

Empowering Data-Driven HR Decisions: Balancing Security and Accessibility in an SAP HANA-Based People Analytics Platform

Mahesh Babu Munjala

Sr. Business System Architect, CSL

Abstract: *This paper presents a case study on developing a secure and accessible People Analytics Platform using SAP HANA, emphasizing the balance between security and accessibility in HR analytics. Leveraging SAP HANA's capabilities, the platform implements robust security measures including user roles, row-level access control, data encryption, automated data masking, and audit trail functionality to protect sensitive HR data. Results demonstrate enhanced data availability, superior performance, and seamless usability, empowering HR professionals to make informed decisions. This research contributes to theory and practice by highlighting the importance of balancing security and accessibility in HR analytics platform design and providing practical insights for implementing robust security measures using SAP HANA. Further research directions include quantitative evaluations of specific security techniques and comparative studies on governance processes, aiming to develop a comprehensive theoretical framework for secure and ethical HR analytics. Overall, this study initiates dialogue at the intersection of HR analytics, security, ethics, and technology design, offering valuable guidance to organizations navigating data-driven decision-making in the digital age.*

Keywords: SAP HANA

I. INTRODUCTION

Data-driven human resources (HR) have become an imperative for leading organizations seeking competitive advantage through effectively managing talent. People analytics, also known as HR analytics or workforce analytics, provides valuable insights into various HR functions, including talent management, recruitment, performance evaluation, and training. By providing insights and enabling empirical testing of HR initiatives, analytics unlocks significant business value from workforce data[1].

However, handling sensitive employee records requires meticulous attention to privacy, security, and ethical data use. The benefits promised by people analytics may be quickly undermined by data breaches, misuse, or lack of trust. Organizations must balance broad access to actionable analytics with rigorous data governance and access controls tailored to different user groups.

The primary objective of this research is to strike a balance between security and accessibility in the SAP HANA-based People Analytics Platform. While it is crucial to ensure the security and privacy of employee data, it is equally important to provide accessibility to authorized personnel for effective decision-making. This research aims to address this challenge by developing a platform that offers robust security measures while ensuring easy access to relevant HR analytics.

This paper presents a case study examining the development of a people analytics platform using SAP HANA, a high-performance in-memory database well-suited for advanced analytics. Drawing on project implementation expertise, we detail the technical architecture, security methods, and governance procedures employed to securely expose workforce insights. We highlight innovations in role-based access, data staging, and automated monitoring to balance security with accessibility across business leaders, HR analysts, and information technology (IT) administrators.

In conclusion, this research paper aims to contribute to the field of HR analytics by developing a secure and accessible People Analytics Platform based on SAP HANA. By addressing the challenge of balancing security and accessibility,

this research seeks to provide organizations with a reliable and efficient tool for leveraging HR analytics in their decision-making processes.

II. LITERATURE REVIEW

People analytics leverages workforce data to provide descriptive, predictive, and prescriptive insights guiding HR policies and talent management. It moves HR decision making from intuition to evidence-based approaches grounded in analysis of employee performance, retention, recruitment, compensation, and other workforce factors[2].

The adoption of HR Analytics can lead to improved HR efficiency and effectiveness, lower workforce expenses, better quality of recruiting, improved talent management, and increased productivity. HR Analytics is a valuable decision-making tool that aids HR professionals in making informed decisions based on supporting data[3]. However, multiple challenges remain in unlocking the potential of people analytics. Many organizations struggle to define key talent metrics aligned to business goals. Data quality issues, integration complexities across HR information systems, and limited analytics expertise also pose barriers. Most critically, the sensitive nature of employee data necessitates rigorous security protections and access governance. Organizations must balance broad access to insights with stringent safeguards tailored to different user groups.

