

Centralized Data Warehousing for Improved Retail Analytics and Operation

ABOUT CLIENT

- A major US-based retailer with a nationwide presence, offering a unique range of consumer products, including groceries, electronics, and household items.
- With hundreds of brick-and-mortar locations and an extensive online marketplace, the company serves millions of customers nationwide.

PROBLEM STATEMENT

The company highlighted multiple challenges in its data management pipeline when we first sat together for a discussion. Here are the key issues we identified:

Disjointed Data Systems:

The company struggled with fragmented data from various systems, including Shopify for online sales, Salesforce and Microsoft Dynamics for CRM, and SAP/Oracle SCM for inventory. This made it hard to get a unified view of their operations.

Slow Reporting Processes:

Reports took several days to compile due to data being scattered across systems. This delay impacted their ability to make timely and informed decisions.

Inventory Management Issues:

Frequent stock-outs and overstock situations created operational inefficiencies and led to customer dissatisfaction, affecting overall business performance..

Customer Insights Gap:

Data from loyalty and rewards programs was not fully utilized, limiting their understanding of customer preferences and engagement.

Lack of Actionable Visualization:

Without a centralized dashboard, tracking key metrics like sales, inventory levels, and customer behavior was a challenge, hampering real-time decision-making.

SOLUTION

Our experts implemented a centralized data warehousing solution integrated with Power BI to address the client's challenges. Key steps included:

Unified Data Infrastructure:

- Consolidated data from e-commerce platforms, CRM systems, inventory systems, and loyalty programs into a centralized warehouse.

Data Integration and ETL:

- Streamlined data ingestion using Azure Data Factory, ensuring real-time synchronization and consistency.

Advanced Reporting:

- Deployed automated dashboards in Power BI for quick insights into sales, inventory, and customer behavior.

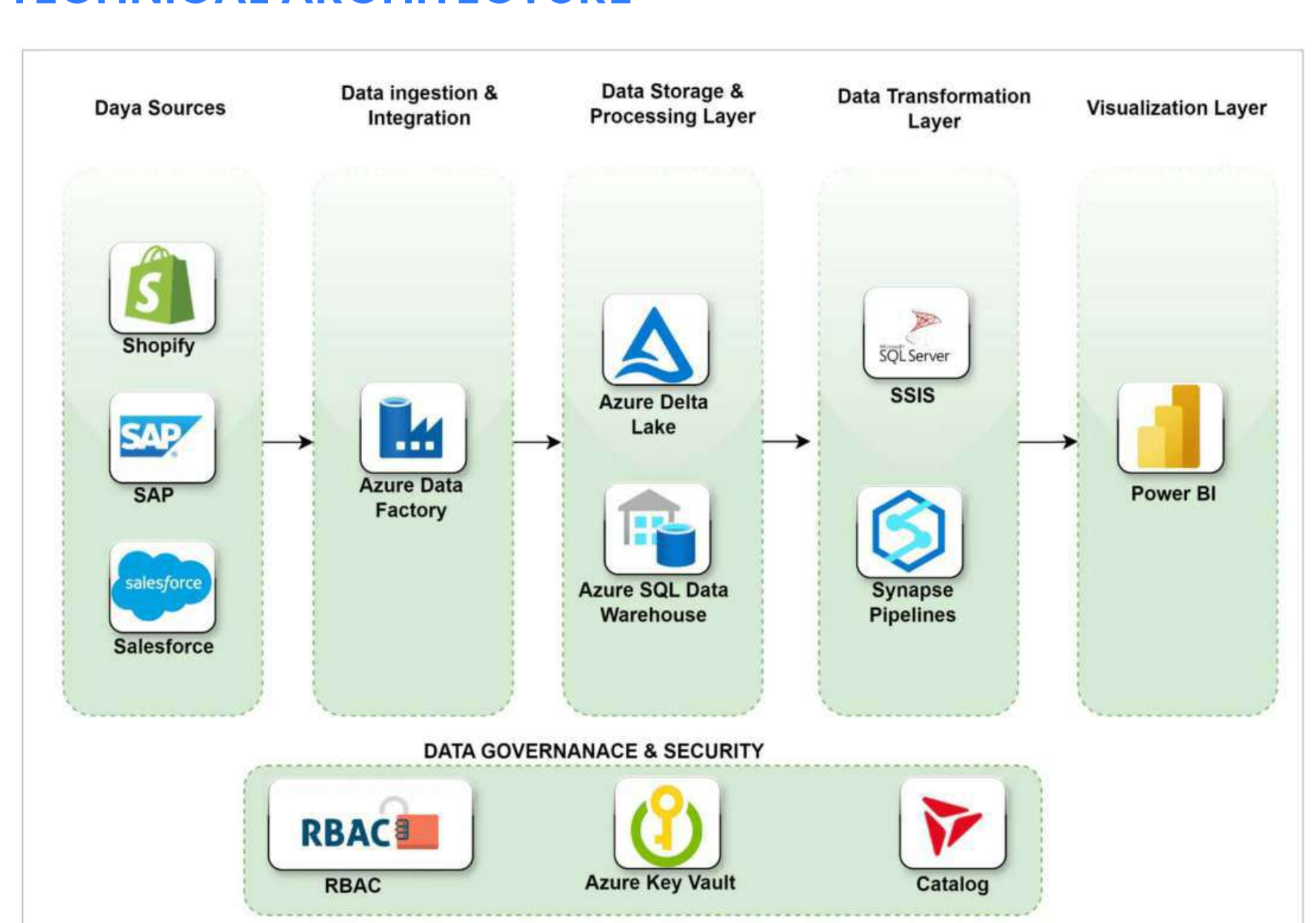
Predictive Analytics:

- Implemented demand forecasting to optimize inventory levels and reduce inefficiencies.

Secure Governance:

- Enforced data security using Azure Role-Based Access Control (RBAC) and encryption protocols.

TECHNICAL ARCHITECTURE



Azure Data Factory (ADF):

- Purpose:** Orchestrated and automated ETL (Extract, Transform, Load) processes by connecting to various data sources, transforming the data, and loading it into a centralized data warehouse.

2. Key Data Sources:

- E-Commerce (Shopify): Extracted transactional data on sales, customer interactions, and purchases.
- CRM (Salesforce, Microsoft Dynamics): Consolidated customer details, communication histories, and sales activities into a unified customer view.
- Inventory Systems (SAP, Oracle SCM): Captured real-time stock levels, purchase orders, and shipping details.
- Loyalty Programs: Integrated data from customer rewards systems to analyze behavior and lifetime value.

Data Storage and Processing Layer:

- Purpose:** Stored and processed unified data for analysis.

2. Key Components:

- Azure Data Lake Storage (ADLS): Served as the scalable platform for storing raw data in formats like JSON and CSV.
- Azure SQL Data Warehouse (Synapse Analytics): Processed and stored integrated data in a relational format, ready for analysis..

3. Features:

- Built a unified data model combining sales, customer, inventory, and loyalty data for cross-functional analysis.
- Created specific data marts (e.g., sales, inventory, loyalty) to streamline reporting.

Data Transformation Layer:

- Purpose:** Prepared data for analysis by ensuring it was clean, consistent, and actionable.

- Tools:** SSIS/Synapse Pipelines: Used to remove duplicates, normalize formats, and aggregate data

3. Key Steps:

- Data Cleansing and Normalization: Cleaned and standardized data from sources like Shopify and Salesforce.
- Data Enrichment: Combined external data (Nielsen, IRI) with internal data to provide deeper insights into market trends and customer preferences.

Data Analytics and Visualization Layer:

- Purpose:** Enabled decision-makers to derive actionable insights through dashboards.

- Tool:** Power BI was used for visualizations and reporting.

Dashboards created for the client:

- Sales Analytics: Presented trends in sales, revenue breakdowns, and product performance.
- Inventory Management: Monitored stock levels, stock-outs, and overstock conditions in real time.
- Customer Insights: Offered a 360-degree view of customer behavior and loyalty program engagement.
- Supply Chain & Market Trends: Visualized supplier performance and market insights for benchmarking.

Data Governance and Security Layer:

- Purpose:** Governed and secured the data while ensuring compliance.

2. Key Features:

- Role-Based Access Control (RBAC): Restricted access to sensitive data, allowing only authorized users to view specific information.
- Azure Data Catalog: Cataloged data assets and maintained compliance with privacy regulations like GDPR and CCPA.
- Azure Key Vault: Secured data with encryption during storage and transit.

BUSINESS IMPACT

- Improved data accessibility by 40%, providing a complete view of customer interactions and sales performance.
- Streamlined ETL processes reduced data fragmentation by 35%, integrating diverse data sources.
- Enhanced reporting speed boosted decision-making agility by 50%, enabling quicker responses to market changes.
- Predictive analytics and real-time tracking reduced stock-outs and overstocks by 30%.
- Integrated loyalty and market data improved customer insights, enhancing targeted marketing by 25%.

The centralized data warehousing solution transformed the client's data landscape, enabling real-time analytics and seamless decision-making. With improved reporting, inventory management, and customer insights, the client is now well-equipped to drive operational efficiency and strategic growth.

Industry

Retail & E-commerce

Services Used

- Azure Data Engineering
- Business Intelligence (BI)
- Data Analytics,
- Data Governance
- Data Warehousing
- Digital Transformation
- Recommendations and Insights
- ETL

Region

North America

Function/Department

- Customer Service and Support
- Procurement and Purchasing
- Sales and Business Development

Engagement Model

End to End Project Lifecycle Management