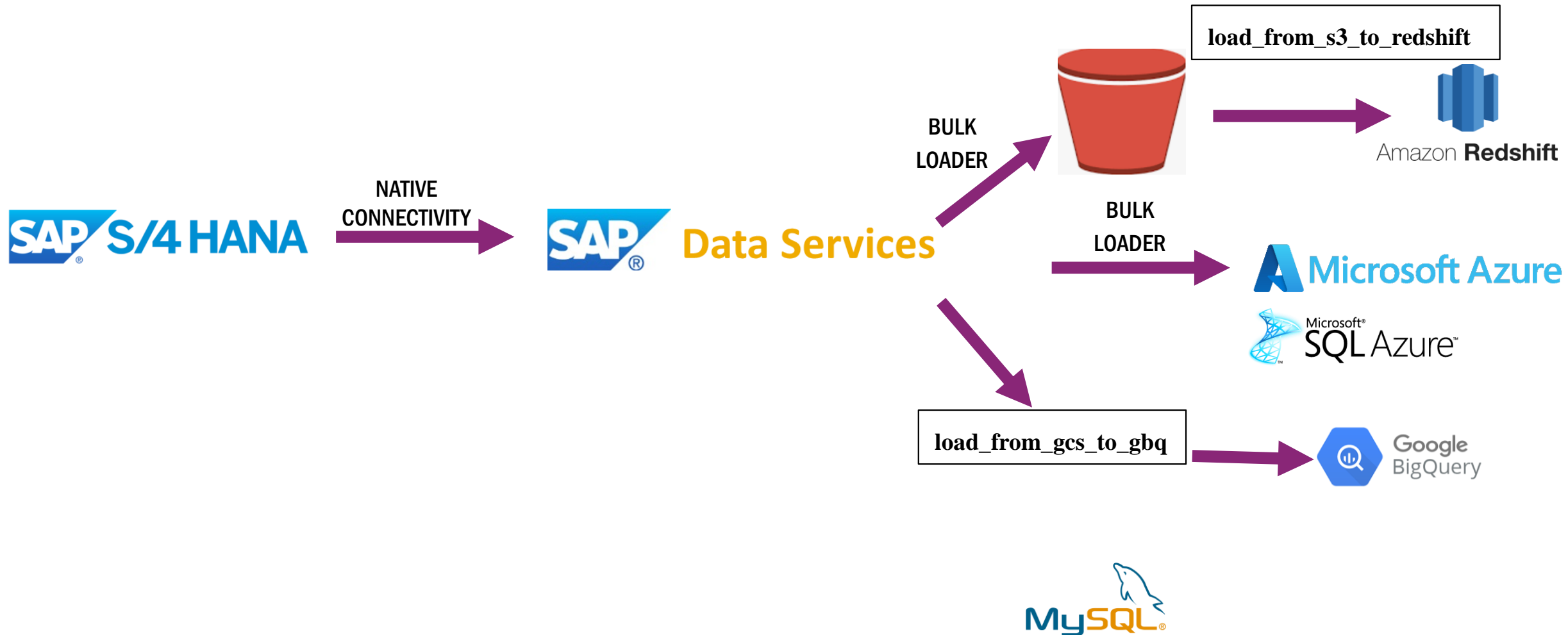
Approximate Cost: $$-$$$$

DRAWBACKS / CONSIDERATIONS

- Gateway required for cloud-based ETL tools
- Roadmap unclear for SAP Data Services
- Data Services is a more significant investment – Data Intelligence uses scaled pricing (capacity units)

OUR PERSPECTIVE

- Data Services is robust, established, and can support ETL needs well beyond the scope of this review, but it is a significant investment for a tool with an uncertain roadmap.
- Data Intelligence is newer and not as extensively adopted, but SAP is investing heavily so it could be a viable long-term approach

GUIDANCE

- Explore the functionality and pricing model of Data Intelligence to confirm if it meets your needs.
- Attempt a small POC with Free Trial of Data Intelligence
- Consider whether the Enterprise ETL functionality of Data Services would warrant the larger investment.

