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Enterprise Technology Practice

Building a Scalable and Secure Data Warehouse for NetSuite: An End-to-End ELT Approach

This document is a collaborative effort by Wienanto Tanuwidjaja, Raditya Pratama, and Armanda Sanjaya, representing views from Logiframe's Oracle NetSuite Practice on how NetSuite customers can build secure data warehouse with ELT approach.



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Table of Contents

Table of Contents **1**
1. Introduction **2**
1.1 Business Problem 2
1.2 Objective of this Whitepaper 2
2. Traditional ETL vs. Modern ELT for NetSuite **3**
2.1 Introduction to ETL and ELT 3
2.2 Comparison Table 3
2.3 Practical Examples 3
2.4 Recommended ELT Tools 4
3. Technology Stack & Architecture **5**
3.1 Data Pipeline Components 5
3.2 Architecture Diagram 5
4. Step-by-Step Implementation Guide **5**
4.1 Extracting NetSuite Data 5
A. Using SuiteAnalytics Connect with ODBC 5
B. Using SuiteAnalytics Connect with JDBC 8
C. Integrate NetSuite with Cloud Data Warehouse 10
D. Enhance Reporting Using Data Visualization 12
5. Security & Governance **13**
5.1 Role-Based Access Control (RBAC) 13
5.2 Data Masking & Compliance 13
5.3 Audit Logs & Monitoring 14
5.4 Secure Data Storage & Transfer 14
6. Data Quality & Monitoring **14**
6.1 Data Quality Checks 14
6.2 Pipeline Monitoring 14
6.3 Error Handling & Recovery 14
7. Conclusion & Future Trends **15**
7.1 Conclusion 15
7.2 Future Trends 15

1. Introduction

1.1 Business Problem

Many organizations using traditional ERP systems struggle with extracting, transforming, and analyzing their data efficiently. Legacy systems often have rigid data structures and require extensive customization for reporting. NetSuite provides a robust cloud-based solution with built-in analytics and integration capabilities. However, organizations can further enhance their data strategy by implementing an ELT (Extract, Load, Transform) approach to maximize the power of NetSuite's SuiteAnalytics and SuiteTalk APIs. Some key challenges with legacy ERPs include:

- **Performance Limitations:** Traditional on-premise ERPs require extensive resources for large-scale queries.
- **Data Silos:** Legacy systems lack seamless integration with modern CRM, eCommerce, and marketing platforms.
- **Complex Transformations:** Data extraction often depends on third-party middleware, increasing complexity and maintenance efforts.
- **Scalability Issues:** On-premise ERP solutions struggle to scale, unlike NetSuite's cloud-based model.

1.2 Objective of this Whitepaper[1]

This whitepaper presents a modern, cloud-based ELT architecture for integrating NetSuite data with a scalable data warehouse. By leveraging best practices and automation tools, this solution enables organizations to:

- Centralize NetSuite data in a high-performance data warehouse.
- Use SQL-based transformations for flexible data modeling.
- Automate data pipelines with Apache Airflow, Fivetran, or dbt.
- Implement role-based access control (RBAC) and security best practices.
- Enable seamless reporting using Power BI, Tableau, or Looker.

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[1]NetSuite is a product of Oracle Corporation. This whitepaper is intended to provide insights into optimizing NetSuite analytics using an ELT approach. Logiframe is a certified solution provider partner of NetSuite, offering expert implementation, integration, and support services to help businesses maximize their NetSuite investment.

2. Traditional ETL vs. Modern ELT for NetSuite

2.1 Introduction to ETL and ELT

Businesses are shifting from traditional ETL (Extract, Transform, Load) to modern ELT (Extract, Load, Transform). ELT is particularly suited for cloud-based ecosystems like NetSuite. The key difference is where transformation occurs—before loading (ETL) or after loading (ELT).

2.2 Comparison Table

Feature	Traditional ETL	Modern ELT
Transformation Timing	Before Loading	After Loading
Performance	Slower	Faster (Cloud Processing)
Flexibility	Rigid	Agile
Scalability	Limited	Highly Scalable
Best for	On-Premise Systems	Cloud-Based Systems

2.3 Practical Examples

Example 1: Financial Reporting

- **ETL:** Data is extracted, transformed externally, then loaded into a reporting database, causing delays.
- **ELT:** Raw data is loaded into Snowflake; business logic is applied using dbt, enabling real-time reports.

