SAP Data Orchestration Options for Cloud Providers

DEC 9, 2022

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Agenda

- Introduction
- Modern Data Architecture
- 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 – Data products on Azure & AWS, leveraging SAP data

Lives in Atlanta, GA. Loves traveling, hiking.

NATHAN KELIHER | Principal/Technical Architect

20+ years delivering data-driven solutions with SAP and non-SAP

Pre-sales, implementation, and training experience with S/4HANA Embedded Analytics, BW on HANA, 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 leveraging modern data architecture

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 RESEAR.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
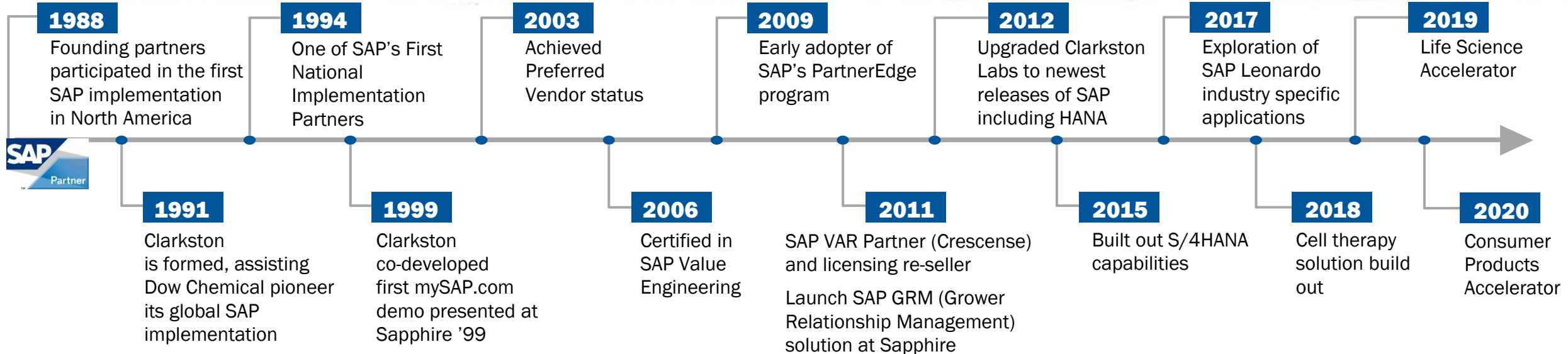
OUR SERVICES

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

1994 One of SAP's First National Implementation Partners

2003 Achieved Preferred Vendor status

2009 Early adopter of SAP's PartnerEdge program

2012 Upgraded Clarkston Labs to newest releases of SAP including HANA

2017 Exploration of SAP Leonardo industry specific applications

2019 Life Science Accelerator

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

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

2006 Certified in SAP Value Engineering

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

Launch SAP GRM (Grower Relationship Management) solution at Sapphire

2015 Built out S/4HANA capabilities

2018 Cell therapy solution build out

2020 Consumer Products Accelerator

SAP Partner

Project & Service Offerings

Strategy | Implementation | Optimization | Support | Licensing

Areas of Expertise

Program Delivery | Managed Services | Process/Functional | Technical

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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.
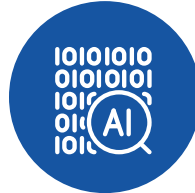
DATA OPERATIONS
Our data operations team can help you develop, deploy, and maintain the best data architecture tailored for your company. Our in-house data architects and data engineers will help develop the right solution for your business.

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.
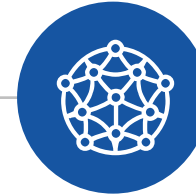
BUSINESS INTELLIGENCE
Reporting and dashboards are important descriptive analytics tools; our business intelligence team can help improve visibility and streamline your decision making.

