



WHITEPAPER

Revolutionizing Insurance Data Modeling Through Data Vaults

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Chapter 01: Introduction

In the insurance industry, effective data management is imperative. The growing digitization of operations and unparalleled influx of data emphasizes the crucial role of robust data modeling capabilities for insurance providers. Data modeling empowers insurance companies to extract meaningful insights from this wealth of data, allowing them to make more informed decisions, enhance risk assessment, improve customer service, and streamline their operations.

When creating data models for their data warehouse architecture, insurance providers must account for three important factors: scalability, flexibility, and auditability.

- Scalability means efficiently managing the continuous growth and diversification of data to ensure smooth performance.
- Flexibility is crucial to quickly adapt to structural changes in response to evolving market dynamics.
- Maintaining data accuracy, integrity, and compliance with regulatory standards requires auditability.

The data vault methodology has gained popularity as the preferred data modeling choice by meeting these three essential criteria: scalability, flexibility, and auditability. This approach has emerged as a great alternative to traditional data modeling methods, providing a structured and efficient solution that seamlessly aligns with the insurance industry's specific requirements.

This whitepaper discusses how data vaults help insurance companies effectively handle changing business needs and increasing data demands.

Chapter 02: Why Data vault Stands Out Among Other Data Modeling Solutions

The insurance industry encounters unique data management challenges that traditional data modeling techniques may not fully accommodate. Here are the main obstacles they face and how data vault can help overcome them:

Changing Business Requirements

Traditional Data Modeling

Insurance companies deal with a constantly evolving landscape that encompasses policy changes, regulatory updates, and shifting customer expectations. Traditional data modeling techniques, often based on fixed schemas, establish a structured blueprint for data storage. While this approach provides stability, it severely limits adaptability. Adding new data elements, such as those resulting from a policy update, requires alterations to the existing schema.

This process involves time-consuming updates, as well as potential disruptions to ongoing operations. The rigid nature of these schemas impedes swift adjustments, hindering an organization's ability to respond effectively to changing data needs.

Data vault Methodology

Data vaults tackle flexibility concerns through their schema-agnostic architecture. Unlike traditional models that rely on fixed schemas, data vaults employ a hub-and-spoke structure that separates raw data from business logic. This design allows for the straightforward addition of new data elements.

When new data requirements emerge, data vaults can accommodate them by creating new hubs, links, and satellites without the need for extensive schema modifications. This inherent flexibility enables insurance companies to swiftly adapt to evolving data sources and business needs while minimizing the disruptions associated with altering rigid schema-based models.

Rising Volume of Data

Traditional Data Modeling

Insurance companies collect vast amounts of data from policyholders, claims, underwriting, and other sources. Traditional data warehouses are frequently constructed using monolithic architectures. While they may function well with moderate data volumes, they render ineffective for larger datasets. As data accumulates, these systems struggle to maintain consistent performance levels, often leading to slowdowns or bottlenecks in data processing.

Scaling these architectures isn't cost-effective, and typically involves substantial investments in hardware upgrades or transitioning to more scalable platforms. These efforts result in increased costs and downtime.

Data vault Methodology

Data vaults excel in scalability by leveraging a distributed and parallel processing approach. Traditional data warehouses with monolithic architectures struggle to maintain performance as data volumes grow substantially. Data vaults, on the other hand, distribute the workload across multiple hubs, ensuring consistent performance even with vast data accumulation.

Scaling a data vault is relatively straightforward, typically involving the addition of processing nodes or storage resources. This scalability approach mitigates the need for extensive hardware upgrades seen in traditional systems, allowing insurers to manage data efficiently, regardless of the increasing volumes of policy data, claims, and customer interactions.

Auditability

Traditional Data Modeling

In the insurance industry, maintaining a clear and comprehensive audit trail is of utmost importance. Insurance companies handle sensitive customer data, policy changes, and financial transactions, all subject to strict regulatory oversight. Traditional data modeling and warehousing solutions may lack comprehensive built-in audit trail features, particularly when compared to specialized solutions like Data vaults. This limitation restricts them in tracking changes to data, establishing clear data lineage, and ensuring compliance with stringent regulatory requirements.

Data Vault Methodology

Data vaults are designed to tackle auditability concerns by incorporating robust built-in auditing features. These features act like a detailed log, recording essential information about any changes made to the data. This information includes who made the changes, when those changes occurred, and precisely what modifications were carried out.