Example 2: Sales Analytics Dashboard

- **ETL:** Sales data is extracted daily and processed in batches, delaying insights.
- **ELT:** Data is continuously extracted via NetSuite's REST API, transformed in BigQuery, and updated in Looker.

Example 3: Inventory Management

- **ETL:** Data is processed externally, increasing latency and inconsistency risks.
- **ELT:** Inventory data flows into Redshift; dbt models handle real-time stock calculations.

2.4 Recommended ELT Tools

To implement an effective ELT strategy, businesses can leverage the following tools:

- **Fivetran:** Automates data extraction and loading from NetSuite to cloud data warehouses with minimal setup.
- **dbt (Data Build Tool):** Provides SQL-based transformations, modular data modeling, and lineage tracking.
- **Apache Airflow:** Manages and orchestrates complex data workflows with scheduling, monitoring, and logging capabilities.
- **Snowflake:** A cloud-native data warehouse that provides scalability, performance, and secure data storage.
- **BigQuery:** Google's serverless, highly scalable data warehouse that enables real-time analytics.
- **Amazon Redshift:** A fast, cloud-based data warehouse optimized for large-scale data processing.
- **Looker/Power BI/Tableau:** Data visualization tools that provide intuitive dashboards and reporting for decision-makers.

Each of these tools plays a key role in ensuring smooth ELT operations, from data extraction to final insights delivery.

Here are the official links and documentation to help you learn how to use these tools:

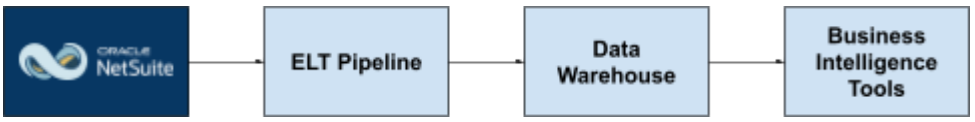
1. Fivetran: https://fivetran.com/docs
2. dbt (Data Build Tool): https://docs.getdbt.com/
3. Apache Airflow: https://airflow.apache.org/docs/
4. Snowflake: https://docs.snowflake.com/
5. BigQuery: https://cloud.google.com/bigquery/docs
6. Amazon Redshift: https://docs.aws.amazon.com/redshift/latest/dg/
7. Power BI: https://learn.microsoft.com/en-us/power-bi/
8. Tableau: https://help.tableau.com/
9. Looker: https://cloud.google.com/looker/docs/

3. Technology Stack & Architecture

3.1 Data Pipeline Components

Component	Purpose
SuiteAnalytics Connect	Extracts NetSuite data via ODBC/JDBC
NetSuite REST API	Enables real-time, flexible data access
Fivetran/dbt	Automates ELT pipelines
Snowflake/BigQuery/Redshift	Cloud-based data warehousing
Looker/Tableau/Power BI	Data visualization & reporting

3.2 Architecture Diagram



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4. Step-by-Step Implementation Guide

4.1 Extracting NetSuite Data

A. Using SuiteAnalytics Connect with ODBC

1. Make sure the SuiteAnalytics Connect feature is enabled on your Netsuite account.
2. Download and install the Netsuite ODBC driver either on a local machine or a virtual machine. Please match the driver according to the operating system used, e.g., Windows 64-bit.