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.
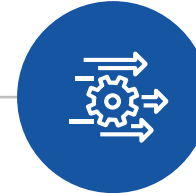
ANALYTICS ACTIVATION
Our Activation program will jumpstart analytics at your organization, using templates and checklists at every stage of a guided project to upskill your team and formalize the journey.
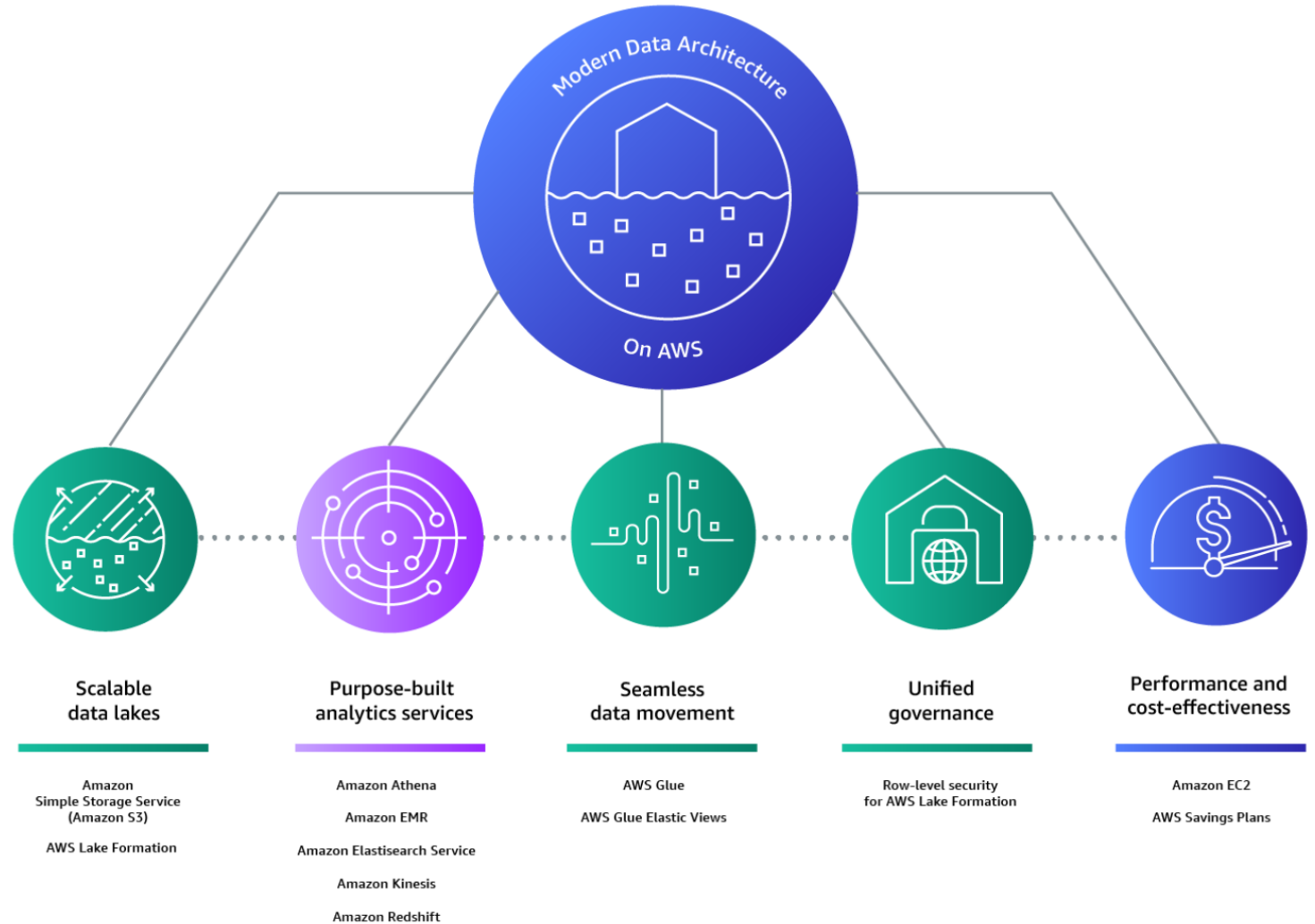
MANAGED DATA + ANALYTICS
Clarkston offers Data Management and Analytics as a Service. We are your go-to resource to offload the management, monitoring, and analysis of your data.
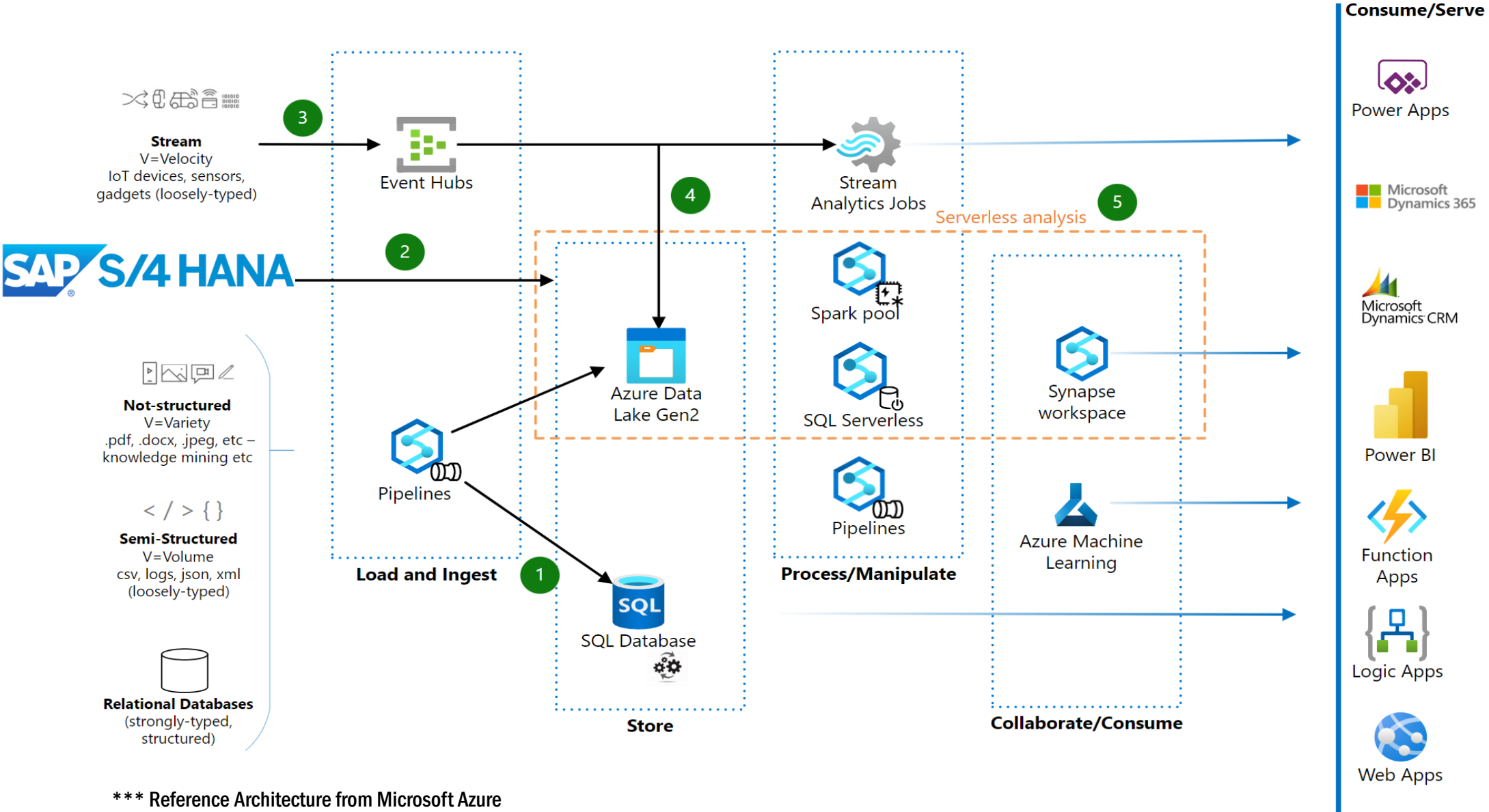
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Modern Data Architecture

