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ACCELERATING IMPLEMENTATION OF FIELD SERVICE SOLUTION THROUGH ZERO ETL BETWEEN SALESFORCE SERVICE CLOUD AND SNOWFLAKE FOR BI-DIRECTIONAL DATA SHARING

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Abstract

This paper explores the acceleration of field service solution implementation through the adoption of zero Extract, Transform, Load (ETL) processes between Salesforce, a leading service platform, and Snowflake, a cloud-based data platform. Paper investigates the benefits, challenges, and methodologies associated with this approach, demonstrating its potential to significantly reduce implementation time, improve data accuracy, and enhance overall operational efficiency in field service management.

Paper will also explore a case study that demonstrates the application of Zero ETL in a field service management solution, achieving 30% faster deployment and more than 75% cost savings through elimination of data pipelines.

Keywords: Field Service, Zero ETL, Salesforce, Snowflake, Data Sharing, Real-time Integration, Cloud Computing

I. INTRODUCTION

Field service management plays a pivotal role in service-based industries, from utilities and telecommunications to healthcare and manufacturing. Ensuring timely, efficient service delivery requires seamless coordination and information flow across multiple systems, enabling organizations to meet customer expectations and improve operational efficiency. A core challenge in this domain is integrating data from operational systems, like Salesforce Service Cloud, with analytical platforms, such as Snowflake, to facilitate real-time insights, reporting, and data-driven decision-making.

Traditionally, this integration has relied on complex Extract, Transform, Load (ETL) processes. ETL systems are designed to extract data from a source, transform it to fit the target system's schema, and then load it into the destination [2]. However, ETL processes are not only resource-intensive but can also introduce significant delays and increase the risk of data inconsistencies. This time-consuming process can slow down field service implementations, create costly delays, and make it difficult to achieve accurate real-time insights, both critical for efficient field service management [1].

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Zero ETL represents an innovative approach to data integration that bypasses traditional ETL pipelines altogether by enabling direct, real-time data sharing between platforms [5]. With Zero ETL, data is transferred seamlessly from Salesforce to Snowflake without the need for intermediate transformations or custom-built scripts, thus improving data accessibility, reliability, and freshness. This paper introduces a robust framework for implementing Zero ETL by leveraging native connectors and APIs provided by Salesforce and Snowflake, demonstrating how organizations can avoid ETL bottlenecks, reduce the time and cost of implementation, and enhance data consistency.

In addition to presenting the framework, this paper explores the operational and technical benefits of Zero ETL in field service management and addresses potential challenges in achieving optimal integration. By providing a practical, case-study-backed examination of this approach, this paper aims to establish Zero ETL as a powerful tool for accelerating field service solution deployment while ensuring high-quality data flow across platforms.

II. BACKGROUND AND PROPOSED METHODOLOGY

A. Traditional data sharing mechanism for field service solutions

Traditional data sharing mechanism between field service operational solution such as Salesforce service cloud and data platform such as Snowflake involved building data pipelines at table level. This requires extensive effort in developing data pipelines and maintaining them over time. This also introduces additional issues such as data quality, data security.

The key challenges associated with traditional ETL for field service implementation include:

Latency: Delayed access to real-time data for decision-making.

Complexity: Increased operational overhead due to data transformation and management.

Cost: High costs associated with maintaining ETL infrastructure and managing data pipelines

B. Emergence of zero ETL

Zero ETL (Extract, Transform, Load) is an emerging trend that aims to eliminate the traditional ETL process, where data is extracted from one system, transformed to fit another, and then loaded into a new system [3]. In a zero ETL architecture, data is instead accessed and integrated in near real-time, without the need for intermediate steps. This is achieved through direct integration between databases, applications, and analytics platforms, often leveraging cloud-native technologies and APIs. By reducing or eliminating data movement and transformation overhead, zero ETL provides faster insights, minimizes latency, and simplifies data architecture, making it especially appealing for real-time analytics and decision-making in modern, agile businesses [6]. This shift is being driven by the growing demand for speed, scalability, and simplified data workflows.

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III. ZERO ETL ARCHITECTURE BETWEEN SALESFORCE AND SNOWFLAKE

Zero ETL architecture between Salesforce and Snowflake involves direct integration of Salesforce within Snowflake and vice versa using Oauth authentication, and it leverages data sharing mechanism available in modern cloud platforms.

a. Salesforce outbound data:

Salesforce can ingest data from core Salesforce platform to Salesforce data cloud through off the shelf CRM connector or through ingestion API. Ingested data is stored in tables with Apache iceberg format. Tables can be made available to snowflake by creating a data share and selecting the tables that need to be shared with Snowflake. Snowflake can query the tables shared through data share directly from the same storage location in Salesforce data cloud as Snowflake query engine is compatible with iceberg format.