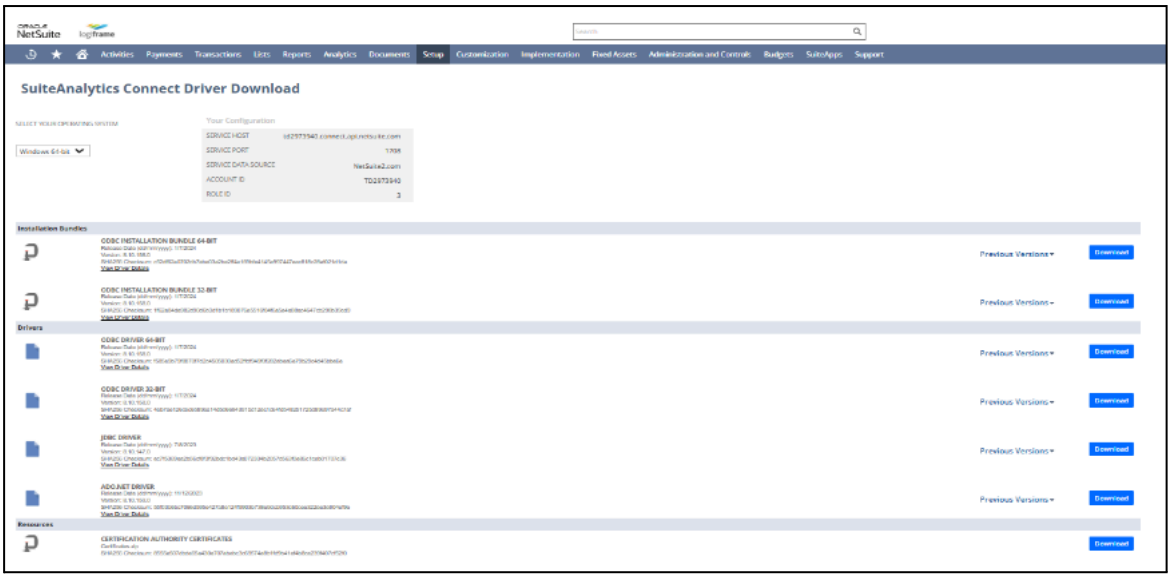


Illustration 4.1.1: NetSuite SuiteAnalytics Connect driver download.

3. Configure and test the connection using NetSuite credentials and role permissions.

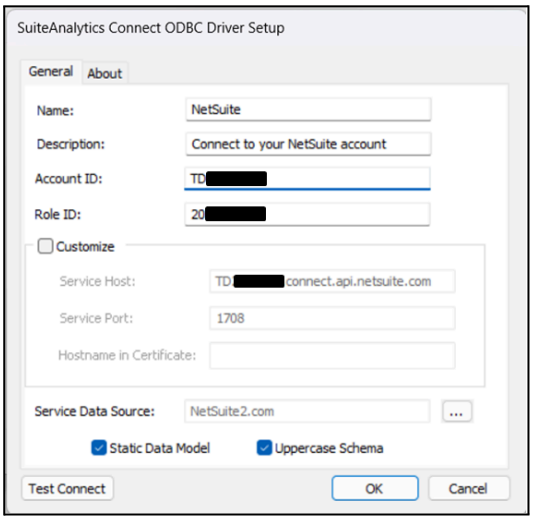


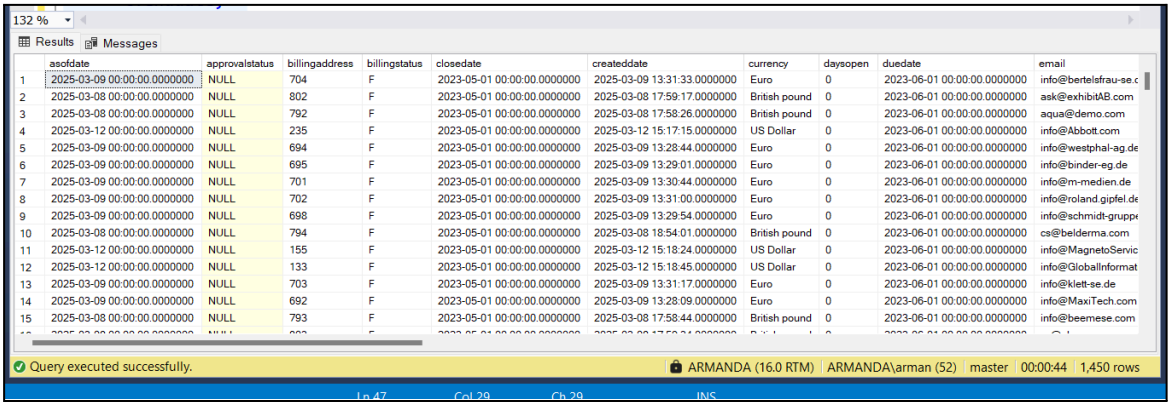
Illustration 4.1.2: SuiteAnalytics Connect ODBC Driver Setup.