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Sample Architecture with SAP Data Services

SAP Data Intelligence Features

ABAP CDS Reader
- Read from a CDS view into SAP Data Intelligence Cloud
- Supports full and incremental (delta) loads

ABAP ODP Reader
- Read from an ODP into SAP Data Intelligence Cloud
- Supports full and incremental (delta) loads

OData Query Consumer
- The OData Query Consumer reads from an OData RESTful API.
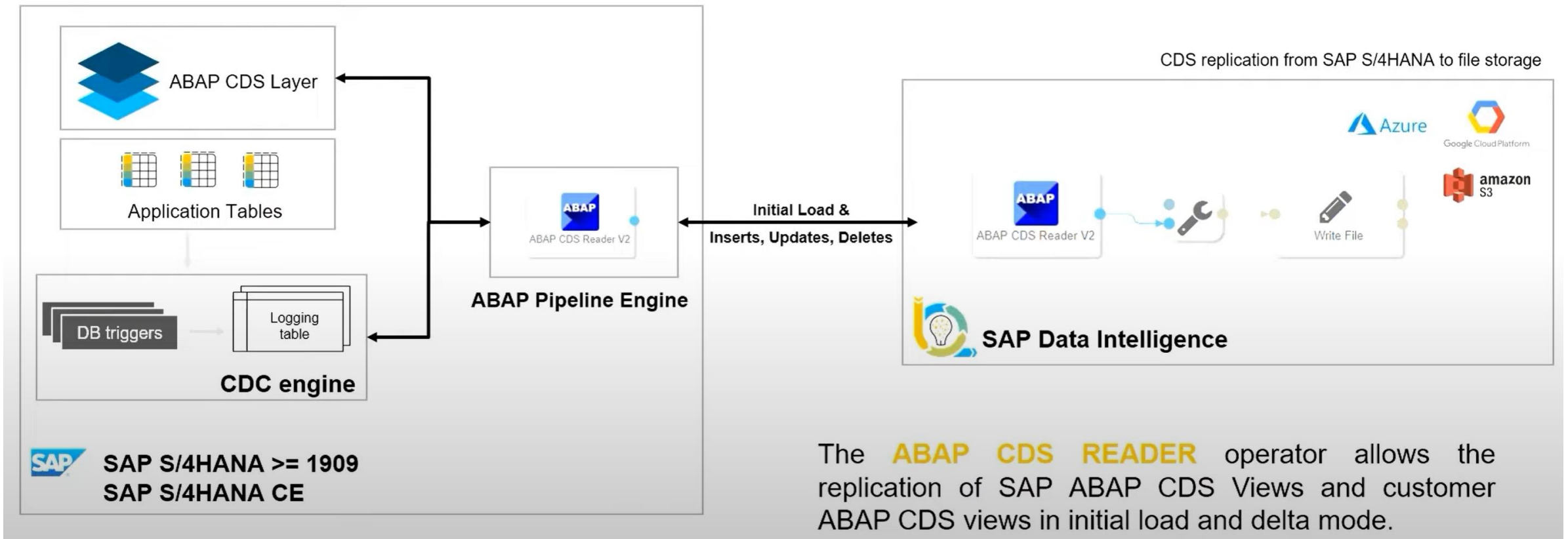
Change Data Capture (CDC)
- Uses triggers for Insert, Update, and Delete to track the change history for a specific table

Supports Azure SQL Database, DB2, HANA, MySQL, Microsoft SQL Server, Oracle

Data Quality operators

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Extraction of S/4 HANA CDS Views via ABAP CDS Reader

ABAP CDS is the semantically rich data model in SAP S/4 HANA and allows the consistent representation of a business object like a Business Partner.

The **ABAP CDS READER** operator allows the replication of SAP ABAP CDS Views and customer ABAP CDS views in initial load and delta mode.