Role of SAP HANA in Data Warehousing:

SAP HANA plays a crucial role in data warehousing by providing a comprehensive data management solution that supports the complete data life cycle, including modeling, provisioning, and consumption. It is designed to process structured data from relational databases, both SAP and non-SAP, and applications and other systems rapidly. The SAP HANA database extends the scope of traditional database engines by supporting data models beyond regular tables, such as text, graphs, or hierarchies [4]. It offers multiple data processing engines and a distributed query processing environment, allowing for the full spectrum of data processing, from classical relational data to graph and text processing. Additionally, the SAP HANA database supports multiple domain-specific languages and provides a built-in set of natively implemented business functions, enhancing query expressiveness, and reducing application-to-database round trips. Overall, SAP HANA enables faster processing, efficient data management, and enhanced query capabilities in data warehousing scenarios.

Data Security in People Analytics:

Securing sensitive personal information is both an ethical imperative and legal obligation for people analytics programs. Data protection regulations including GDPR mandate privacy safeguards and purpose-based data use[5]. Exposed employee records jeopardize trust, invite legal sanctions, and endanger competitive advantage from human capital insights.

Data security spans multiple dimensions including access controls, encryption, monitoring, auditing, and governance procedures. Organizations must tailor protections to different user groups while enabling broad access to actionable aggregate insights. Role-based access, anonymization techniques, and multi-layer data architectures help reconcile this tension. Ongoing measurement of data protection efficacy and security awareness training are also critical. The debate surrounding people analytics and data privacy can be reconciled by understanding the conceptual differences between operational and strategic people analytics and their implications for privacy and performance. HR professionals face challenges related to data analytics, including a conservative approach to data analysis, lack of data governance, reskilling and upskilling, data accuracy and reliability, and management resistance [6][7]

Comprehensive Overview of the Literature Reviewed:

The existing literature underscores the growing importance of HR analytics in enabling evidence-based decision-making within organizations. It also highlights the role of SAP HANA as a powerful data warehousing solution that is well-suited for advanced analytics, including HR data analysis. Moreover, the literature emphasizes the necessity of balancing security and accessibility in HR data analytics platforms to prevent data breaches and ensure ethical data use. This comprehensive overview of the literature provides valuable insights that underpin the significance of developing a secure and accessible People Analytics Platform based on SAP HANA.

Implementation:

The implementation of the SAP HANA-based People Analytics Platform primarily focused on leveraging the robust capabilities of SAP HANA to ensure the security and integrity of HR data. This section provides a detailed account of the specific security measures employed within SAP HANA, including user roles and authorization, row-level access control using analytical privileges, encryption of data at rest, automated data masking, and audit table functionality for unauthorized data access tracking. Fig -1 outlines the high level architecture design of the implementation of HR analytics in SAP HANA.