4. Setup connection in Database Management System that supports ODBC connection, e.g., Microsoft SQL Server Management Studio.
5. Execute query to get the required data, e.g.,

Python

```
SELECT * FROM OPENQUERY(NETSUITE_ODBC,
  'SELECT
      t.asofdate,
      t.approvalstatus,
      t.billingaddress,
      t.billingstatus,
      t.closedate,
      t.createddate,
      c.name AS currency,
      t.daysopen,
      t.duedate,
      t.email,
      e.entityid AS employee,
      t.enddate,
      cust.entityid AS entity,
      t.exchangerate,
      t.foreignamountpaid,
      t.foreignamountpaid * 16000 as amount_rp,
      t.foreignamountunpaid,
      t.foreigntotal,
      t.id,
      t.memo,
      nx.description AS nexus,
      t.otherrefnum,
      t.posting,
      ap.periodname AS postingperiod,
      t.shipcomplete,
      t.shipdate,
      t.shippingaddress,
      t.status,
      tm.name AS terms,
      t.trandate,
      t.trandisplayname,
      t.tranid,
      tl.subsidiary,
      ss.name
  FROM TRANSACTION t
  INNER JOIN transactionline tl ON tl.transaction = t.id
```

```
INNER JOIN subsidiary ss On ss.id = tl.subsidiary
LEFT JOIN currency c ON t.currency = c.id
LEFT JOIN employee e ON t.employee = e.id
LEFT JOIN customer cust ON t.entity = cust.id
LEFT JOIN nexus nx ON t.nexus = nx.id
LEFT JOIN accountingperiod ap ON t.postingperiod = ap.id
LEFT JOIN term tm ON t.terms = tm.id
WHERE t.type = ''CustInvc''
  and tl.mainline = ''T''');
```



132 %

Results | Messages

	asofdate	approvalstatus	billingaddress	billingstatus	closedate	createddate	currency	daysopen	duedate	email
1	2025-03-09 00:00:00.0000000	NULL	704	F	2023-05-01 00:00:00.0000000	2025-03-09 13:31:33.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@bertelsfrau-se.c
2	2025-03-08 00:00:00.0000000	NULL	802	F	2023-05-01 00:00:00.0000000	2025-03-08 17:59:17.0000000	British pound	0	2023-06-01 00:00:00.0000000	ask@exhibitAB.com
3	2025-03-08 00:00:00.0000000	NULL	792	F	2023-05-01 00:00:00.0000000	2025-03-08 17:58:26.0000000	British pound	0	2023-06-01 00:00:00.0000000	aqua@demo.com
4	2025-03-12 00:00:00.0000000	NULL	235	F	2023-05-01 00:00:00.0000000	2025-03-12 15:17:15.0000000	US Dollar	0	2023-06-01 00:00:00.0000000	info@Abbott.com
5	2025-03-09 00:00:00.0000000	NULL	694	F	2023-05-01 00:00:00.0000000	2025-03-09 13:28:44.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@westphal-ag.de
6	2025-03-09 00:00:00.0000000	NULL	695	F	2023-05-01 00:00:00.0000000	2025-03-09 13:29:01.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@binder-eg.de
7	2025-03-09 00:00:00.0000000	NULL	701	F	2023-05-01 00:00:00.0000000	2025-03-09 13:30:44.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@m-medien.de
8	2025-03-09 00:00:00.0000000	NULL	702	F	2023-05-01 00:00:00.0000000	2025-03-09 13:31:00.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@roland.gipfel.de
9	2025-03-09 00:00:00.0000000	NULL	698	F	2023-05-01 00:00:00.0000000	2025-03-09 13:29:54.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@schmidt-gruppe
10	2025-03-08 00:00:00.0000000	NULL	794	F	2023-05-01 00:00:00.0000000	2025-03-08 18:54:01.0000000	British pound	0	2023-06-01 00:00:00.0000000	cs@belderma.com
11	2025-03-12 00:00:00.0000000	NULL	155	F	2023-05-01 00:00:00.0000000	2025-03-12 15:18:24.0000000	US Dollar	0	2023-06-01 00:00:00.0000000	info@MagnetoServic
12	2025-03-12 00:00:00.0000000	NULL	133	F	2023-05-01 00:00:00.0000000	2025-03-12 15:18:45.0000000	US Dollar	0	2023-06-01 00:00:00.0000000	info@GlobalInformat
13	2025-03-09 00:00:00.0000000	NULL	703	F	2023-05-01 00:00:00.0000000	2025-03-09 13:31:17.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@klett-se.de
14	2025-03-09 00:00:00.0000000	NULL	692	F	2023-05-01 00:00:00.0000000	2025-03-09 13:28:09.0000000	Euro	0	2023-06-01 00:00:00.0000000	info@MaxiTech.com
15	2025-03-08 00:00:00.0000000	NULL	793	F	2023-05-01 00:00:00.0000000	2025-03-08 17:58:44.0000000	British pound	0	2023-06-01 00:00:00.0000000	info@beemese.com

Query executed successfully. ARMANDA (16.0 RTM) | ARMANDA\arman (52) | master | 00:00:44 | 1,450 rows

Ln 47 Col 29 Ch 29 INS

Illustration 4.1.3: The query to extract NetSuite invoice transaction data in Microsoft SQL Server Management Studio has been successfully executed.