Public Cloud Options

Public Cloud ETL

OPTIONS AVAILABLE

Cloud-based ETL from the major storage providers:

- Azure Data Factory (ADF)
- Amazon Glue
- Google Cloud Data Fusion
- Coding options within each of the 3 platforms

KEY FEATURES / BENEFITS

- Scalable computation and cost
- Integration with Cloud Storage and DB
- Managed within Cloud architecture – no 3rd entity needed

Approximate Cost: $$-$$$$

OUR PERSPECTIVE

- Low cost and implementation time make cloud ETL an attractive option for many SAP customers. Once a repeatable approach is established, maintenance, scheduling, and scaling are straightforward using these robust tools

MECHANISMS FOR EXTRACTION OF SAP DATA

- OData: via native connectors or coded integration
- RFC: May require custom connectors / plugins
- SLT: requires license to replicate outside SAP landscape
- CDS Views: No Direct connection – must be via Odata or ODP (requires connector)

DRAWBACKS / CONSIDERATIONS

- Accessing an On-Prem System from Cloud ETL Tool
- Plugins may be required for certain types of connections
- No direct access to CDS views

GUIDANCE

- There is no one simple way to access the data, so the various approaches must be weighed against cost, ease of connectivity, and capacity/willingness to code where customizations are required.

Possible options within Azure Data Factory

From SAP BW

SAP Table – All tables + Views

Open Hub - Any objects that uses DTP – Cube, DSO, DataSource

SAP BW on MDX – Infocubes, smaller volume

From SAP S4

- SAP HANA – Tables, full & custom queries
- CDC - Recent addition, leverages ODP framework

New linked service

Data store   Compute

🔍 SAP

All   Azure   Database   File   Generic protocol   NoSQL   Services and apps

SAP BW Open Hub	SAP BW via MDX	SAP CDC
SAP Cloud For Customer	SAP ECC	SAP HANA
SAP Table		

Third Party ETL

OPTIONS AVAILABLE

On-premise and Cloud 3rd-party ETL tools that sit between the SAP landscape and Cloud Storage, such as:

- Informatica
- Talend
- Pentaho

MECHANISMS FOR EXTRACTION OF SAP DATA

- OData: via native connectors or coded integration
- RFC: May require custom connectors / plugins
- ODP: Supported by some tools such as Informatica
- CDS Views: No Direct connection – must be via OData or ODP (requires connector)

KEY FEATURES / BENEFITS

- Robust connectivity, transformation, and scheduling
- Cloud connectors not needed if connecting within network
- Some smaller niche tools exist as alternatives to full ETL

Approximate Cost: $$-$$$$

DRAWBACKS / CONSIDERATIONS

- New vendor relationship and infrastructure support costs
- Processes are not as tightly integrated with either source or destination environments

OUR PERSPECTIVE

- Difficult to navigate the space as no standard way to access SAP data exists across the tools, but there are multiple connectivity options requiring various levels of effort to set up. Strong talent pool and available training resources make some of these options appealing as enterprise ETL tools.

GUIDANCE

- Consider the data/objects to be replicated into your cloud environment and which tools support those objects
- Explore ways to leverage any ETL tools already implemented in your landscape.
- Weigh cost/effort to implement a full Enterprise ETL against the scope of its expected use

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Matrix

Feature	Public Cloud ETL	3rd Party ETL	SAP ETL
On-prem vs Cloud	Cloud Only	Cloud and On-Prem	Cloud and On-Prem
Extraction Mechanisms	CDS Views via Odata ODP	CDS Views via Odata ODP RFC	Native CDS Support ODP RFC
Supported Targets	Cloud Storage and DB tables	Cloud Storage and DB tables	Cloud Storage and DB tables
Change Data Capture	via ODP or custom psuedo delta	via ODP or custom psuedo delta	via ODP and CDS Reader
Real-time vs batch	Primarily Batch Near-real time via ODP	Primarily Batch Near-real time via ODP	Batch and Real-time
Raw vs modeled sources	Modeled Extractors/Views Tables via SLT Only*	Modeled Extractors/Views Tables via RFC or SLT*	Modeled Extractors/Views Tables via RFC or SLT*
Implementation Size	Small to Large	Medium to Large	Small to Large
3rd party SAP connectors	Exist, May not be required	Exist, May not be required	Not Required
Level of Effort	Medium	Highest	Medium
Licensing aspects	Pay per use *SLT License may be needed	Software Licensing cost *SLT License may be needed	*SLT License may be needed