This level of granularity not only enhances transparency but also ensures accountability in data management, making it an essential tool for insurance companies aiming to maintain the integrity of their data.

This ensures a clear data lineage and facilitates compliance with stringent regulatory requirements. Data vaults provide a comprehensive historical record of data transformations, making it possible to track data modifications and access over time accurately. With this audit trail, insurers can easily demonstrate compliance, maintain data integrity, and ensure transparency in their data management processes, particularly when compared to traditional solutions that often lack these advanced audit capabilities.

Chapter 03: Key Benefits of Data Vaults for Insurance Companies

Insurance providers deal with various data types, which vary depending on the specific insurance line and the intended purpose of data usage, such as sharing customer data, preventing fraud, or brokering deals. Data vaults offer a range of key advantages, including:



Policy Management

Data vaults assist insurance companies in storing and tracking policy-related information, including details concerning policyholders, coverages, premiums, renewals, and cancellations. They achieve this by using hubs to manage policy IDs, links to establish associations, and satellites to store detailed policy data. Data vaults promote integration, enhancing the accuracy and consistency of policy data across various systems.

As a result, this positively impacts departments like customer service, marketing, and risk analysis. They also facilitate handling different policy types and coverages by offering flexible data modeling and loading, allowing for diverse and customized policy offerings. Moreover, data vaults support monitoring and evaluation of policy performance through historical analysis and auditing, enabling optimization of pricing, profitability, and retention.



Claims Processing

In claims processing, data vaults have a crucial role. They use hubs to manage claim IDs, links to create connections between claims, and satellites to store detailed claim information. This setup allows for the easy sharing and retrieval of claim data with authorized individuals such as adjusters, investigators, and lawyers.

Data vaults also aid in identifying and mitigating potential risks or frauds through data analytics and predictive models. They support the integration and analysis of various data sources, such as natural hazard data and location data, enabling cost reduction and improved efficiency.

Data vaults enhance customer satisfaction and retention in claims processing by segmenting and targeting customers based on preferences and behavior. Additionally, personalized offers and messages are created and delivered to customers based on their interests and feedback, fostering customer loyalty and advocacy.



Underwriting

Data vaults assist insurance companies in storing and tracking policy-related information, including details concerning policyholders, coverages, premiums, renewals, and cancellations. They achieve this by using hubs to manage policy IDs, links to establish associations, and satellites to store detailed policy data. Data vaults promote integration, enhancing the accuracy and consistency of policy data across various systems.

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Compliance

Data vaults are instrumental in ensuring compliance with regulations and standards. They enforce business rules and validations at the source level, reducing errors and inconsistencies that could lead to non-compliance. Additionally, Data vaults store data in an unaltered form, preserving its evidentiary value and integrity. They facilitate auditing and reporting by keeping track of all data changes over time, ensuring transparency and accountability.



Secure Insure

Chapter 04: A Case Study



Introduction

SecureInsure, a prominent insurance company with a substantial market presence, operates across 15 countries, serving over 10 million policyholders. The company manages a vast volume of data, with its data ecosystem expanding at a rate of approximately 25% annually. SecureInsure's extensive operations cover a diverse range of insurance products, including life, health, property, and casualty insurance, with an annual premium revenue exceeding \$5 billion. In the face of these significant operational dimensions, SecureInsure had three pivotal data management objectives.

- The company needed a scalable solution to efficiently manage the exponential growth of data, which had been accumulating at a rate of over 10 petabytes per year.
- In its wide-reaching operations, spanning multiple insurance sectors, SecureInsure had recognized the necessity for adaptability to meet the varied demands of each region.
- With a vast network and numerous regulatory frameworks to navigate, the company had been committed to elevating auditability within its data management, aiming to meet the stringent requirements of multiple regulatory bodies across its extensive operational footprint.

To achieve these objectives, SecureInsure implemented Data vaults, which proved invaluable in efficiently accommodating the surging data volumes. With an annual growth rate of 25%, the scalability of Data vaults had been crucial in maintaining effective data management processes. Moreover, the adaptability offered by Data vaults had allowed SecureInsure to tailor its data models to meet the diverse needs of the countries it served, spanning different insurance markets and regulatory environments. Furthermore, Data vaults, with their robust audit trail capabilities, provided a detailed record of data modifications and access history, facilitating compliance with the varying regulatory frameworks across its extensive operational reach and fostering a culture of transparency and data integrity within an organization of this magnitude.