B. Using SuiteAnalytics Connect with JDBC

1. Make sure the SuiteAnalytics Connect feature is enabled on your Netsuite account.
2. Download and extract the Netsuite JDBC driver.
3. Configure the JDBC driver in Database Management System that supports JDBC connection, e.g., DBeaver.

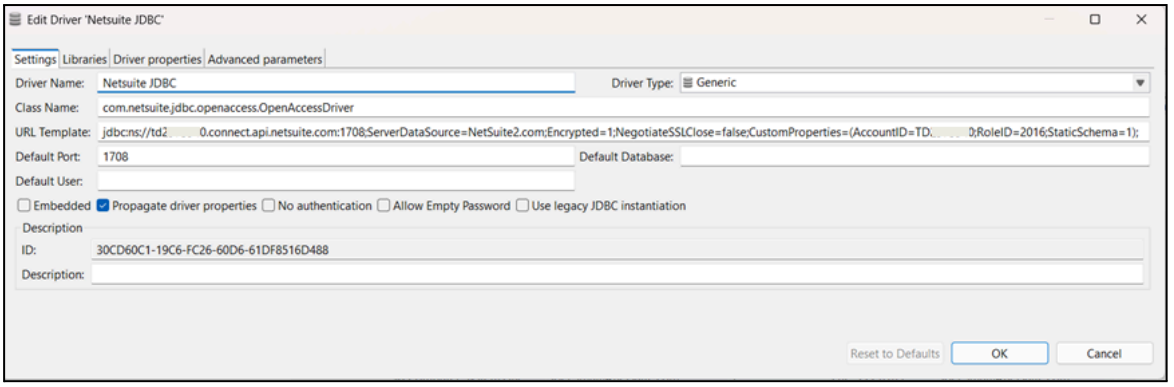


Illustration 4.1.4: Configuration of new driver in DBeaver with the information provided by NetSuite such as Class Name, Account ID & Role ID which will be embedded into the template URL.

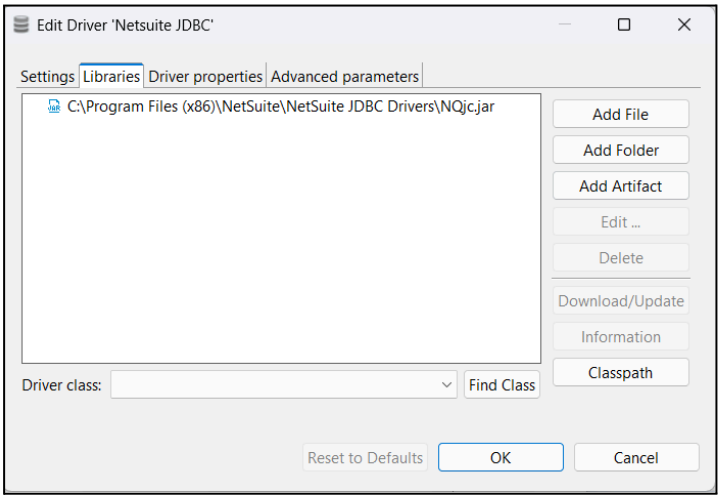
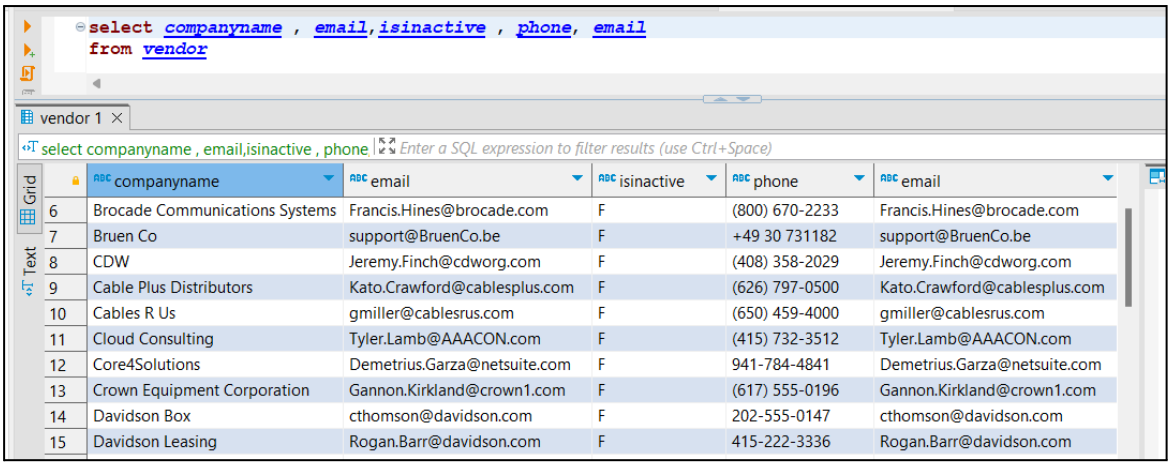