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Appendix

Cloud Architecture Tools of the Big 3 Providers

| Platform	Storage	DB	ETL	ML
Microsoft Azure	Azure Data Lake	Azure SQL	Azure Data Factory (ADF)	Azure ML
Amazon Web Services (AWS)	Amazon S3	Amazon Redshift	Amazon Glue	Sagemaker
Google Cloud Services (GCS)	Google Cloud Storage	Google BigQuery	Cloud Data Fusion	Vertex AI

Data Extraction Mechanisms for SAP Applications

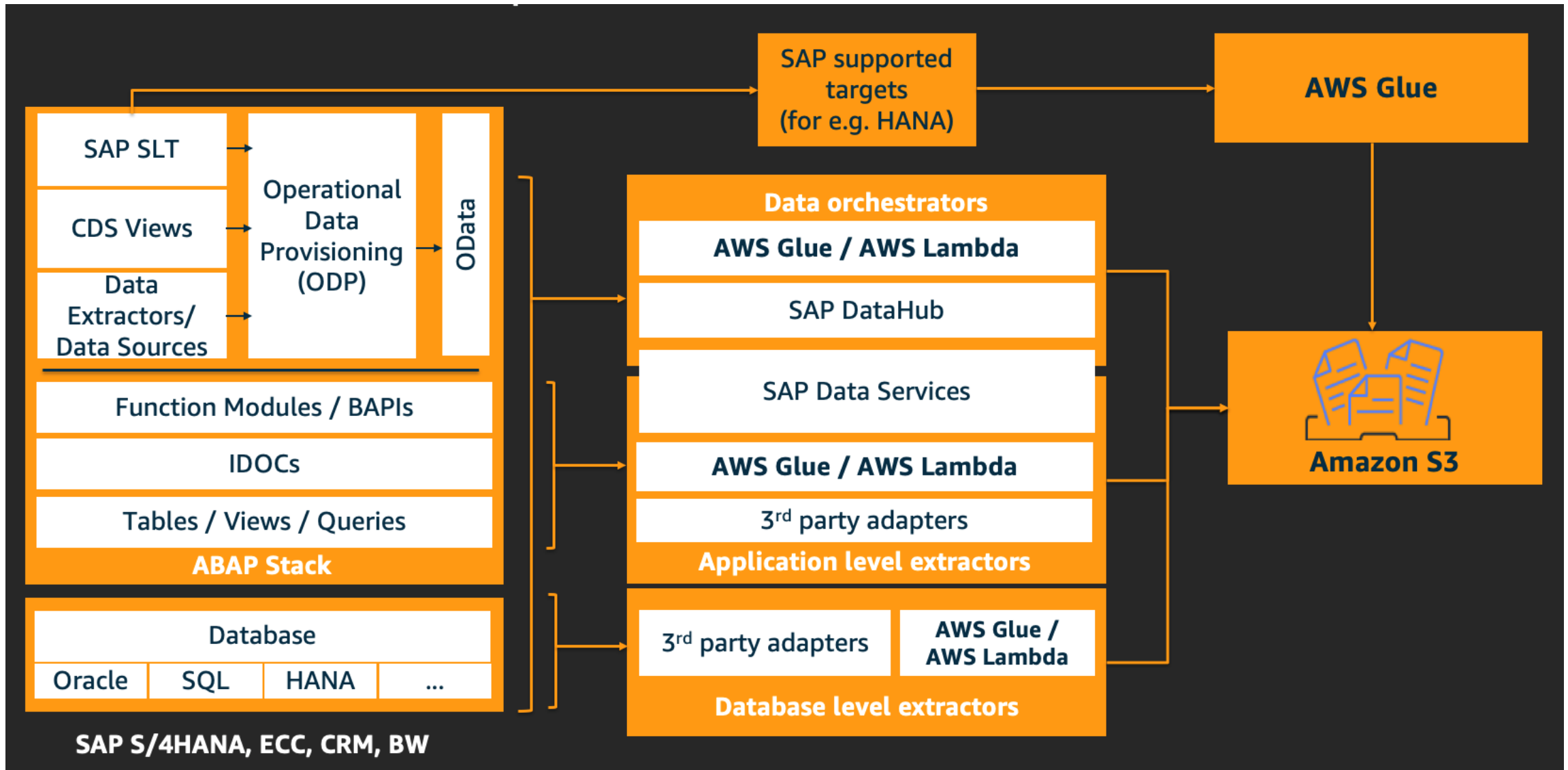| Supported Source Objects	EXTRACTION MECHANISM					
	OData	RFC	ODBC	ODP	SLT	CDS Reader
Table	**	X	X		X	*
View	**	X	X			*
CDS View	X		X	X		X
Query		*	X			
Function		X				
SAP Extractor				X		
Change Data Capture?				X	X	X