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

*** Reference Architecture from Microsoft Azure

Orchestration Tools - Considerations

# 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)

- On-prem vs Cloud

- Small vs large enterprise implementations

- Current data platforms & level of effort to migrate/maintain parallel system

- Skills required – code/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

- Orchestration Performance

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SAP Orchestration Options

Data Access/Extraction Mechanisms for SAP Applications
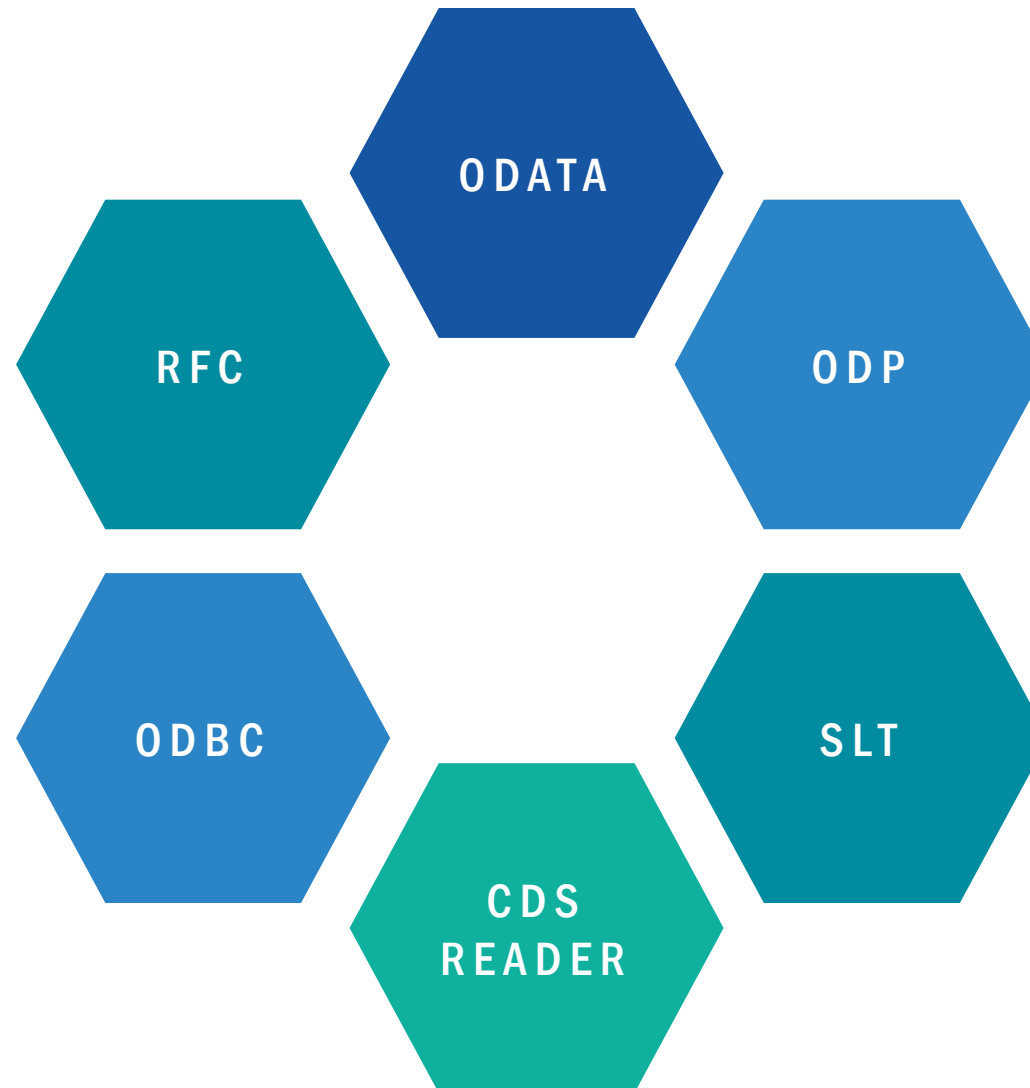
Some of the Options