Illustration 4.1.5: Add the NQjc.jar file into DBeaver containing the JDBC driver that can be registered in Java environment.

4. Execute query to get the required data, e.g.,

```python
select companyname, email, isinactive, phone, email
from vendor
```



	companyname	email	isinactive	phone	email
6	Brocade Communications Systems	Francis.Hines@brocade.com	F	(800) 670-2233	Francis.Hines@brocade.com
7	Bruen Co	support@BruenCo.be	F	+49 30 731182	support@BruenCo.be
8	CDW	Jeremy.Finch@cdworg.com	F	(408) 358-2029	Jeremy.Finch@cdworg.com
9	Cable Plus Distributors	Kato.Crawford@cablesplus.com	F	(626) 797-0500	Kato.Crawford@cablesplus.com
10	Cables R Us	gmiller@cablesrus.com	F	(650) 459-4000	gmiller@cablesrus.com
11	Cloud Consulting	Tyler.Lamb@AAACON.com	F	(415) 732-3512	Tyler.Lamb@AAACON.com
12	Core4Solutions	Demetrius.Garza@netsuite.com	F	941-784-4841	Demetrius.Garza@netsuite.com
13	Crown Equipment Corporation	Gannon.Kirkland@crown1.com	F	(617) 555-0196	Gannon.Kirkland@crown1.com
14	Davidson Box	cthomson@davidson.com	F	202-555-0147	cthomson@davidson.com
15	Davidson Leasing	Rogan.Barr@davidson.com	F	415-222-3336	Rogan.Barr@davidson.com

Illustration 4.1.6: The query to extract NetSuite vendor master data in DBeaver has been successfully executed

C. Integrate NetSuite with Cloud Data Warehouse

NetSuite can be integrated with other cloud-based applications to enable seamless data extraction, storage, and analysis for business insights. Using Fivetran as an automated data pipeline, we can extract the NetSuite data and load it efficiently into Snowflake, a powerful cloud data warehouse. This combination allows organizations to centralize their NetSuite data in Snowflake, making it easily accessible for reporting, analytics, and decision-making, without the need for manual data handling or complex integrations.

1. Set up integration record in NetSuite to authenticate and manage third-party applications integration.



Illustration 4.1.7: Set up integration record in NetSuite to allow third-party applications to connect with NetSuite. Ensure you have permission to SuiteAnalytics Connect, Access Token, & Data Warehouse Integrator.

2. In Fivetran, create a new connection with a Netsuite SuiteAnalytics Connect as the data source. Then fill in the required credentials information.

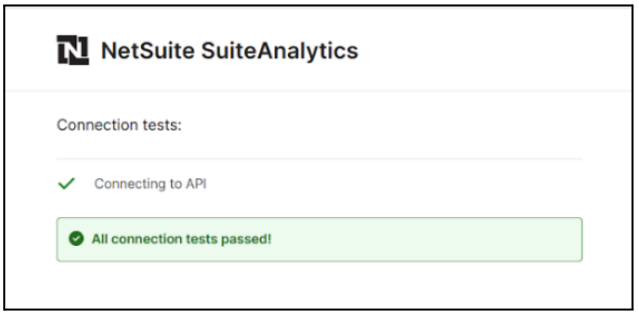


Illustration 4.1.8: The connection between NetSuite and Fivetran has been successfully established.