Implementation of Data Vaults

Adapting to Change

Data vaults were pivotal for SecureInsure. These data vaults introduced an agile and structured framework for data Modeling, and enabled SecureInsure to swiftly adapt to changes in the insurance landscape. Data vaults operate by segmenting data into three vital layers: the raw data vault, the business data vault, and the business intelligence layer.

The raw data vault functions as a staging area for all incoming data, regardless of its source or format. This layer maintains data in its raw, unaltered state, rendering it highly adaptable to changes in data sources or structures.

The business data vault acts as an intermediary layer, structuring and integrating raw data through a standardized approach. This flexibility is invaluable, and it allowed SecureInsure to modify data structures rapidly to meet evolving business needs or regulatory requirements.

Lastly, the business intelligence layer transforms data into insights through reporting and analytics, which enabled SecureInsure to make informed decisions with agility.

Growing Volumes of Data

When considering scalability, SecureInsure could effortlessly incorporate new data sources into the business data vault to address the organization's expanding data requirements.

Data vaults excel in scalability due to their architecture, particularly the raw data vault. This layer efficiently captured and preserved raw data, preventing bottlenecks, and ensuring data availability, even as the organization's customer base and transaction volumes increased.

Furthermore, the business data vault within the data vault framework played a pivotal role as SecureInsure's data requirements grew. It offered a structured and scalable foundation for integrating new data sources seamlessly.

Audit Log

The insurance industry places a significant emphasis on auditability to meet regulatory requirements and maintain data integrity, and data vaults are instrumental in achieving this objective.

The organized methodology for data modeling employed by data vaults is key to ensuring auditability. The raw data vault captures and preserves data in its original form, serving as a vital component for auditability. This pristine copy of data from various sources allowed SecureInsure to trace it back to its source, ensuring transparency and data fidelity.

The business data vault layer within the data vault architecture further enhances auditability by structuring and integrating data in a standardized manner. This approach ensures consistency in data transformations and calculations, reducing the risk of errors that could compromise audit trails.

Data vaults excel in maintaining historical records by preserving raw data and guaranteeing data integrity. The business data vault then organizes and standardizes the data, ensuring compliance with regulatory requirements in the insurance industry.

Moreover, data vaults facilitate efficient data lineage tracking, that allowed SecureInsure to monitor data movement and transformations within the system. This lineage information is invaluable for audit and compliance purposes, ensuring that the data's journey can be reconstructed and validated as needed, aligning seamlessly with the stringent regulatory requirements in the insurance sector.

The Result

SecureInsure faced pressing concerns in the rapidly evolving insurance sector.

Implementing data vaults helped SecureInsure achieve their data objectives. They provided flexibility by separating data into Raw, Business, and Intelligence layers, allowing swift adaptation. Scalability improved as data vaults efficiently handled growing data volumes. Auditability thrived with structured data modeling, maintaining data integrity, transparency, and lineage tracking. SecureInsure's journey showcases how innovative solutions can transform insurance operations.

Chapter 05: How Would Astera's Data Vault Component Do It?

In the insurance industry, managing vast amounts of data is essential but traditional data warehousing techniques can be time-consuming and error prone. This diverts valuable resources from critical tasks. Astera DW Builder is a comprehensive, code-free platform that integrates, stores, and manages data, enabling businesses to seamlessly extract, transform, and load data from diverse sources into a centralized repository. With its intuitive interface and advanced data modeling features, Astera Data Warehouse Builder simplifies the complex process of data warehousing, making it accessible to both technical and non-technical users.

A key component of Astera DW Builder is the data vault. Using this functionality, you can automate the creation and design of the data vault architecture for data warehouses with just a few clicks. This feature enhances scalability, flexibility, and performance, making it an effective solution for businesses across various industries, notably insurance, to manage and analyze their data more efficiently.

Raw vaults and Business vaults

Within the insurance industry, we often need to preserve the integrity of our data for analytical purposes, such as actuarial analysis or risk assessment. Astera DW Builder's data vault component caters to this requirement by supporting both raw vaults and business vaults. Raw vaults store the unaltered data in its pure form, while business vaults are designed to efficiently organize and deliver processed, business-ready information.

This clear division allows users to maintain data integrity for analytical insights while also ensuring that they have readily accessible data for making informed business decisions.

Ease of Use and Design

Insurance professionals often come from various backgrounds and skill levels. Astera's intuitive drag-and-drop interface ensures that even those with limited technical expertise can efficiently harness the power of data vault modeling. Hubs, Links, and Satellites are the building blocks of this modeling approach.