SAP ETL Options

OPTIONS EVALUATED

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

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

KEY FEATURES / BENEFITS

- Robust connectivity, transformation, and scheduling
- Native support for SAP sources and Cloud Storage/DBs
- Additional functionality such as Data Quality and Machine Learning

Approximate Cost: $$-$$$$

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 may not be as extensively adopted, but it offers easy pipeline creation and advanced features

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
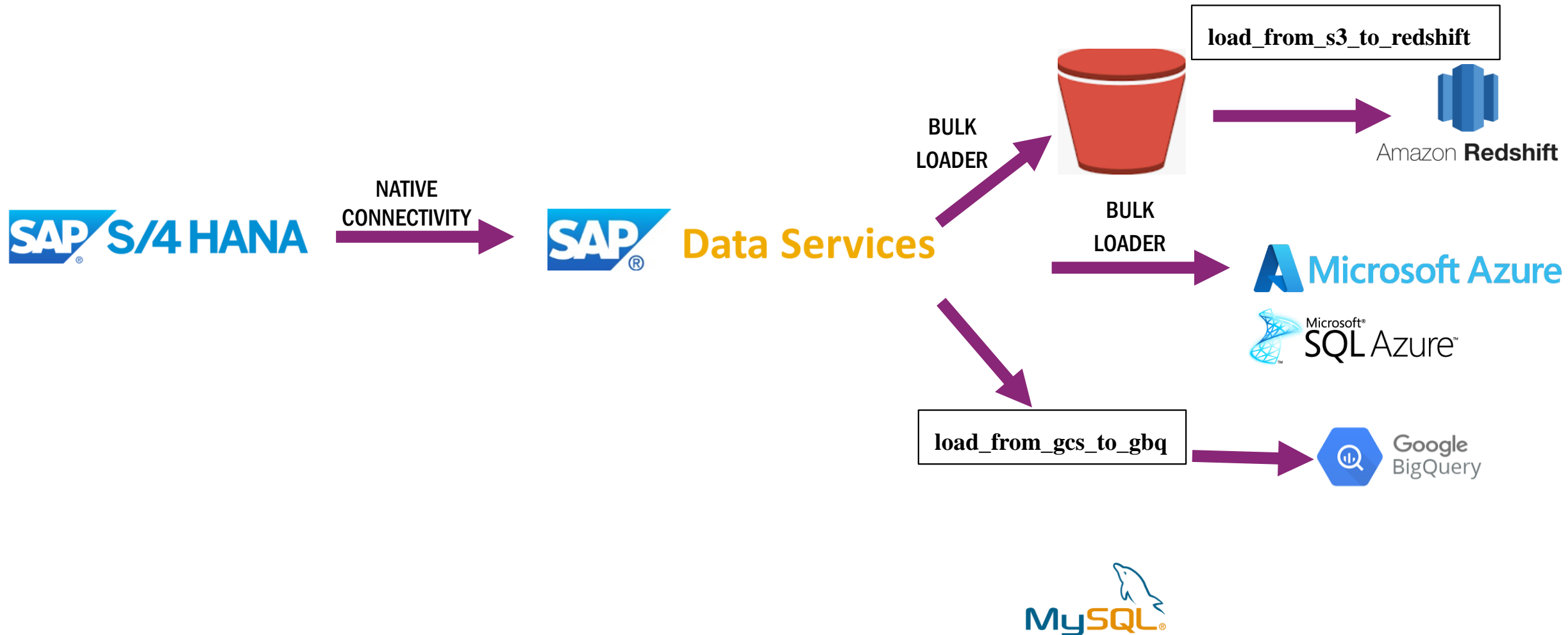- Several mechanisms support Change Data Capture (CDC)

DRAWBACKS / CONSIDERATIONS

- Gateway required for cloud-based ETL tools
- Roadmap unclear for SAP Data Services
- Data Services/Data Intelligence are significant investments

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.