3. Select Snowflake as the destination data warehouse then fill in the Snowflake credentials to connect with Fivetran.

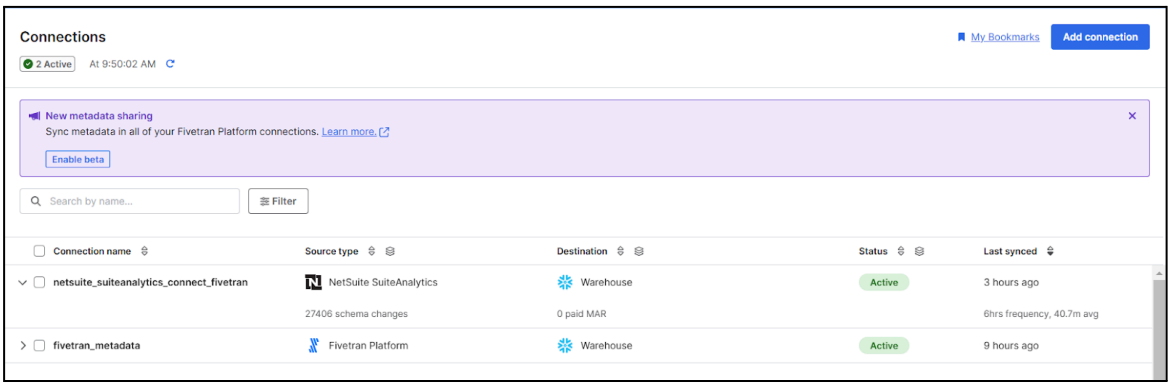


Illustration 4.1.9: NetSuite has been synced with Snowflake using Fivetran as the data pipeline.

4. Execute query in Snowflake to get the required data, e.g.,

```
Python
select ID, abbrevtype, approvalstatus, memo, recordtype, trandate, trandisplayname,
tranid
from
FIVETRAN_NETSUITE_SNOWFLAKE.NETSUITE_SUITEANALYTICS_CONNECT_FIVE
TRAN.TRANSACTION
where abbrevtype = 'PURCHORD'
```

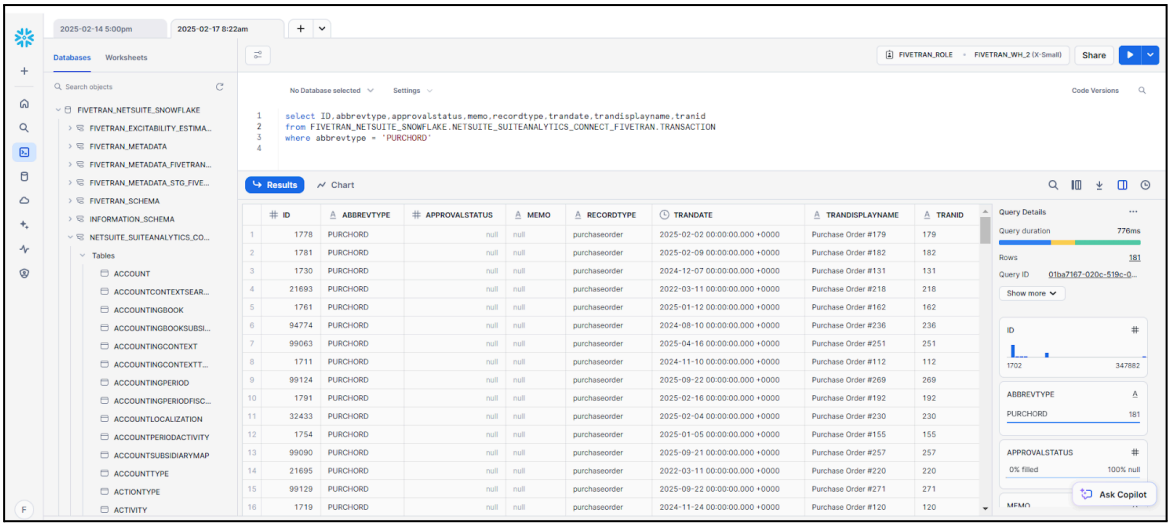


Illustration 4.1.10: The query to extract purchase order transaction data in Snowflake has been successfully executed

D. Enhance Reporting Using Data Visualization

The extracted data from NetSuite may be further processed within business intelligence and data visualization platforms, such as Looker Studio, to generate interactive dashboards and reports. This process offers significant value to enterprises seeking to promote data-driven decision-making through enhanced insight sharing and collaborative analysis.