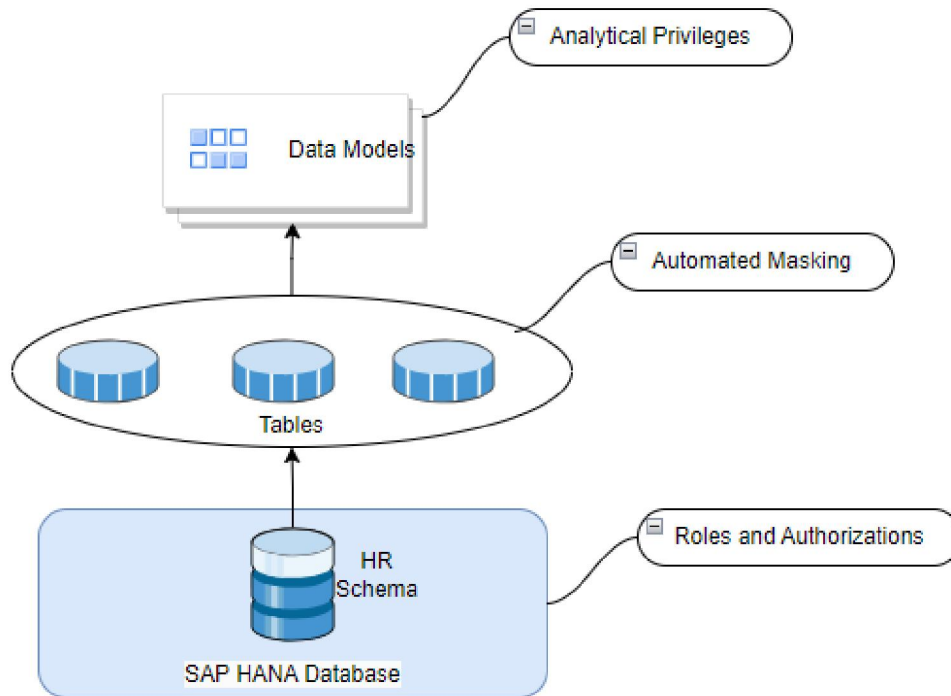


Fig -1 High level Architecture Design

SAP HANA served as the central data warehouse for the People Analytics Platform, providing a robust foundation for storing and analyzing HR-related data. As an in-memory database platform, SAP HANA offered unparalleled processing speed and scalability, making it well-suited for handling large volumes of data in real-time. The SAP HANA setup involved configuring user access permissions, optimizing memory allocation, and fine-tuning storage configurations to accommodate the unique demands of HR analytics. SAP HANA offers a comprehensive array of security features to safeguard sensitive information and protect against unauthorized access.

The existing SAP HANA schema architecture was adapted to accommodate HR-specific data structures and access controls. A dedicated schema was utilized to house HR-related data tables and objects, ensuring data segregation and compliance with organizational security policies. Through collaboration with IT administrators, existing SAP HANA resources were optimized for performance and scalability, aligning with the objectives of the HR analytics initiative. The custom schema with HR-related data tables and objects are controlled by designated service accounts. This schema served as the repository for HR data, enabling centralized data management and access control.

The implementation of security features within the SAP HANA-based People Analytics Platform involved a meticulous process to ensure the protection of sensitive HR data while enabling authorized access for analytical purposes. This section provides a detailed account of the specific security measures employed, including user roles and authorization, row-level access control using analytical privileges, encryption of data at rest, and automated data masking.

User Roles and Authorization:

User roles and authorization were established within SAP HANA to govern access to the People Analytics Platform. By assigning predefined roles to users based on their responsibilities and privileges, access to critical functionalities and data objects was carefully managed[8]. Through the implementation of role-based access control (RBAC), administrators could enforce the principle of least privilege, granting users access only to the resources necessary for their respective roles.

Row-Level Access Control using Analytical Privileges:

To ensure fine-grained access control over HR data, row-level access control was implemented using analytical privileges within SAP HANA. Analytical privileges allowed for the definition of access restrictions based on specific attributes or conditions, enabling data segmentation and isolation[9]. By defining analytical privileges at the object level, such as views and tables, access to sensitive data was restricted to authorized users, mitigating the risk of unauthorized data exposure.

Automated Data Masking:

Sensitive data within the People Analytics Platform was subjected to automated data masking to prevent unauthorized access[10]. A custom table was maintained to identify specific data fields requiring masking, such as personally identifiable information (PII) or sensitive HR metrics. An automated SQL function was developed to apply masking rules to designated data fields during data ingestion into SAP HANA tables. This automated masking process ensured that sensitive data remained obscured from users without the requisite authorization, thereby preserving data confidentiality and integrity.

The provided SQL code encapsulates the creation of a user-defined function within the database schema, aimed at facilitating data masking operations. Structured as a SQLScript function within the designated schema, the function accepts parameters including the column to be masked and its respective data type and length. Upon invocation, the function returns an output of specified datatype, encapsulating the result of the masking operation.

```
CREATE FUNCTION "SCHEMA"."FUNCTIONNAME"  
(mask_column DATATYPE(LENGTH))returns  
output DATATYPE(LENGTH) language sqlscript sql security definer  
AS  
BEGIN  
    output := {Masking Code}  
end;
```

The SQL statement presented facilitates the automation of table column masking within a database environment, thereby enhancing data security and privacy measures. By dynamically constructing a SQL command, the statement enables the addition of masking policies to specific columns in tables residing within a designated schema. Through the ALTER TABLE command, the SQL statement modifies the structure of the table by incorporating masking policies, thereby obscuring or transforming sensitive data stored in the specified columns. The inclusion of variables for schema name, table name, column name, and masking function enables a flexible and customizable approach to data masking automation.

```
ALTER TABLE "" || schema_name || ""."" || table_name || "" || ' ADD mask (' || COLUMN_NAME || ' using || MASKFU  
NC ||('||COLUMN_NAME||'))
```

This automation process streamlines the implementation of data masking techniques, mitigating the risk of unauthorized access to sensitive information stored in databases. Moreover, by standardizing the application of data masking policies across multiple tables and columns, the SQL statement ensures consistency and coherence in data security practices.