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
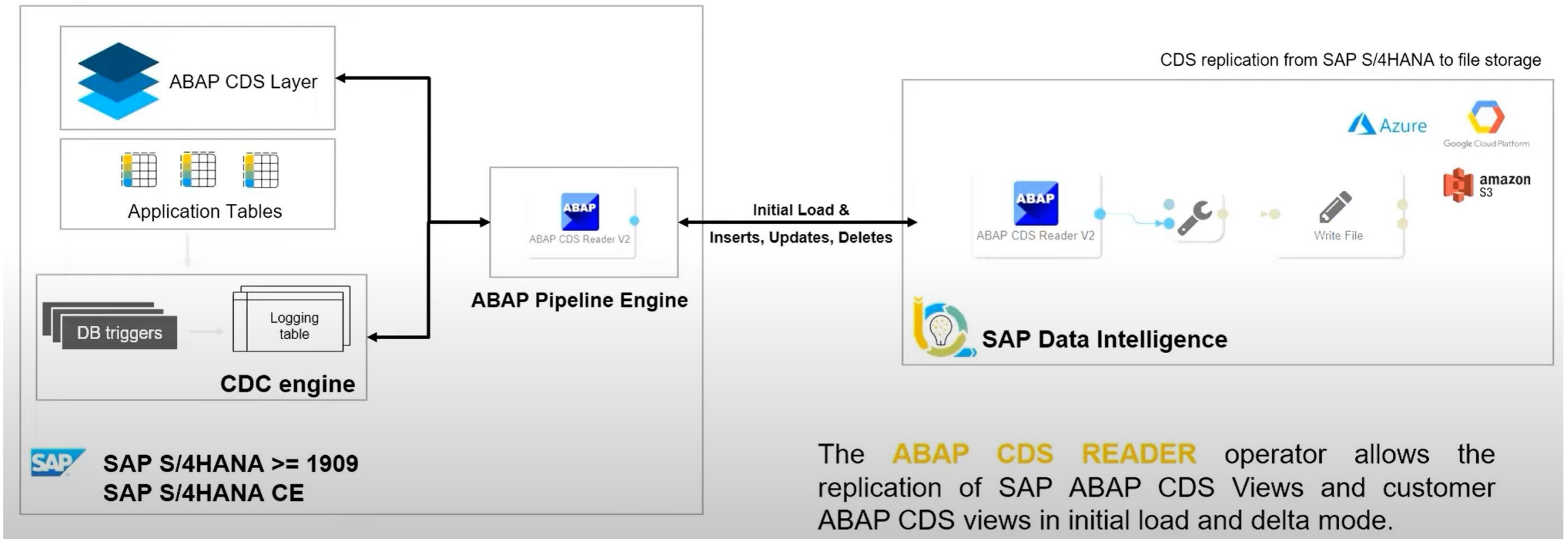
Cloud Storage Supported
- Azure Data Lake Gen 2, Amazon S3, Google Cloud Storage
- Azure SQL Database, Amazon Redshift, Google BigQuery

Other Features to Note
- Data Quality operators

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 EVALUATED

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

MECHANISMS FOR EXTRACTION OF SAP DATA

- OData: via native connectors or coded integration
- RFC: May require custom connectors / plugins
- ODP: based on Extractor, CDS, or SLT
- CDS Views: No Direct connection – must be via Odata or ODP (requires connector)

KEY FEATURES / BENEFITS

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

Approximate Cost: $-$$

DRAWBACKS / CONSIDERATIONS

- Accessing an On-Prem System from Cloud ETL Tool
- Plugins may be required for certain types of connections
- Modeling effort may be higher in some cases

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

GUIDANCE

- A lot of recent progress in this area, specifically around CDC (e.g. recent Azure connector)
- 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	**SAP** BW	**SAP**
SAP BW Open Hub	SAP BW via MDX	SAP CDC
C4C	**SAP** ECC	**SAP** HANA
SAP Cloud For Customer	SAP ECC	SAP HANA
SAP TABLE		
SAP Table		

3rd Party ETL

Third Party ETL

OPTIONS EVALUATED

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

- Native connectors to many cloud environments. 100+ connectors to cloud applications
- Difficult to navigate the space as no standard way to access SAP data exists across the tools
- Strong talent pool and available training resources make 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

Summary

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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SIGN UP FOR INSIGHTS

THANK YOU

SIVAKUMAR KA
ska@clarkstonconsulting.com

NATHAN KELIHER
nkeliher@clarkstonconsulting.com

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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

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Supported Data Extraction Methods

Platform	OData	RFC	ODBC*	ODP**	SLT***	ABAP CDS
Azure Data Factory (ADF)	X		X	X	via ODP	via ODP
Amazon Glue	X		X	X	via ODP	via ODP
Cloud Data Fusion	X		X	X	via ODP	via ODP
SAP Data Services		X	X	X	via ODP	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