Sample Salesforce integration command within Snowflake:

```
CREATE OR REPLACE SECURITY INTEGRATION
<Salesforce_Integration_Name>
  TYPE = OAUTH
  OAUTH_CLIENT = CUSTOM
  OAUTH_CLIENT_TYPE = 'CONFIDENTIAL'
  OAUTH_REDIRECT_URI =
'https://login.salesforce.com/services/cdpSnowflakeOAuthCallback'
  ENABLED = TRUE
  OAUTH_ISSUE_REFRESH_TOKENS = TRUE;
```

Once the outbound integration is established between Salesforce data cloud and Snowflake, data generated in Salesforce platform needs to be streamed to Salesforce data cloud tables either via Salesforce CRM connector (latency of ~15 mins) or through ingestion API (latency of ~2-3 mins). Tables in Salesforce data cloud made accessible for read only queries in Snowflake by creating a new data share with applicable tables [4] [5].

b. Salesforce inbound data:

Data residing in Snowflake is made available to Salesforce by creating a role within Snowflake for Salesforce user with access to databases that need to be shared. Take the role credentials and private key from Snowflake and set up new external integration with Snowflake within Salesforce data cloud. Once the external integration is established, Snowflake tables can be accessed and queried from Salesforce data cloud.

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Following steps need to be followed to enable this integration:

1. Generate a private and public key
2. Upload public key to Snowflake and assign public key to corresponding user

```
ALTER USER <snowflake_user>
SET
RSA_PUBLIC_KEY='MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAt1oKdwr...';
```

3. Export private key in PEM format for Salesforce
4. Configure Salesforce for JWT authentication
5. Verify the integration by accessing the tables in Salesforce data cloud. All tables that are accessible for Snowflake user must be available for read only queries in Salesforce data cloud.

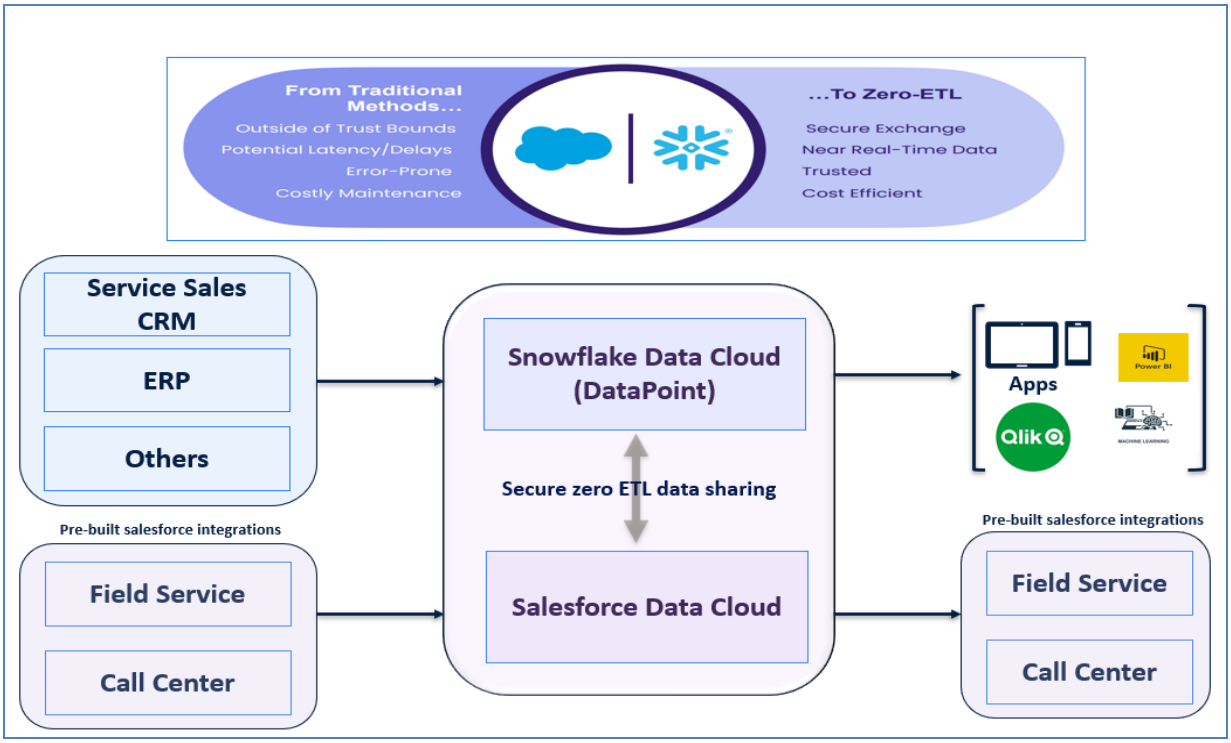

Fig.1. Data share flow between Salesforce service cloud and Snowflake data platform for an enterprise with focus on field service and call center modules.