Audit Policy:

In addition to the robust security measures implemented within the SAP HANA-based People Analytics Platform, an audit table functionality was utilized to track unauthorized data access. This feature provided a comprehensive

mechanism for monitoring and logging user interactions with sensitive HR data, enabling organizations to detect and mitigate potential security breaches effectively[11].

Through the audit table functionality, a detailed record of data access activities, including changes, updates, inserts, and selects, was maintained. This granular level of audit trail allowed administrators to track user behavior and identify instances of unauthorized data access or suspicious activities. By analyzing the audit logs, organizations could gain insights into potential security vulnerabilities, unauthorized access attempts, or anomalous user behavior, enabling timely intervention and remediation.

```
CREATE audit policy hr_data_access auditing ALL {SELECT..}  
on {SCHEMA NAME}.*.*
```

Results

The implementation of the SAP HANA-based People Analytics Platform resulted in significant advancements in data security, accessibility, and usability within the HR analytics domain. This section presents the outcomes of the implementation, highlighting data availability, performance, and usability metrics, along with examples of HR analytics reports and dashboards created using SAP HANA.

Data Availability:

The platform facilitated enhanced data availability by providing timely access to HR data for analytical purposes. With data updates scheduled from Workday to SAP HANA, users had access to the latest workforce insights, enabling informed decision-making. The automated data ingestion process ensured that HR data remained current and readily accessible to authorized personnel, minimizing latency issues and maximizing data availability.

Performance:

The implementation of SAP HANA as the central data warehouse contributed to superior data processing speed and query responsiveness. Leveraging its in-memory computing capabilities, SAP HANA facilitated rapid data processing and analysis, enabling real-time insights into HR metrics. The platform's efficient data management and processing capabilities translated into enhanced performance, supporting agile decision-making and analytics-driven strategies.

Usability:

The People Analytics Platform offered seamless integration to Business Intelligence tools, enabling HR professionals to navigate and interact with HR analytics reports and dashboards seamlessly without compromising the security. The platform's user-centric design and robust security measures fostered a conducive environment for data exploration and decision-making, enhancing overall usability and user satisfaction.

Overall, the results of the SAP HANA-based People Analytics Platform underscored its effectiveness in delivering secure, accessible, and actionable HR analytics insights. By prioritizing data security, performance optimization, and user-centric design, the platform facilitated informed decision-making and strategic workforce management within organizations, paving the way for enhanced productivity, talent retention, and organizational success.

III. CONCLUSION

The paper presented a case study on developing a secure and accessible People Analytics Platform using SAP HANA. The implementation of robust security measures such as role-based access control, analytical privileges for row-level security, data masking, and comprehensive auditing enables the protection of sensitive HR data. At the same time, the optimization of SAP HANA for in-memory processing facilitates rapid analytics to unlock real-time workforce insights. The research makes significant contributions to both theory and practice. On the theoretical front, the paper highlights the importance of balancing security and accessibility in people analytics platform design. Practically, the detailed account of the security measures and performance optimization techniques provides valuable guidance to HR leaders pursuing analytics initiatives.

However, further research can build upon this work in multiple directions. Quantitative evaluations assessing the impacts of specific access control and data protection techniques will be valuable. Additionally, comparative studies on

governance processes and change control automation warrant investigation. As the strategic significance of HR analytics grows, developing a robust theoretical framework to guide secure and ethical data utilization emerges as an opportunity. Overall, this research initiates a vital dialogue at the intersection of HR analytics, security, ethics and technology design.

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