Supported Objects By Data Extraction Mechanisms for SAP Applications

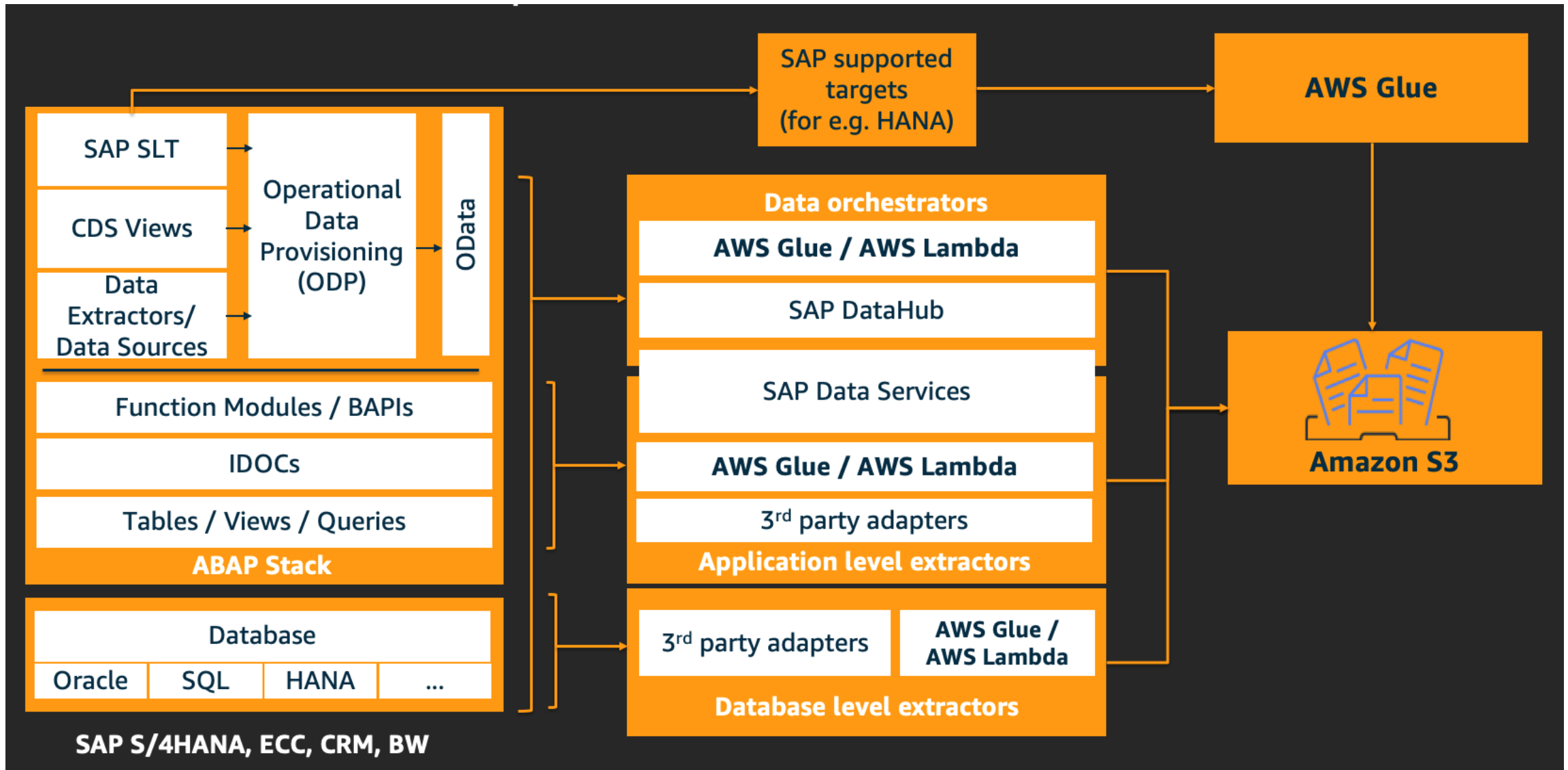| Supported Source Objects	EXTRACTION MECHANISM					
	OData	RFC	ODBC	ODP	SLT	CDS Reader
Table	**	X	X		X	*
View	**	X	X			*
CDS View	X		X	X		X
Query		*	X			
Function		X				
SAP Extractor				X		
Change Data Capture				X	X	X