1. Create a New Report in Looker Studio and select Snowflake as the data source.
2. Fill in the credentials information such as Snowflake account, database name, and schema name. Then enter a query to get the data to be visualized

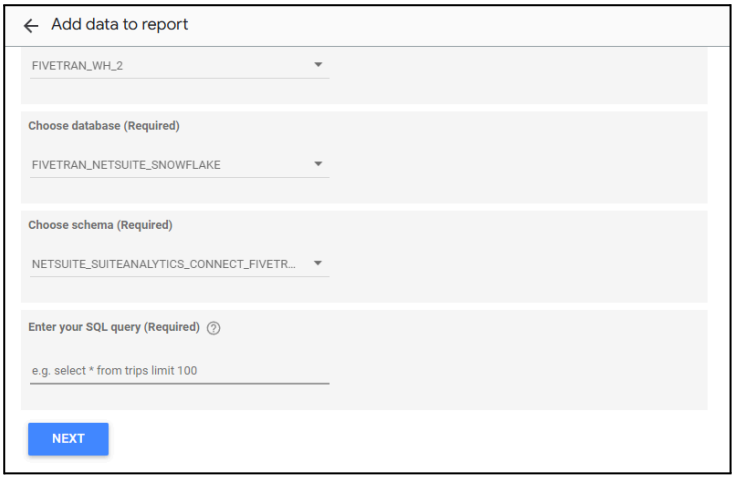


Illustration 4.1.11: Setting up Snowflake as the data source for Looker Studio.

3. Create and customize your own report or dashboard.



Illustration 4.1.12: Customized sales dashboard using the extracted NetSuite data in Looker Studio.

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5. Security & Governance

5.1 Role-Based Access Control (RBAC)

- Assign granular permissions based on user roles.
- Ensure data access is restricted to authorized users.
- Implement multi-factor authentication (MFA) for enhanced security.

5.2 Data Masking & Compliance

- Use dynamic data masking for Personally Identifiable Information (PII).
- Encrypt sensitive data both in transit and at rest.
- Ensure compliance with GDPR, SOC 2, HIPAA, and other regulatory standards.

5.3 Audit Logs & Monitoring

- Track data access and modifications through system-generated logs.
- Use SIEM (Security Information and Event Management) tools for real-time threat detection.
- Enable automated alerts for suspicious activities or unauthorized access attempts.

5.4 Secure Data Storage & Transfer

- Utilize TLS/SSL encryption for secure API communications.
- Apply column-level encryption for highly sensitive fields.
- Restrict access to IP whitelisting and VPN-only connections where necessary.

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6. Data Quality & Monitoring

6.1 Data Quality Checks

- Implement validation rules to check for data consistency, completeness, and accuracy.
- Use data profiling tools to detect anomalies and outliers.
- Automate data quality workflows using tools like Great Expectations.

6.2 Pipeline Monitoring

- Leverage Apache Airflow or dbt Cloud for tracking ETL/ELT job statuses.
- Set up real-time alerts for job failures, delays, or data discrepancies.
- Monitor resource utilization to optimize performance and cost.

6.3 Error Handling & Recovery

- Implement automated retry mechanisms for transient errors.
- Design idempotent ETL processes to prevent duplicate data loads.
- Maintain error logs for quick troubleshooting and auditing.

7. Conclusion & Future Trends

7.1 Conclusion

Implementing a scalable and secure ELT-based data warehouse for NetSuite enables organizations to overcome performance limitations, reduce data silos, and drive data-driven decision-making. By leveraging cloud-based data warehousing solutions, automation tools, and SQL-based transformations, businesses can streamline analytics and improve operational efficiency.

For decision-makers, this approach offers cost savings, scalability, and real-time insights, providing a competitive advantage in data-driven industries. For technical champions, it provides a robust framework for automation, governance, and data security, ensuring smooth operations and compliance with best practices.

7.2 Future Trends

- **AI and Machine Learning-Driven Analytics:** Advanced AI-driven models will enhance data predictions, customer insights, and automated anomaly detection in financial reporting.
- **Real-Time Streaming ELT Pipelines:** Businesses will increasingly adopt real-time streaming solutions such as Kafka, Kinesis, and Snowflake Streams to minimize latency in decision-making.
- **Serverless Data Processing:** The adoption of serverless technologies like Google BigQuery and AWS Lambda will reduce infrastructure costs while enabling faster data transformations.
- **Enhanced Data Governance and Compliance:** With growing regulatory requirements (GDPR, CCPA, HIPAA), organizations will invest more in data lineage tracking, automated compliance audits, and security frameworks.
- **Hybrid and Multi-Cloud Strategies:** Enterprises will leverage multi-cloud architectures (AWS, Azure, GCP) to optimize cost, flexibility, and availability.

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