* These objects are supported when wrapped in a CDS View

** These objects are supported when wrapped in an OData-enabled CDS View

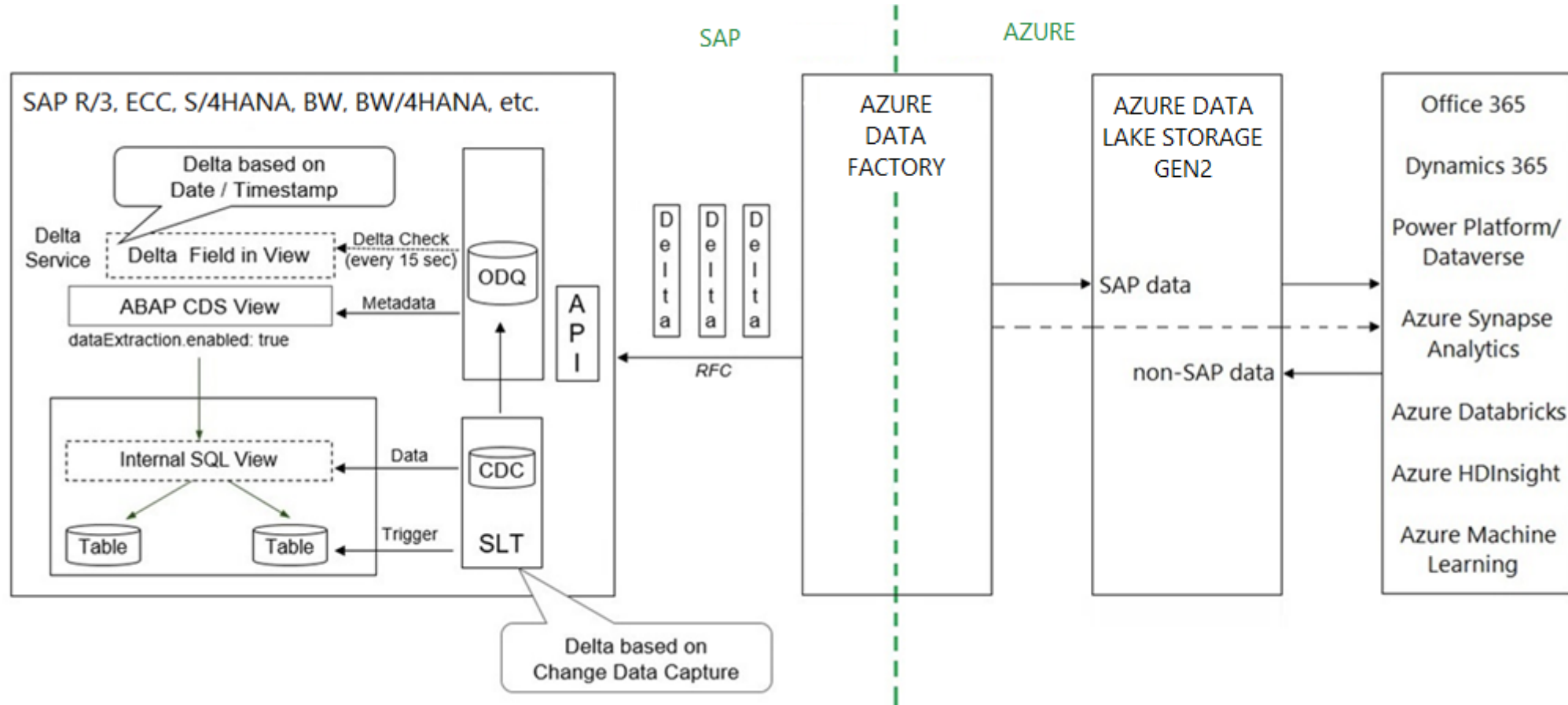# Modern Data Arch - AWS
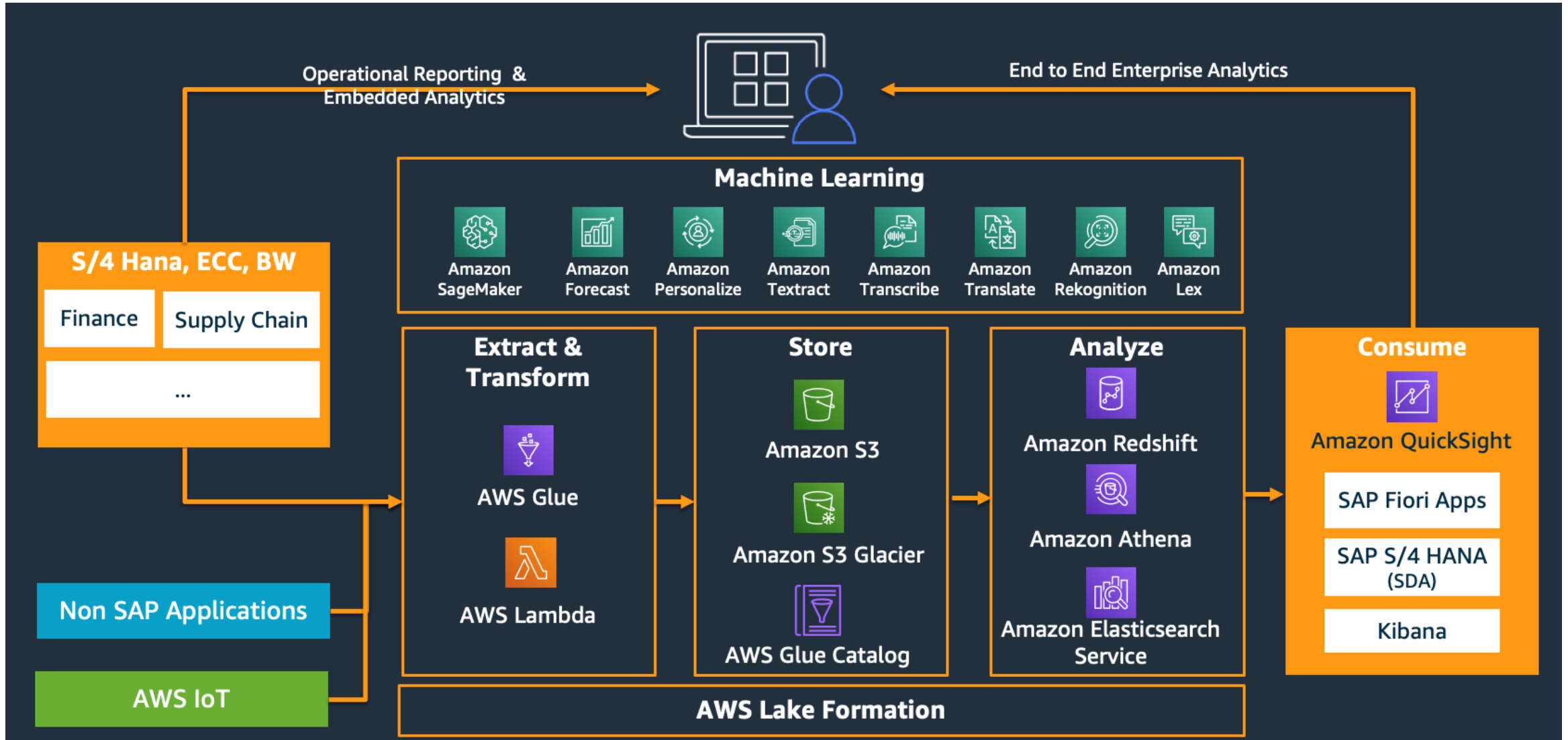
SAP & AWS Integration