* These objects are supported when wrapped in a CDS View

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

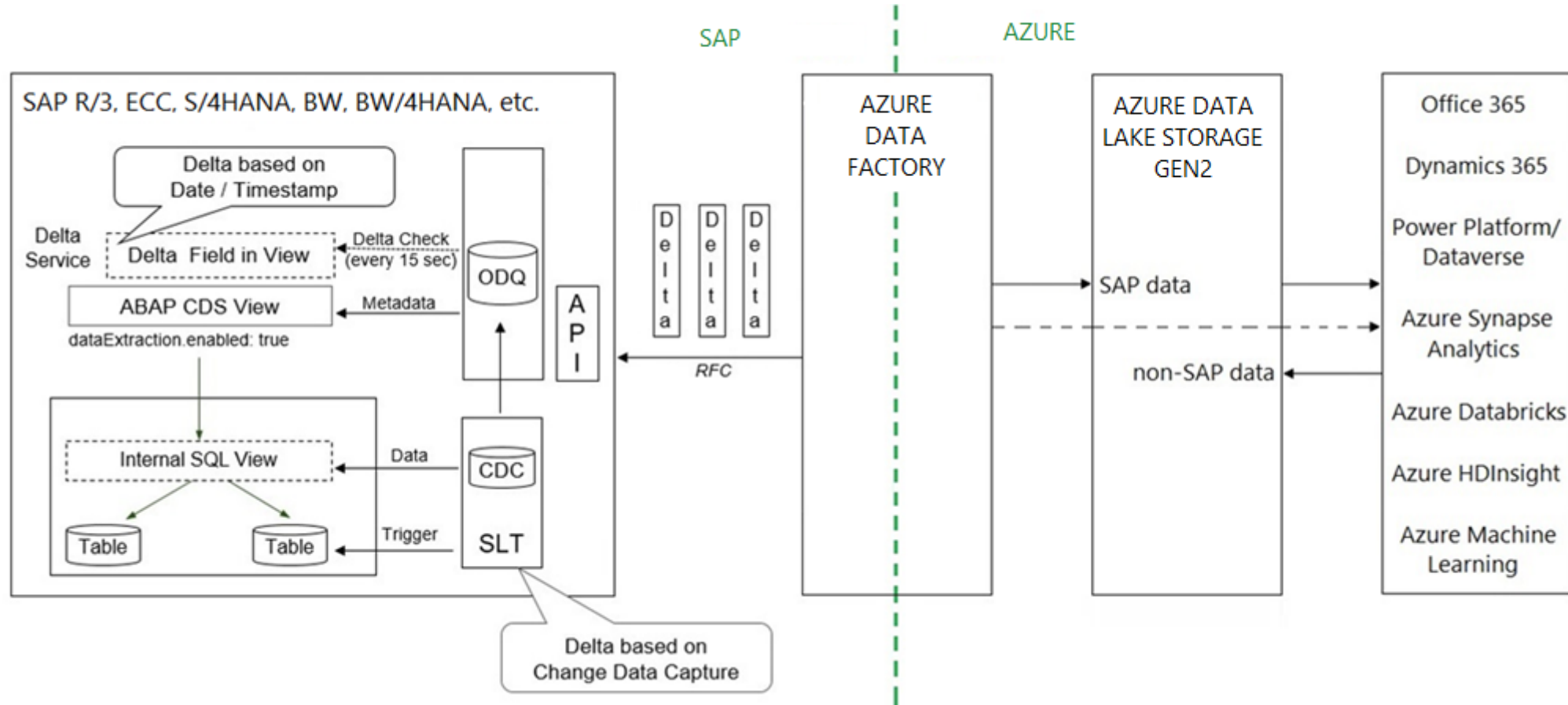clarkston CONSULTING

Modern Data Arch - AWS
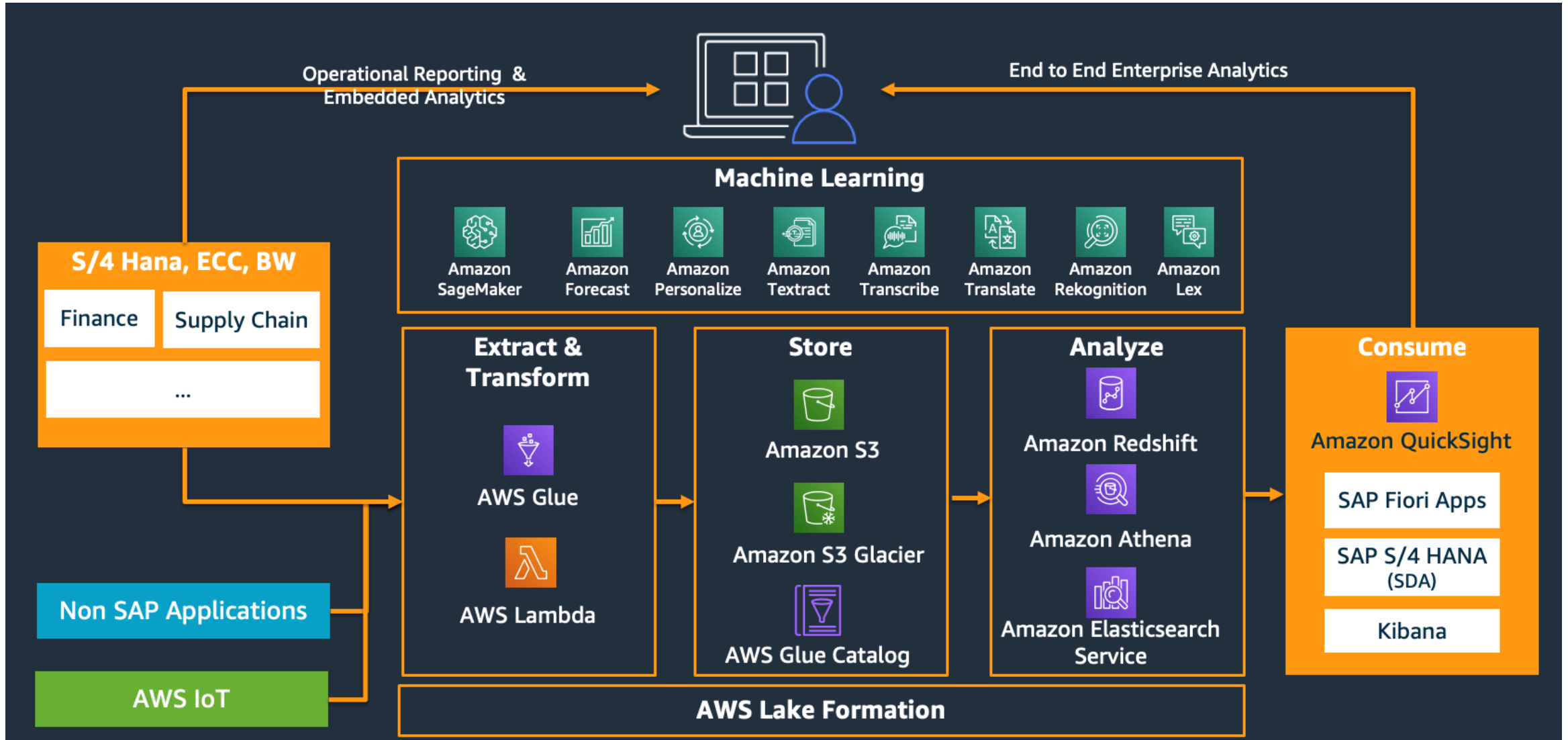
SAP & AWS Integration