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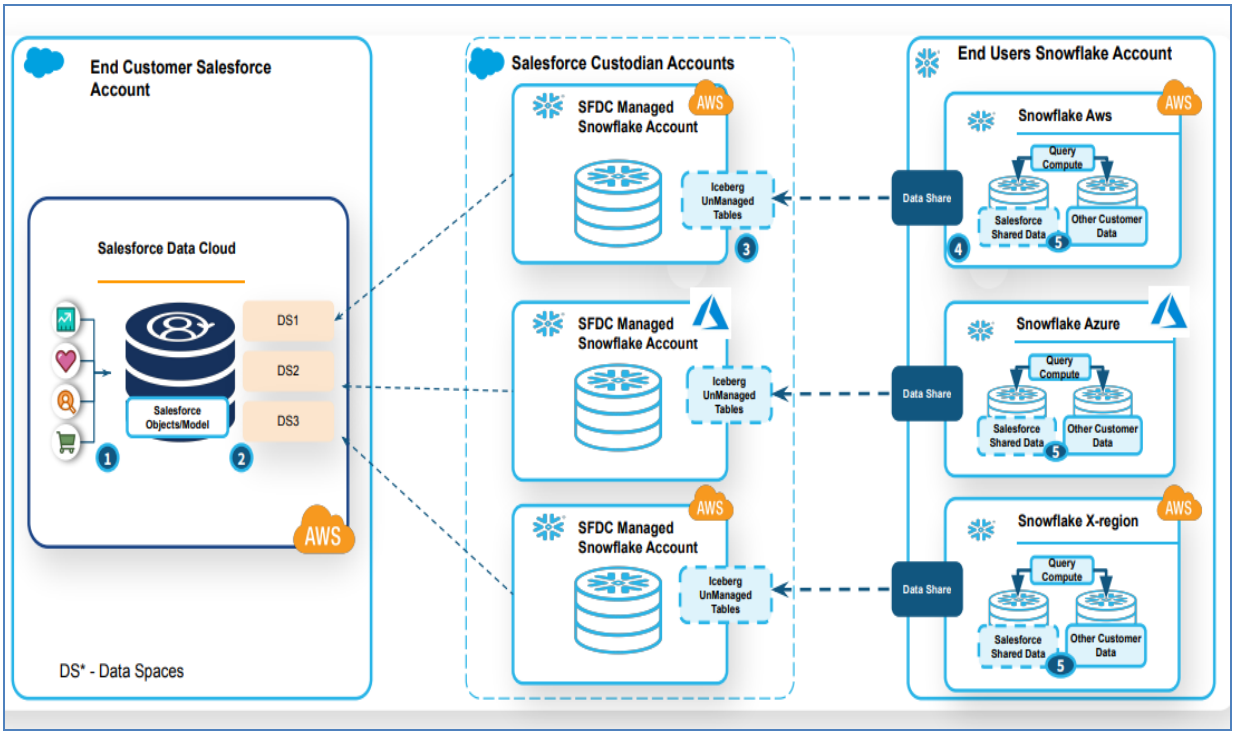

Fig.2. Cross cloud data share architecture between Salesforce and Snowflake, Salesforce is hosted on AWS whereas Snowflake is available in all AWS, Azure and GCP.

IV. KEYBENEFITS

1. Share data between snowflake and salesforce with no cost and effort in building ETL pipelines.
2. Provide historical enterprise datasets available in Snowflake such as work orders, service appointments needed to implement field service module through zero ETL data share.
3. Easily join data between Salesforce and Snowflake, run federated queries, generate actionable insights.
4. Enrich service data generated in Salesforce by combining with other enterprise data sources such as CRM and ERP systems in Snowflake data platform.
5. Feed curated and insightful customer and service related data from Snowflake to Salesforce, enabling call center agents and field mechanics to provide better customer experience.

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V. CASE STUDY

Background: A large global manufacturing and consumer services company was looking to transform field service through Salesforce service cloud to improve field operational efficiency and customer satisfaction. Company had Snowflake as central enterprise data platform consolidating data from all key enterprise source systems.

Implementation: Company chose to adopt emerging zero ETL data sharing between Salesforce and Snowflake

1. Data sharing (zero ETL) integration was set up between Snowflake and Salesforce.
2. Historical data needed to operationalize Salesforce service cloud was provided through zero ETL mechanism.
3. Data generated in Salesforce was brought in to Snowflake for all downstream application and reporting consumption through zero ETL.

Results: Accelerated the field service implementation by

1. 30% reduction in overall field service solution deployment timeline.
2. 75% savings in development effort and cost to provide historical datasets needed to operationalize Salesforce.
3. 90% savings in development and maintenance effort and cost to bring data from Salesforce platform to central enterprise data platform.

IV. CONCLUSION

- Zero ETL is a promising approach for accelerating field service implementation by enabling real-time, direct data sharing between Salesforce and Snowflake. By eliminating the complexity of traditional ETL pipelines, organizations can achieve faster deployment times, lower costs, and improved operational efficiency. Other advantage being as zero ETL enables bi-directional data sharing between Salesforce and Snowflake enterprise data platform, it simplifies and speeds up the execution of advanced analytics, machine learning use cases because of the opportunity combine Salesforce generated data with data coming from other enterprise data sources.
- Overall, as cloud-based platforms continue to evolve, Zero ETL is expected to play a pivotal role in data integration and analytics strategies for field service management and beyond.

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