SAP CDC with Azure

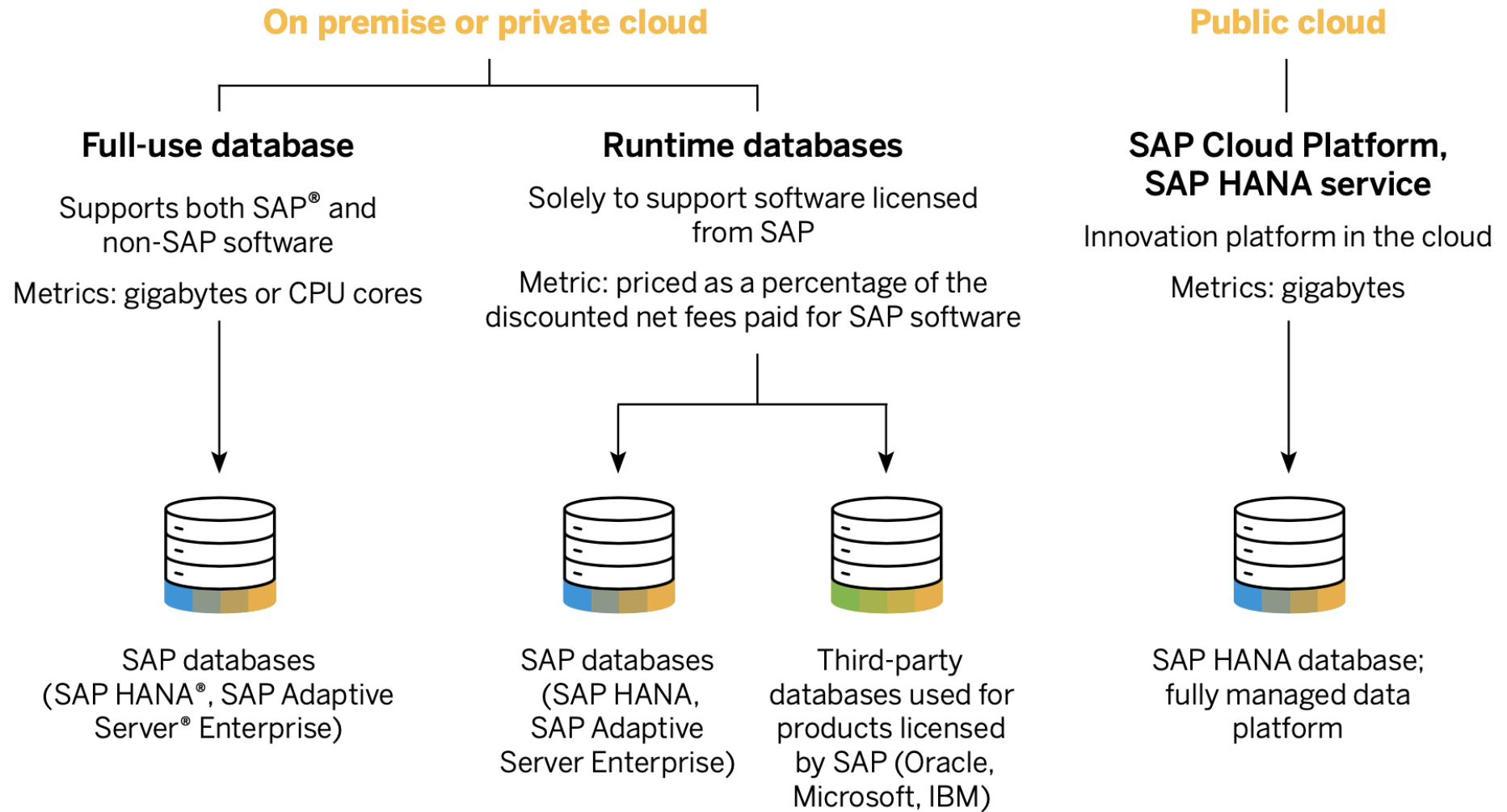# Licensing

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Indirect Static Read

[1] **SAP Application** Access – no additional license needed provided ERP is otherwise licensed, no additional ERP license is needed for use resulting from access by properly licensed SAP applications.

[2] **SAP's On Premise Contractual Definition of Use** – 'Use' is defined as to activate the processing capabilities of the Software, load, execute, access, employ the Software, or display information resulting from such capabilities. Use may occur by way of an interface delivered with or as a part of the Software, a Licensee or third-party interface, or another intermediary system.

[3] **Indirect Static Read** is a scenario in which information has been exported from an SAP system (excluding SAP Business Warehouse or any third-party runtime database) to a non-SAP system pursuant to a predefined query that meets the criteria listed below. SAP's policy is that the use of such exported data in third-party non-SAP systems does not need to be licensed, as long as all of the criteria listed below for Indirect Static Read are met.

- Was created by an individual licensed to use the SAP ERP system from which the information is being exported
- Runs automatically on a scheduled basis, *and*
- The use of such exported information by the non-SAP systems and/or their users does **not** result in any updates to and/or trigger any processing capabilities of the SAP ERP system