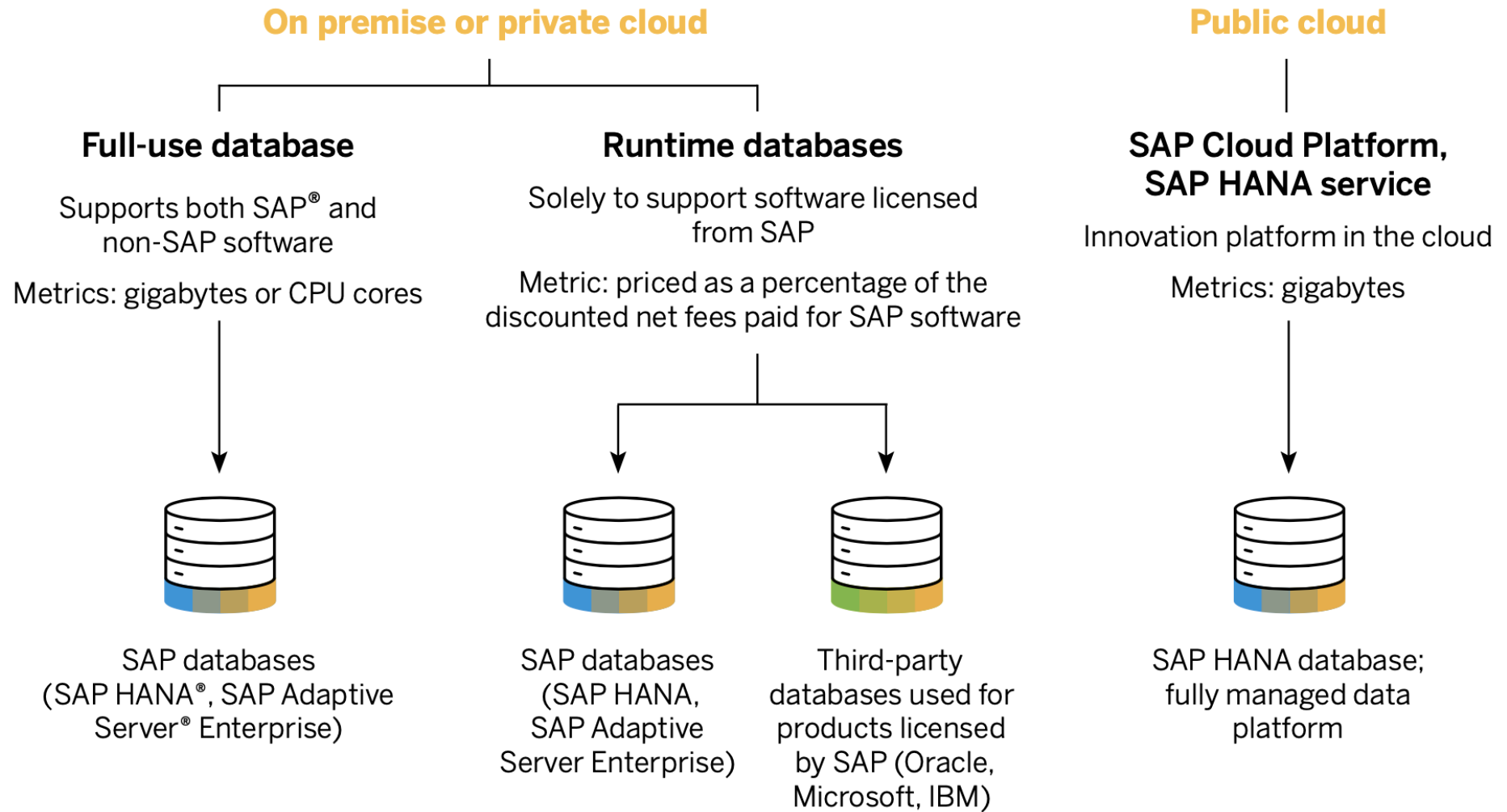# SAP CDC with Azure

Licensing

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

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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

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