Hubs represent core insurance concepts, such as policies or insured individuals. Links serve as the connections between these concepts, revealing relationships like policyholders and their associated policies.

Satellites provide additional context, allowing employees to attach details such as contact information for policyholders. In the case of business vaults, the tool simplifies the creation of bridge and PIT tables, ensuring our data remains well-structured and readily available for decision-making.

Loading, Scheduling, and Automation

Insurance companies deal with constantly evolving data, whether it's policy updates, claims processing, or regulatory changes. Astera DWB Builder's data vault component allows us to effortlessly load data, configure pipelines, and schedule tasks. This automation ensures that the data remains agile and responsive to the ever-changing insurance landscape.

The tool also offers history-tracking and an audit trail, which is crucial for maintaining a comprehensive historical record of changes to our data over time. This transparency and compliance functionality are vital for an industry where regulatory requirements are stringent, and the ability to trace data changes is essential.

Chapter 06: Where Are Data Vaults Headed?

The trajectory of data vaults points toward an exciting future characterized by advanced capabilities and broader applications across industries, including the insurance industry.

Integration of AI and ML

Data vaults are evolving to incorporate AI and ML algorithms for data analysis. Instead of just storing and managing data, they will actively process and interpret it. Machine learning models can be integrated into data vaults to provide predictive analytics and automated decision-making.

In insurance data vaults, AI and ML algorithms can dynamically process policyholder data, performing real-time risk modeling and predictive analytics. This will lead to automated underwriting, fraud detection, and personalized policy pricing, optimizing risk management strategies.

Real-time Data Processing

Data vaults are gearing up for real-time data processing. This involves handling streaming data, where data is ingested, processed, and analyzed as it arrives. This capability is particularly critical in sectors like online retail, where immediate responses to customer behavior can impact sales.

Data vaults, for insurance sectors, can enable low-latency data processing, using frameworks like Apache Kafka. This will allow insurers to monitor and react to policyholder behavior, claims, and external data in real time, improving responsiveness and reducing risk exposure.

Blockchain Integration

The use of blockchain technology within data vaults is emerging as a significant trend. Blockchain provides a secure and tamper-proof way to store and verify data transactions. Data vaults can leverage blockchain to ensure data integrity, especially in sectors where trust and transparency are paramount, such as healthcare.

In the insurance sector, data vaults can integrate blockchain technology to create an immutable ledger of policies and claims, enhancing transparency and trust. Smart contracts within the blockchain will be able to automate claims processing, ensuring secure and tamper-proof transaction records, which is critical for claims verification and fraud prevention.

Multi-Cloud and Hybrid Deployment

Data vaults are becoming more versatile to cater to organizations' diverse cloud strategies. They are designed to seamlessly operate across multiple cloud platforms (like AWS, Azure, and Google Cloud) and on-premises environments.

Insurance data vaults can utilize containerization technologies such as Kubernetes and Docker to ensure consistent deployment across diverse cloud platforms, like AWS, Azure, and Google Cloud. This flexibility will allow insurers to manage data securely while adhering to different data residency and compliance requirements.

Cross-Industry Adoption

Insurance companies can also employ data vaults to harness IoT sensor data for risk assessment and policy customization. For instance, in auto insurance, telematics data from vehicles can inform premium calculations, leading to data-driven, personalized pricing strategies.

Data Privacy and Compliance

Data vaults in insurance have the ability to enforce granular access controls, data encryption, and comprehensive auditing features to meet stringent data privacy regulations, such as GDPR and HIPAA.

This is bound to safeguard sensitive policyholder information, mitigating regulatory risks and ensuring customer trust.

Chapter 07: Conclusion

The adoption of data vaults in the insurance industry represents a significant leap forward in data modeling. By embracing data vaults, companies can efficiently handle the ever-increasing volume of data, swiftly adapt to the changing landscape of the industry, and uphold the highest standards of data integrity and transparency to meet rigorous regulatory requirements.

The importance of this argument cannot be overstated. In an era where data is central to decision-making, the ability to effectively model, manage, and utilize data is a competitive advantage. It ensures that insurance firms remain agile, responsive, and compliant while harnessing the potential of data-driven insights.

As the world moves into an era where data takes on a more prominent role in the insurance sector and beyond, it is crucial for organizations to recognize the significance of data vaults. This recognition is fundamental for companies looking to thrive in a data-intensive environment.



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