Which license do we need?

On premise or private cloud

Public cloud

Full-use database

Supports both SAP® and non-SAP software

Metrics: gigabytes or CPU cores

Runtime databases

Solely to support software licensed from SAP

Metric: priced as a percentage of the discounted net fees paid for SAP software

SAP Cloud Platform, SAP HANA service

Innovation platform in the cloud

Metrics: gigabytes

SAP databases
(SAP HANA®, SAP Adaptive Server® Enterprise)

SAP databases
(SAP HANA, SAP Adaptive Server Enterprise)

Third-party databases used for products licensed by SAP (Oracle, Microsoft, IBM)

SAP HANA database; fully managed data platform

What about S/4 HANA – enterprise or standard edition?

SAP HANA active/active (HSR read-enabled option)

SAP HANA enterprise edition

Series Data	Streaming analytics (SDS)	Data Replication
Document Store	Information management	Predictive (PAL)
Business Functions	Data privacy	Text search, analytics & search

Spatial and graph

SAP HANA standard edition

| Dynamic Tiering | Operational process intelligence | Data warehousing foundation |
| Database services | Integration services | Application services |

HANA Runtime Edition
- **7018066 SAP HANA, Runtime edition for Applications & SAP BW - New/Subsequent**
  15% from HSAV, one-time flat-fee per transaction, discountable

HANA Full Use Edition
- **HANA Enterprise edition Price: 120,000 / 64GB**

- Note: HANA standard edition is not an option for SAP S/4HANA

HANA
Run-time or Full Use